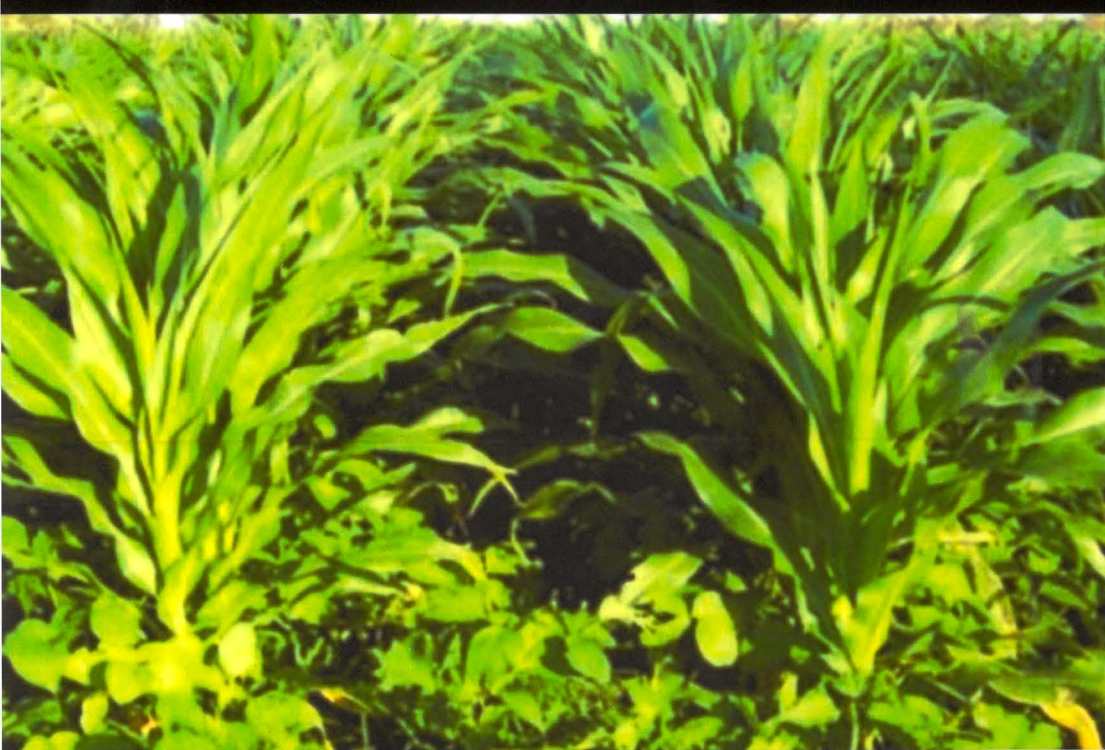
Quantum Agriculture

Biodynamics and Beyond

Hugh Lovel



Quantum Agriculture

Biodynamics and Beyond

Growing Plentiful, Vital Food

by Hugh Lovel

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Foreword

In the late 60s I was invited to Spring Valley, New York where I was introduced to biodynamic gardening and was given a copy of Ehrenfried Pfeiffer's *Introduction to Biodynamics.* Reading it changed my entire view of plants and our relationship in the matrix of life. In the 1970s two friends of mine, Peter Tompkins and Christopher Bird, wrote first an article in *Harpers* and then the enormous best seller *The Secret Life of Plants*. In the 80s I had the good fortune to get to know Alan Chadwick, and to spend three weeks with him, the two of us talking and walking in the woods almost every day, and to witness the last class he ever taught. I make this list so it will be clear that when I say that Hugh Lovel is at that same level, I have some experience by which to make that calibration.

Lovel is a master gardener who understands that we live not on the earth but in it, with miles of life above and below us in an interdependent and interconnected matrix of life. I met him just as he was beginning his life in biodynamic agriculture, and know the passion he brought to a subject that is part metaphysics and part science. You will experience it in this book. It is a path that must be both mastered intellectually and experienced personally to be comprehended.

The thing about a properly functioning biodynamic system, whether it is a private garden or a commercial activity, is that even if you don't understand the world view, you cannot argue with the best fresh ear of corn you have ever eaten, or a tomato so good you just have to go, "Oh my." The proof is in the pudding, as the cliché has it. My wife is a biodynamic gardener. Her garden produces enough produce, fruit, and berries for us to eat all year, and share generously. I had been eating organic, but not biodynamic, food for 40 years. When Ronlyn and I married and this garden was created, about 18 months after we began eating her biodynamic produce, I began to realize I felt different. The food I was eating was more alive. It had more vitality, and so did I.

I cannot say that I understand the radionics part. I have followed this field for many years, going back to Wilhelm Reich's research as well as something known as the Abrams instrument. But I could not tell you whether it was a ritual for expressing nonlocal intention, rather like healing, or whether the apparatus objectively manipulated something. It is an important distinction. One thing we know It cannot be electromagnetic. The argument that, like homeopathy, it transfers information beyond the molecular cannot be refuted. It certainly seems to be the case in homeopathy. But what I can say is that using the system

produces higher quality agricultural outcomes. Farmers are compelled to be pragmatic. They use what works, and some of them are adopting radionics. It is my hope that properly designed double blind studies will be done. There is at least one replication underway, as I write this, validating Cleve Backster's plant consciousness research, and very mainstream work now supports the biodynamic system conception of an area having its own ecosystem, as one coordinated living being. Science is moving towards the matrix of life model.

Lovel's book will be very helpful for those interested in producing the highest possible quality food. Food more nutritious than most people have ever previously eaten. He very meticulously provides the guidance that will allow a person to create a biodynamic system, and he explains it in a way that applies at any scale. It is a compassionate life-affirming path to food production whose explicit purpose is wellness at every level, from the individual, to the family, the community, the nation, and the vast living system that is the Earth herself. Lovel offers readers two gifts: first, detailed instructions in how to create and work with a biodynamic system; and, second, a different way of looking at the world. Once you read ***Quantum Agriculture***, the next step is yours.

Stephan A. Schwartz
Whidbey Island, Washington

Stephan A. Schwartz is a Distinguished Consulting Faculty member of Saybrook University, and a Research Associate of the Cognitive Sciences Laboratory of the Laboratories for Fundamental Research. He is a columnist for the journal ***Explore,*** *and editor of the daily web publication* ***Schwartzreport.net*** *in which he covers trends affecting the future. He also writes regularly for* ***The Huffington Post****. Government appointments include: Special Assistant for Research and Analysis to the Chief of Naval Operations, consultant to the Oceanographer of the Navy. He has also been an editorial staff member of* ***National Geographic****, Associate Editor of* ***Sea Power****. And staff reporter and feature writer for* ***The Daily Press*** *and* ***The Times Herald****. For 40 years he has been studying the nature of consciousness. He is the author of more than 100 technical reports and papers, and has written numerous magazine articles for Smithsonian, OMNI, American History, American Heritage, The Washington Post, The New York Times, as well as other magazines and newspapers. He has produced and written a number television documentaries, and has written four books:* ***The Secret Vaults of Time, The Alexandria Project, Mind Rover*** *and his latest,* ***Opening to the Infinite.***

Acknowledgements

Foremost acknowledgment goes to my wife, Shabari, and her late husband Christopher Bird, co-author of *Secret Life of Plants* and *Secrets of the Soil*. Shabari introduced me to biodynamics in 1976. Portions of the format of this book were inspired by the *2006 BAA Resource Manual* which grew out of the work of Peter Proctor and Hamish Mackay. I also was inspired by Alex Podolinsky, who twice responded to questions I mailed to him in my early days as a biodynamic farmer in Georgia. Others whose encouragement I am indebted to include Glen Atkinson, Allan Balliett, Jeff Poppen, Dennis Klocek, Fred and Kathy Walters, Joel Salatin, Elaine Ingham, Jerry Brunetti, Gary Zimmer, Sally Fallon Morell, Graeme Sait, Steve Martin, Lindsay Bock, Terry McCosker, Steve Diver, Andre Leu, Mark Moodie, Daron Joffee, Skip Miller, Dr. Joaquin Chong, Alessandra Previdi, Johnathan Grieve, Mike Fluitt, Mark Tally and Gary Freeborg.

Those who have mentored me have my special regards, including Peter Escher, Harvey Lisle, Hugh Courtney, and most recently, John Priestley. In science, Dr. Burt Kneisel, deserves mention as my first chemistry professor who always had multiple answers to every question, and from whom I learned science as a living debate rather than a right or wrong protocol. I owe Vladimir Vanha and Tom Carmichael for teaching me how to write. Charles Walters was my first publisher. I am also indebted to my Australian Quantum family of friends and colleagues Kym Green, Geoff Bassett, Roger Carthew, John and Dorothy Priestley, Shane and Shan Joyce, Heinz and Angela Gugger and Neil and Kym Sullivan. Many others too numerous to list have helped me along the way, including my parents, siblings and early teachers who nurtured and inspired me and remind me how fundamental and desirable change is.

This book is dedicated to Shabari Bird Lovel,
whose participation in my life has brought
both mystery and wonder.

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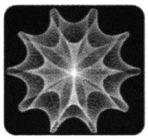
Getting Started

- Be observant and study nature with an eye to life processes. Biodynamics means life processes. Forget dogma. Live life.
- Think of your farm or property as a biological entity, alive within its boundaries.
- Stir and spray your boundaries, roads, paths, fences, gardens, cultivated fields and accessible land with **all the biodynamic preparations** to impart the preparation patterns to this biological entity. Try to do this at least twice a year.
- Take comprehensive (Albrecht plus Totals) soil tests of different soil types on accessible land and work out a plan for addressing your limiting deficiencies.
- Learn to make quality compost using the biodynamic compost preparations.
- Learn to maximize diversity, maximize biomass production, maximize digestive activity and build stable humus.
- Learn to manage obnoxious weeds and pests without poisons. Find out what each weed indicates. Pepper them only if necessary.
- When you have done and are doing the above, the following book may be helpful.
- First and last, no matter what your faith, pray.



Introduction to
Biodynamics

Biodynamic Agriculture is a comprehensive method of self-sufficient agriculture that produces exceedingly nutritious food. It grew out of Rudolf Steiner's agriculture lectures which were given in response to the chemical methods introduced in the mid nineteenth century by Justus van Liebig. Steiner's understanding of how individual agricultural operations lived and grew—and the roles of sulphur, carbon, nitrogen, hydrogen and oxygen between lime and silica—was both scientific and practical. He identified the processes essential to life and introduced natural remedies to activate these processes so farms and gardens could supply most of what they need from their surroundings.

There are many seeming contradictions in Steiner's Agriculture course. To truly understand what Steiner was talking about probably requires study of his medical lectures.

Biodynamic agriculture—the oldest of organic methods—is a science based, holistic, regenerative agriculture that works with life processes to achieve self-sufficient, quality production of delicious high-vitality goods. It grew out of the insights of Rudolf Steiner, whose agriculture lectures at the estate of Count and Countess von Keyserlingk near Koberwitz, Poland in 1924, addressed the shortcomings of chemical agriculture in a truly comprehensive way.

In his twenties Steiner's scientific training was in maths, chemistry and biology at the technical institute of Vienna. He later earned his Doctorate in Philosophy with his treatise, *The Philosophy of Freedom*, which advanced the proposition—now accepted as proven in Quantum Physics—that observer and phenomenon are inseparably linked. Clearly the choice of what we look for is a factor in determining phenomena. Indeed, what we look for depends on our concepts, without which we have no grasp of what our senses encounter.

Hired by a publishing house to edit the scientific writings of German literary giant, J. W. von Goethe, Steiner was inspired by Goethe's explanations of the processes behind physical, measurable occurrences. Each measurement is fixed at a time and place, but over time living things keep changing. Without continuous measurements of these changes no *processes* emerge. Goethe noted that the butterfly in a museum was only a corpse, and the processes that animated it were missing. Yet, elusive though they might be, these processes contribute enormously to the essence of reality, particularly with living things.

Steiner, who was clairvoyant, investigated folk lore, herbal medicine, Eastern religions, native cultures, homeopathic medicine and many other disciplines to acquire the concepts and vocabulary to make sense out of his impressions of nature. Particularly in the last years of his life, his medical and agricultural lectures conveyed an all-encompassing approach to understanding the maths, physics and chemistry of how living organisms function and how their problems can be dealt with. Most of his agriculture course focused on life processes. Ever practical, his remedies for agriculture took into account the environment in the broadest possible sense—the rhythmic motions of the sun, moon and planets relative to the earth in the context of the universe. His agriculture lectures convey a profound grasp of how processes within living organisms relate to our surroundings.

One of the keys is viewing each property as a self-contained organism, something alive, whether a large farm or a small garden. Biodynamics also clarifies our relationships with cosmological cycles and the activities of nature at large.

Starting with the horizontal lime and vertical silica processes, on the grand scale the life activities of an agricultural operation function between these two axes. This fundamental concept correlates with night and day, winter and summer, nitrogen and carbon, legumes and grasses, soil and atmosphere, inner and outer planets, sedimentary and igneous rocks, plant reproduction and food production.

The night-time processes associated with lime and nitrogen relate to mineral release, nitrogen fixation, digestion and nourishment, all of which occur within the soil or work downward into the soil. On the other hand, the daytime processes associated with silica and carbon relate to photosynthesis, blossoming, fruiting and ripening. These processes arise out of the soil and work through plants into the air.

Understanding biodynamics helps us see the relationships of various agricultural processes to each other, where things fit into bigger pictures and what the causes and consequences of various interactions may be. When we know these things we have a better idea of what our resources are and how to guide agricultural events. Then we can build soil as we save time and money, reduce inputs and use what is at hand in nature. In short, biodynamics is a way of making sense of what happens in nature so we eliminate waste and bring things into a healthy, dynamic balance.

Ever the biochemist, in his *Agriculture Course* Steiner indicated the roles of various elements. He described sulphur as what the spirit 'moistens' its fingers with to work into the physical, oxygen is the carrier of life, hydrogen is the vehicle for the spirit, nitrogen is the carrier of consciousness and carbon is the basis for physical form. By providing a vocabulary for these concepts and showing their relationships to the activities and substances of the world around us Steiner

outlined a framework for creating a much wiser and more rewarding agriculture.

Biodynamics shows us how to make the land thrive, and how to remedy conditions we wish to change. Most of what we need is free—a gift of water, carbon dioxide and nitrogen from the atmosphere. Inputs like lime, gypsum, phosphates and trace elements are remedies for depleted land that has fallen out of balance. Were it thriving, it wouldn't need inputs. However, most land today is sick, and we must supply whatever is missing before it can thrive.

Given the necessary ingredients, biodynamics has a toolbox of compelling preparations to impart the life processes needed to draw what nature freely provides into living activity.

For example, silicon is abundant in the soil while nitrogen is abundant in the air. Both are like God, ever present and immediately at hand—but chemical agriculture fails to draw silicon and nitrogen into biological activity. Instead it relies on inappropriate inputs that stimulate without nourishing—fertilisers that reduce fertility. Instead, biodynamics uses small amounts of specially prepared catalytic preparations to engage silicon and nitrogen, which are key for quality production.

No doubt future generations will ask, why did we ever put poison on food? Why didn't we work with nature instead of waging war against her? Why did we ignore silicon and put nitrogen fertiliser on the soil at great cost when these two elements could simply be tapped into? Why did we spend so much effort and treasure on research into artificial nitrogen fertilisers when nitrogen is abundant and free?

Steiner re-introduced a vocabulary that was dormant and misunderstood. On the silica axis carbon was the Philosopher's Stone[1], and 'the Great Plastician that manifests the cosmic imaginations'. On the lime axis oxygen carries the *etheric forces* which provide the organizational processes that invigorate both plants and animals. The ***ethers*** correspond to the classical *elements* of fire, air, water and earth. The ***warmth ether*** is a sulphur process that occurs with ***fire;*** the ***light ether*** is a nitrogen process that occurs with ***air***; the ***tone ether*** *(aka chemical ether)* is a hydrogen process that occurs in ***water*** and the ***life ether*** is a carbon process that occurs in the ***earth***.

Nitrogen carries the ***astrality,*** which forms the basis for awareness, sensation and desire—the planetary processes inherent in the nature of animals. Steiner viewed *astrality* as the basis of consciousness, which gives us an inner experience

[1] *From the* ***Encyclopaedia Britannica*** *"The philosopher's stone, variously described, was sometimes said to be a common substance, found everywhere but unrecognized and unappreciated."*

of the universe around us.

Astrality is associated with the planetary relationships in the solar system which channel the influences of the surrounding universe. The zodiac or animal circle constellations around the solar ecliptic are focused by the 'wandering' planetary bodies. The planets beyond the earth and sun—Saturn, Jupiter and Mars—relate to silica and nourishment, while the planets between the earth and sun—Mercury, Venus and the Moon—relate to lime and reproduction.

All astral influences work through nitrogen in biology. Steiner designed very practical, herbal composting preparations using yarrow, chamomile, stinging nettle, oak bark, dandelion and valerian as the keys to triggering these planetary nitrogen processes. Ideally all manures and organic wastes are composted using small quantities of these six herbal preparations–while horsetail can assist these processes at the borders and edges where all life processes arise. It doesn't take much of this kind of compost for nitrogen to volunteer instead of ignoring life.

In several instances, particularly those relating to the inner planets, the herbal preparations involve animal sheaths. And, in a number of cases the European plants and animals can be replaced by American, Asian or Australian species. It isn't the particular herb or animal that is essential, it is the process they exemplify and the role they play in the astrality essential to life and awareness. Using these preparations in recycling organic materials conserves and builds nitrogen into stable, yet active and available forms that provide optimal nourishment.

Steiner also pointed out hydrogen, the first and most universal element, was the vehicle for spirit, the prime mover. Humans embody this spirit as ***ego***, a formative force of individuality and self-awareness. Humans, who are aware of their individuality, take a hand in their future evolution; while animals simply go along with the flow that affects them from the surrounding planets and stars. Each species receives its formative forces from a different starry direction.

Why Steiner focused on agriculture as the culmination of his life's work is recounted in Adalbert Graf von Keyserlingk's book, *The Birth of a New Agriculture, Koberwitz, 1924*. Steiner's motivation is also revealed in Ehrenfried Pfeiffer's account of a question Pfeiffer asked him on a train after the Agriculture Course.

> *"How can it happen that the spiritual impulse, and especially the inner schooling, for which you are constantly providing stimulus and guidance, bear so little fruit? Why do the people concerned give so little evidence of spiritual experience, in spite of all their efforts? Why, worst of all, is the will for action, for the carrying out of these spiritual impulses, so weak?" I was particularly*

anxious to get an answer to the question as to how one could build a bridge to active participation and the carrying out of spiritual intentions without being pulled off the right path by personal ambition, illusions and petty jealousies—for these were the negative qualities Rudolf Steiner had named as the main inner hindrances. Then came the surprising and thought-provoking answer. "This is a problem of nutrition. Nutrition as it is today does not supply the strength necessary for manifesting the spirit in physical life. A bridge can no longer be built from thinking to will and action. Food plants no longer contain the forces people need for this."

A nutritional problem which, if solved, would enable the spirit to become manifest and realize itself in human beings! With this as a background one can understand why Dr. Steiner said that "the benefits of the biodynamic preparations should be made available as quickly as possible to the largest possible areas of the entire Earth, for the Earth's healing."[2]

Biodynamic agriculture crosses scientific disciplines and expands the frontiers of science into realms where life processes and consciousness are generated. At one time this would have been dismissed as imponderable, mystical or, perhaps, delusional. Nonetheless the use of biodynamic methods—especially the biodynamic preparations—keeps increasing since biodynamics gets quality results.

Biodynamic practice is an individual affair subject to complex variables, and results are not guaranteed. Despite many guidelines, the responsibility for success lies with the enthusiasm and clarity of intent of each person applying the method.

We might keep in mind that from the viewpoint of quantum physics, the observer and the phenomenon are inseparably linked. The act of observation is a key factor in determining the phenomenon. Stated in a more time-honoured way, what we seek, we find, or what we think, we grow.

Biodynamics seeks the truth of physics and chemistry, and in doing so it works with the principle of fluid dynamics that a microscopic change at a point can effect large scale changes in the medium. Chaos theory calls this the 'Butterfly Effect', as though a butterfly can flap its wings and change the weather.

Certainly there is chaos, but chaos theory is about how order arises from chaos. It does this at boundaries, though the factors which trigger it are so infinitesimal they are difficult to identify. Forty years before chaos theory became standard

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[2] ***Agriculture***, ***Rudolf Steiner***, *Copyright 1993, Bio-Dynamic Farming and Gardening Association, Inc. Kimberton, PA, Creeger-Gardner translation. Appendix C, pp 260, 261*

physics Steiner was using the term 'smallest entities' to describe these infinitesimal organisational factors. This lends weight to other Steiner recommendations, not only the biodynamic preparations but also the value of stirring small quantities of preparations in enough water to cover large areas.

We should take into account that Steiner intended us to experiment. Near the end of his last lecture on agriculture he commented:

> *"In these lectures, I have only been able to supply certain guidelines, of course, but I am sure that they will provide a foundation for many different experiments extending over a long period of time, and that they will lead to brilliant results if worked into your agronomical practices on an experimental basis. That should be a guideline for dealing with the material presented in this course."*[3]

Biodynamics embraces many innovations and makes no pretence of prescribing the 'only' right way. Hamish Mackay, an Australian biodynamic leader, has suggested, 'Perhaps biodynamic farmers should state how and why they use the preparations and the outcomes they expect. If after three years they find they are not getting satisfactory results maybe they should try more 'traditional' biodynamic methods. This would allow evolution in practices while holding unsatisfactory experimentation in check.'

[3] ***Agriculture***, ***Rudolf Steiner***, *Copyright 1993 Bio-Dynamic Farming and Gardening Association, Inc. Kimberton, PA, Creeger-Gardner translation. pp 168, 169.*

SOME SUGGESTED READING

A Biodynamic Farm *by Hugh Lovel:* Provides detailed information about making the biodynamic preparations as well as describing what biodynamics meant for its author.

Agriculture *by Rudolf Steiner:* The original 8 agriculture lectures given by Rudolf Steiner in 1924, with excerpts from the discussion sessions. The Creeger-Gardner edition also includes his reference notes.

Alchemical Chemistry *by Glen Atkinson:* A further exposition of the energetic activities that puts forward a new approach to the period table of the elements and gives insight into how biodynamic agriculture can address all manner of agricultural challenges.

Anthroposphical Spiritual Science and Medical Therapy *by Rudolf Steiner:* A second medical course of nine lectures delivered in 1921 to physicians and medical students at Dornach, Switzerland.

Birth of a New Agriculture: Koberwitz 1924 *by Adalbert Graf von Keyserlingk:* An historical account of events leading up to the Agriculture Course and the development of biodynamics.

Culture and Horticulture *by Wolf Storl:* A textbook for a course in agriculture taught at Grant's Pass Community College in Oregon. It presents the rich philosophical and cultural background of biodynamics and provides an overview to help us understand it better.

Grasp the Nettle *by Peter Proctor:* Provides basic background on how to apply biodynamic methods to a wide range of conditions—a good introductory book.

Sacred Agriculture: The Alchemy of Biodynamics *by Dennis Klocek:* This book explores the essence of biodynamic agriculture, in particular the nature of inner development needed to utilize the method effectively.

Spiritual Science and Medicine *by Rudolf Steiner:* A set of 20 lectures delivered in 1920 which form the basis of a new approach to understanding the human body and medicinal practice.

The Energetic Activities In Biodynamic Agriculture *by Glen Atkinson:* A re-arrangement of Steiner's agriculture lectures based on his medical lecture courses given in 1920 and 1921 to clarify how the threefold processes of the nervous, rhythmic and metabolic systems work with the fourfold substances of lime, humus, sand and clay and the physical, etheric , astral and egoic processes.

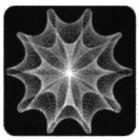
Peter Escher, pioneer of biodynamic tree paste and Ehrenfried Pfeiffer's financial backer in setting up Threefold Farm in Spring Valley, New York

"Don't start out by reading about biodynamics. You should first observe very quietly and carefully what is going on with your crops and soil. You see, if you come right down to brass tacks, people don't look. Biodynamics is not simply using this spray and that stuff, it's thinking for yourself. I would never want to work with someone who takes everything for granted.

"What you want to do is create a stable humus. Now, you can read a lot of books about soils, but the quickest definition I know of for a stable humus is 'what comes out of the business end of an earthworm!' Most growers don't think in those terms. They ask, 'What spray schedule do you use?' That's completely misleading. The guy who's on the right track is the one who grabs me by the scruff of the neck, takes me out to his apple orchard or whatever, and shows me how he handles his soil.

"The most important rule in farming is that a good farmer prays, while a 'tractor operator' doesn't. I don't care whether that grower even uses commercial or toxic sprays. If he's devout, if he realizes there something in the soil that's greater than he is, he'll get a touch for the land and go on to learn what to do and when."

–Peter Escher



Establishing a Self-Sufficient System

Developing Basic Soil Fertility

Because soil fertility involves biological processes as well as mineral substances, it is complex and always changing. Biodynamic agriculture acknowledges that most soils today need their health and biology rebuilt. In times past nature built healthy, vital soils, and there is value in copying nature in rebuilding soil health. However, with degraded soils we cannot take millions of years as nature did—we need intelligent intervention. Cultivation, grazing, composting, soil conservation, green manuring, soil testing, soil remineralisation, fossil humates and visual soil assessment all play a role in establishing self-regenerative, self-sufficient living soils, farms and gardens.

The biological activities at the basis of self-regenerative soil fertility occur at the surfaces of soil particles where minerals come in contact with warmth, light, chemistry and life. It is at these surfaces that biological activities provide silicon release and nitrogen fixation. These two key substances—nitrogen and silicon—are so abundant they will last as long as farming exists. Getting them to act on our behalf is essential.

Soil Building

Nature, with minimal human intervention, developed biologically diverse, richly fertile soils and eco-systems with little by way of inputs other than the accumulation of dust, periodic rainfall, fresh air, sunlight, microbes, plants and animals. Where the diversity of species came from is unknown, but we assume it took long eons of time. Rainforests, despite how they've been exploited, tend to be fertile ecosystems rich in microbial, plant and animal species. And while rainforests can be quite fertile, diverse and abundant, the world's deepest and richest topsoils evolved as grazing lands—prairies, steppes, plains, savannahs, veldts and meadows—rich swards of grasses, legumes and herbaceous plants, supportive of large, migratory herds of herbivores and their predators.

Both forests and grasslands draw in carbon. Hydrogen [water] is strongly attracted to carbon. Forests store most of their carbon above the surface of the soil where it cools the earth and precipitates rain. Grasslands, though they also precipitate rain, store more of their carbon in the soil as humus complexes. When a forest burns, most of its carbon returns to the atmosphere. When grass land

burns, the carbon it built into the soil remains. This creates deeply fertile soils.

The way nature builds soil fertility involves awesome diversity and intense cooperation. Therein lies synergy, which is where two or more things working together produce a greater joint sum than when working separately and adding the sums together. Where nature thrives, virtually every ecological niche is filled, every job is done simultaneously, and every need is satisfied. Everything is recycled and conserved. Nothing is left bare, no opportunity lost. If something is missing or deficient it may take eons upon eons for it to accumulate from settling dusts, rainfall or cosmic ray bombardment. Nature is patient, but if we wish things to happen fast, we need to help. We can do a lot to assist nature at this task.

Cultivation

In nature, soil animals cultivate the soil—from the smallest protozoa, arthropods, nematodes, mites, collembolans, beetles, ants and earthworms to large burrowing animals. Plants and their fungal symbiotes spread soil particles apart by growing into pores, cracks and crevasses. They secrete substances that eat rocks, digest soil particles and feed micro-organisms that free up minerals. At some point fungi and soil animals consume old plant roots and open up passages where air and water penetrate. Earthworms grind soil particles up as part of their digestion. They also recycle plant matter as manure, building soil fertility and feeding further growth. This softens the soil and builds crumb structure, tilth and retention of moisture and nutrients while allowing water, air and root penetration. Conversely, continuous grazing as well as machinery impact compresses the soil and reverses some if not most of these gains.

Mechanical cultivation softens the topsoil and prepares a clean seedbed for planting. For the most part, cultivation destroys soil life and is highly oxidative and digestive. In an age of machinery and power equipment, massive cultivation and mono-cropping are the norm. This releases an abundance of nutrients and growth looks good because it collapses the soil biology. This depletes reserves and leads to dependence on fertilisers. More and more cultivation leads to ever higher fertiliser inputs, greater loss of soil biology and such a system eats its future.

No question, too much cultivation breaks down organic matter, impoverishes soil life, disrupts soil structure and releases nutrients that often are lost. Wind and water erosion also occur. Even back in the 1920s Steiner saw the trends and introduced horn manure [500] and horn silica [501] along with the herbal preparations [502-507] as remedies. But no remedy cuts losses like minimizing cultivation. The biodynamic preparations are not a panacea for all errors. We

must be observant and farm sensitively and intelligently.

Various strategies can minimize damage from cultivation while still enjoying its benefits. Some crops, such as potatoes, may require cultivation. But with a mixed operation, crop rotations can take this into account and soil building can still proceed, crop after crop. Strip cropping, composting, cover cropping, rotating land into pasture, cutting hay which is recycled as manure, mulching and so forth can help to foster biology and diversity. Controlled traffic—where machinery follows pre-determined lanes—reduces compaction. No-till and minimum till planting methods can help, especially when there is good digestive activity in the soil.

In reality, herbicides and soluble salts are a hindrance. Forget herbicides and use biological fertilisers with biodynamic preparations to feed the soil food web. Inter-cropping, multi-cropping and succession cropping can increase diversity and reduce the need for machinery impact. While harvesting mixed vegetation, manage boundaries on roads, access strips, headlands, fence rows, laneways, waterways and ditches as biological reservoirs that interact with cultivated areas. Harvest rather than kill the verges. Life arises at boundaries. Verges are key.

Grazing

High density cell grazing involves large numbers of livestock grazing and trampling small blocks for a few hours and then moving on, not to return until plants have regrown. This imitates nature. Animals must follow plants. Rather than putting animal needs first, graze to build fertility. This will get the most out of your genetics anyway. Re-graze as is best for regrowth. This could be returning in two weeks, two months or in more than a year—whatever the pasture needs. Buy, sell or trade livestock based on what it takes to grow the best pastures.

Cell grazing impact should be brief and minimal. What is not grazed should be trampled to feed the soil's animal life. Sow seed on bare areas and then feed hay or silage to plant the seeds and fertilise growth. Slash and fertilize immediately after grazing. Then the more sought after plants that are grazed hardest have a better chance at recovery and the ecosystem recycles the residues.[4]

Composting

This is more than digestion and decay. Nature breaks down organic materials

[4] *Something to investigate is Holistic Resource Management www.savoryinstitute.com and Resource Consulting Services www.rcs.au.com (yes the url is .au.com this is not an error!).*

into simple carbohydrates and amino acids, but in many cases these sugars, starches and amino acids would evaporate or leach if they weren't conserved in accessible forms. Just as bees gather nectar, digest it, and store it in their honeycomb, micro-organisms in the soil gather up carbon compounds, amino acids and loose nutrients which they store in large molecules called humic acids which form stable complexes with clay. As with bees, the organisms that gather and store these nutrients go back to their stores and have a feed when needed.

Chief amongst these beneficials are actinomycetes and mycorrhizal fungi, which form mutually beneficial relationships with plant roots. By building compost stacks, piles or windrows with a favourable carbon to nitrogen mix of organic matter, soil, moisture and air, we can produce humified composts. A ratio of 30 to 1 carbon to nitrogen along with 10% soil and 50% moisture is a good starting mix.

Once composts piles are on their way, cover them—a tarp, a stucco of straw and soil, a sowing of wheat, a mulch of horsetail herb, or the cover from last year's silage pit. In short, provide a skin that gives integrity and contains the pile's life processes. This is needed. Think of a compost pile as a caterpillar in the pupae or chrysalis stage where transformation is taking place beneath the outer skin.

Into every newly built pile, before covering and incubating, use a bar or shovel handle and make holes deep into the pile. Insert a small spoonful of each of the herbal 'composting' preparations made from yarrow, chamomile, stinging nettle oak bark, dandelion and valerian [BD 502–507].[5] Roll each preparation into a ball, perhaps with a little manure or clay, and drop it in. A recommended pattern is to punch two holes near the centre for stinging nettle [504] and oak bark [505] preps with four holes near the corners or ends for the yarrow [502], chamomile [503], dandelion [506] and valerian [507]. With the valerian flower juice [507] dilute the liquid tincture in water, stir intensively, reversing directions back and forth for 15 minutes. Pour part down the hole and sprinkle the rest over the pile. If available, horsetail herb [BD 508] can be scattered over the mass before covering the pile.

These preparations impart a set of organic processes that assist and improve breakdown, humification and nitrogen conservation. Covering a compost heap provides an outer skin or membrane that holds in the life and vitality of the pile as it matures into humified, ready-to-spread food for the soil biology. It is stable and mature when most of its nutrients are bound up. Then microbial activity will be dominated by nitrogen fixing, phosphorous solubilizing and humus-forming

[5] *Making these preparations is described in detail in Steiner's agriculture course as well as in my book, A Biodynamic Farm.*

species as appropriate to tie up and access nutrients. Piles may be frequently turned or left static. Turning favours actinomycetes [aka actinobacteria]. Unturned piles favour mycorrhizae. Compost is best kept moist and under cover.

Commercial Scale Composting

Use of the composting preparations is just as important in large scale composting operations as it is in small ones. The question is the economy of scale. On the one hand each preparation need only be inserted in a single place—even in a pile as large as a house. Beneath the cover or skin each preparation will radiate its effects throughout the pile. On the other hand, special composts, known as Barrel Compound [aka Barrel Compost, BC, Cow Pat Pit or CPP], contain all the herbal preparations in one easy-to-use formula that can be stirred intensively for 20 minutes and sprayed throughout the pile as it is assembled. BC can also be added to the water used to moisten the compost when turning with a large mechanical turner. This can bring the benefits of the preparations into a large scale operation efficiently.

Some composters prefer to use the horn preparations along with the herbal preparations in composting. Soil Activator combines *all* the preparations in one compound that can be stirred and applied in the same fashion as Cow Pat Pit or Barrel Compound. According to John Priestley, one of Australia's most innovative biodynamic farmers, "The only way the biodynamic preparations don't work is if you don't use them." As a caveat, understanding what the results look like can be a guide to which preparations to emphasize with repeated applications.

Volatilization and Leaching

A common problem identified by organic farm research is volatilization and leaching from raw animal or plant wastes. Just because something is organic doesn't mean it is good, and losses of soluble nutrients tend to pollute the soil, water table and atmosphere. Proper management of plant and animal wastes—such as effluents—prior to application on soils involves composting solids and fermenting liquids with the herbal biodynamic preparations. All materials need to be broken down into stable humus or stable liquids before use. Application of the full set of biodynamic preparations balances fermentation, ties up loose nutrients and minimizes leaching. Rank, manurey smells are a sign of nitrogen loss and are an invitation for weeds, pests and diseases. Such nitrogen loss is no plus for soil fertility or the environment. Wherever animal wastes collect or nitrogenous materials break down, soil, rock powders, soluble humates and

biodynamic preparations should be integrated with the handling of these wastes, and Barrel Compound, Cow Pat Pit or Soil Activator can help minimize losses.

Cover Crops and Green Manures

In general cover crops are robust annual plantings of compatible winter or summer active grasses, legumes and herbaceous species that build soil biology, increase nitrogen fixation and provide forage, mulch or residues to feed the soil. In some cases forage or seed crops can be harvested from these mixes before the next crop is planted. Traditionally these are grazed or ploughed down, though cultivation hardly builds soil biology. Whether grazed or ploughed down, Barrel Compound, Cow Pat Pit or Soil Activator assist rapid breakdown and humification.

Ideally minimum or no-till cover crop mixes should include as many compatible types as possible of summer or winter active grasses, legumes and herbs. Sowing with grazing, slashing or minimal tillage, needs no herbicides. Apply compost and biodynamic field sprays to hasten recycling instead. As summer/winter successions restore diversity, they will rebuild soil biota, recycle and conserve loose nutrients, ramp up digestion and control pests, weeds and diseases. This also increases soil carbon, softens soils, conserves moisture, reduces run-off and prevents erosion. This can build biology on otherwise bare soils where previously the advice might have been herbicides.

Broadacre crops can be under-sown with succession species to take over after harvest. Or, cover crops may be planted and grazed as catch crops at the end of growing seasons. They can also follow short season crops depending on region and climate, and can be handy ways to feed rock powders and composts to the soil biology in orchards and vineyards. Basically vegetation is a plus, while bare soil is a loss. Even weeds are a cover crop. Feed them and grow them well.

Imagine a winter crop of oats, lupines, peas, rape, clovers, turnips, mustards and corn salad that is direct seeded into existing pastures. If there are weeds, such as thistles, think of them as deep rooted diversity. Sometimes cover crops can be harvested and separated for grain and other seeds. Or the seeds might be kept for re-sowing. Mixes of winter cereals, legumes and broadleaf plants might include wheat, barley, rye, triticale, vetches, clovers, medics, turnips, mustards, rape, rutabegas and winter radishes. If the area in question is pasture, under-sow with perennial grasses, legumes and other species such as dandelions, clovers, plantains, chicories and yarrow along with the annuals as succession species. For summer covers a mix might include different kinds of sorghums, millets, cowpeas, lab lab (dolichos), maize, soybeans, buckwheat, chicories and autumn nettles.

Graze, cut as hay or silage, or harvest as seed to be milled for feed.

Many experiments along these lines were pioneered by Colin Seis of Winona Farms. Visit his website at www.pasturecropping.com. Using a diversified mixture of compatible summer and winter active annual species, sow seed [minimum or no-till] into existing vegetation, such as pastures and hayfields. Use what's there and add species that extend the seasons. This approach saves time and money and shows considerable promise for soil improvement and increased forage yields. It also multiplies options and reduces losses from droughts or floods.

Soil Testing

Before bringing in manures or minerals it is important to have reliable information about what is already there. Soil testing, while helpful, can be misleading. Chemical agriculture tested soils for soluble nutrients using dilute solutions of mild acids to mimic what plants give off at their roots. But, this ignores soil biochemistry and assumes plants depend on soluble nutrients.

In his retirement Justus von Liebig, the father of chemical agriculture, realized he was wrong in thinking plants depend on solubility. This was his *mea culpa*:

> *"At one time, the view permeated my every fibre that plants obtained their nourishment in soluble form. This view was false and was the source of my error, but the human mind is a curious thing and it sees nothing beyond its field of vision. In truth, agriculture is both contemplative and spiritual. Unfortunately almost no one realizes the true beauty of agriculture—its inner spirit and beingness. It warrants the best efforts of science—not only because of its produce and the benefits it bestows on those who understand the language of nature—but because it stands above all other vocations. As my final wish, I pass on the mission to cleanse my teachings of the accumulated deceptions others have used to obscure them, lo these many years."*

Rudolf Steiner taught his agriculture course to correct Liebig's errors. Time passed. Ehrenfried Pfeiffer, who worked closely with Steiner in Switzerland, immigrated to the United States after World War II and, with the help of Peter Escher, set up laboratories in Spring Valley, New York. Pfeiffer conducted extensive total testing of soils and found most soils contained large quantities of nitrogen, phosphorous and potassium although this abundance did not show up on soluble tests. When, based on soluble tests, N, P and K were applied, these soils declined in fertility because soil biology was ignored. Soil biology, given encouragement and sufficient trace elements, usually provides access to the

insoluble but available N, P and K stored in the soil. But NPK fertilisers make soil biology lazy. Fertiliser industries ignored Liebig's final wish and sold farmers the soluble salts of what they already had. They used NPK theory to promote sales.

Total Testing

Today in Australia Environmental Analysis Laboratories (EAL) at Southern Cross University in Lismore, New South Wales offers both the soluble Albrecht test and a hot aqua regia total soil digest similar to the one Pfeiffer used. EAL accepts samples from anywhere in Australia or the world. Be sure to ask for the quantum test or the Albrecht/Mehlich III test plus a total test. See: www.scu.edu.au/eal/ A similar test is also available in the US by Texas Plant and Soil Laboratories in Edinburg, Texas www.texasplantandsoillab.com Ask for their quantum test.

The Albrecht test measures the ratios of calcium, magnesium, potassium and sodium, which are the major cations (metallic elements) in the exchangeable portion of the soil. The ratio of calcium to magnesium is particularly important for tilth. Heavy soils may need as high as a 7 to 1 ratio of calcium to magnesium to crumble and expose their particle surfaces. By the same token, light, sandy soils may need more like a 3 to 1 ratio to hold them together. Other soluble targets of importance for robust, vigorous growth include 50 ppm sulphur, 2 ppm boron, 90 to 100 ppm silicon, 70 ppm phosphorous, 100 to 200 ppm iron, 50 to 80 ppm manganese, 7 to 10 ppm zinc, 5 to 7 ppm copper, 1.5 ppm molybdenum, 3 to 4 ppm cobalt and 1.2 ppm selenium.

In total tests the targets for N, P and K depend on the carbon content of the soil, as the better part of soil reserves are probably stored in humus. Total testing finds out what is in the soil reserves despite seeming deficiencies in soluble tests. As Pfeiffer discovered, soils usually contain huge reserves of N, P, K and other elements even though these may seem deficient in soluble tests. Clearly something biological, beyond mere solubility, is going on.

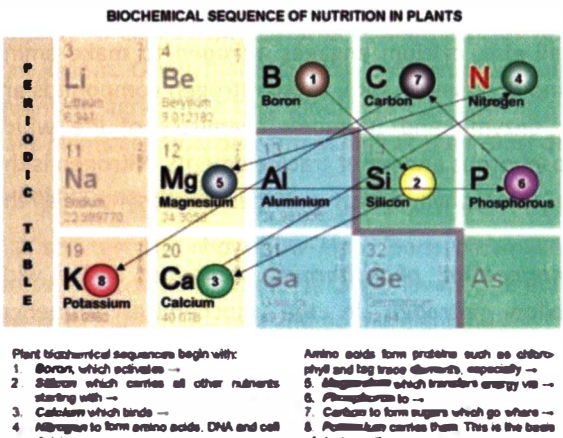
The Biochemical Sequence

There is a hierarchy or biochemical sequence of what must function first before the next thing and the next thing works. The elements early in this sequence must be present and working well before later elements have any chance of being useful for plant growth. Nitrogen, phosphorous and potassium occur late in this biochemical sequence, while sulphur, boron, silicon and calcium start things off.

Sulphur: Since everything going on in the soil biology occurs at the surfaces of soil particles where minerals react with water, air and warmth; sulphur—which

activates surfaces—is the essential key-in-the-ignition for kicking off the soil biochemistry. In his Agriculture Course, Steiner speaks of how *'the spirit-activity of the universe works as a sculptor, moistening its fingers with sulphur . . .'* [6]

Sulphur works at the surfaces, boundaries and edges of things to bring organization and life into being. Along with warmth, it is the classic catalyst of carbon chemistry. Regardless of other soluble elements, the soluble soil test should show 50 ppm sulphur [Morgan test] for biological soil fertility to function properly. Light soils may need a bit less and heavy soils may need more. In the total test a 60 to 1 carbon to sulphur ratio is needed to ensure enough sulphur in soil reserves.



Silicon forms the basis for the capillary action that takes up nutrients from the soil. Fortunately for agriculture, silicon's activity defies gravity. But to do this silica relies on boron, a component of clay. In his second agricultural lecture Steiner insightfully asserts, *"First we need to know what is really going on. However else clay may be described, however else we must treat it so that it becomes fertile—all this is of secondary importance; the primary thing we need to know is that clay promotes the upward stream of the cosmic factor."*[7]

It is the ***boron*** component in clay that is the accelerator pedal of agriculture, while silicon is the highway that carries all the nutrients. This places boron first in the biochemical sequence, and if either boron or silicon is deficient the soil biology will function below its potential. With either boron or silicon deficiency—and especially with both—crops will wilt instead of growing on hot days. Ironically, the two most effective ways to create boron and silicon deficiency are:

1. Clean cultivation

[6] ***Agriculture, Rudolf Steiner****, Creeger-Gardner translation, pp 44-47.*

[7] ***Agriculture, Rudolf Steiner****, Creeger-Gardner translation, page 31.*

2. Use of artificial nitrogen fertilisers

Though standard in modern agriculture, these practices make boron and silica available by killing off the soil biology that maintains the soil's clay/humus complexes. This releases a flush of boron and silicon which can easily be lost.

Calcium, which comes next in the sequence, is the truck that travels on the highway. It collects and carries with it the nutrients that follow in the biochemical sequence. As the opposite polarity from the free-handed silicon, calcium is hungry, even greedy. Above all else, calcium engages ***nitrogen*** to make amino acids, the basis of DNA, RNA and proteins. In turn, these nitrogen compounds are responsible for the complex enzyme and hormone chemistry of life which employs magnesium, iron, phosphorous and other trace elements. Nitrogen is the basis for the amino acids in chlorophyll, which provides photosynthesis, the means of catching energy.

Photosynthesis is where ***magnesium, phosphorous, potassium*** and a wide range of micronutrients follow ***nitrogen*** in the biochemical sequence. Unfortunately, NPK fertilisers stimulate this latter portion of the sequence without addressing the priorities of sulphur, boron, silicon and calcium. NPK fertilisers stimulate growth, but they are like methamphetamine. They grow weak crops that are fertilised like weeds and are susceptible to pests and diseases.

Supplementation with Minerals and Rock Powders

Even though quantum agriculture is primarily about organization and biological activities, soil mineralization must be considered. How does one organise something if it isn't there? Many soils need gypsum or elemental sulphur because they are sulphur deficient in both their soluble and total tests. Many soils also need silicon rock powders—also a source of boron. This is true if past nitrogen fertilisation has flushed whatever boron and silicon was there away. Boron and silicon deficiencies also occur following overgrazing or clean cultivation. Silicon availability may need to be fostered to get the soil biology up and running so it can release more silicon from the surfaces of soil particles. The soil's silicon biology is easily depleted by nitrogen fertilization, overgrazing or clean cultivation.

Through lack of experience and understanding, many 'organic' farms use raw manures—the worst being chicken manure—as a nitrogen source. This soon depletes sulphur, boron and silicon. The remedy for this is likely to be compost made by adding 10% or so of high silicon rock powders along with a little gypsum to composts and composting fully with soil until it looks and smells like soil.

In addition to gypsum and high silica rock powders, lime can be used to provide

calcium. Dolomite also provides magnesium if this is needed. Rock phosphorous provides silicon, calcium and phosphorus. There are also natural potassium sulphate ores. Rock powders tend to also provide a variety of trace elements. For high pH soils with large excesses of sodium and potassium the remedy in drier climates may be increasing the soil's holding capacity with humates and zeolite to buffer pH and build more storage.

Most importantly, the biochemical sequence shows us we need to start with sulphur to expose the surfaces of soil particles to biological activity so reserves can kick in. Other methods may not recognize sulphur's key importance, but in quantum agriculture this should be clear. Liebig's 'law of the minimum' rightly says plants can only perform as well as their most deficient nutrient.

Calculating Inputs

A soil test can show how many parts per million [ppm] of each element are present and whether it meets target levels. The question is, how can we calculate the right adjustment and add no more and no less? There is a rule of thumb.

250 kg/ha [or 250 lbs/ac] of any input supplies that input's per cent analysis as parts per million.[8] (Since a hectare is 2.5 acres and a kilo is 2.2 pounds we can approximate this rule fairly closely using 250 lbs/acre in the place of kilos and hectares.) For example, suppose the soluble test for sulphur [Morgan test] shows 5 ppm when the target is 50 ppm, then 45 ppm sulphur is needed. If gypsum is 15% sulphur then 750 kg/ha [750 lbs/ac] gypsum will deliver 45 ppm sulphur. If gypsum is 20% Sulphur then only 565 kg/ha [565 lbs/ac] is required. If the gypsum is 12% Sulphur nearly a metric ton per hectare [or 1000 lbs/acre] is needed.

Since gypsum is calcium sulphate, it provides both calcium and sulphur, which usually is desirable. However, in the event the soil is already rich in calcium and has a pH of 6.3 or higher, elemental sulphur may be a better choice as a sulphur input. In contact with moist soil, sulphur will oxidize to sulphate and lower the pH slightly; but it will open up the surfaces in the soil, stimulate soil biology and release some mineral reserves. For practical purposes elemental sulphur may be combined with 10% bentonite in pellets or flakes for ease of handling. 90% elemental sulphur would require 125 kg/ha [125 lbs/acre] to deliver 45 ppm S.

By way of contrast, sodium molybdate is 42% molybdenum. To add 0.5 ppm Mo

[8] *This is based on the average weight of the top 17 cm of soil in one hectare, which is approximately 2,500,000 kg. [To do the maths, 2,500,000 / 250 = 10,000 which is 1 per cent of a million parts per million.]*

to the soil requires 42 divided by 0.5, which equals 84. If we divide 250 kg by 84 we get 2.976 kg/ha [2.9 lbs/acre] sodium molybdate. However, to add so much in one go would be expensive and unwise. With most inputs, particularly the traces, the soil has trouble adjusting to a lot all at once. In the case of sodium molybdate 0.5 kg/ha [0.5 lbs/ac] is the usual correction and 1 kg/ha [1 lb/ac] is considered the limit. The maximum manganese or zinc sulphate per application per hectare is 25 kg/ha [25 lbs/ac], and copper sulphate rarely is applied at any rate higher than 15 kg/ha [15 lbs/ac]. Get a calculator and do the maths to see where things stand, keeping in mind soil biology may gain access to reserves in the total test.

Holding On with Humates

When adding trace elements, especially boron, food for the fungal part of the soil food web is essential. Fungi hold on to inputs that otherwise would leach. If available, well-humified biodynamic compost produced within the farm is highly desirable. If this is not available then other humic inputs must be considered. Humic acids are extracted commercially from carbon rich deposits such as leonardite, soft brown coal and peat. Raw leonardite or brown coal may be processed with potassium hydroxide, ammonium sulphate, urea or chicken manure and sold as raw humates. As long as freight costs are affordable this may be a good option. On the other hand, powdered or granular soluble humate extracts are a handy food concentrate for actinomycetes and mycorrhizal fungi, which are important for nutrient retention and delivery. Both raw humates and soluble humates are excellent for buffering boron or sea minerals[9]. However, most soluble humate extracts are alkaline, and sulphates such as copper, zinc, manganese and cobalt may require acid humic extracts for liquid applications, or else they may require low molecular weight fulvic extracts.

Humates are helpful when feeding bulk minerals such as gypsum, silica rock powders, lime, rock phosphate or potassium sulphate to the soil food web. Trace elements may be combined with 250 kg/ha [250 lbs/ac] of raw humates or 25 kg/ha [20 lbs/ac] soluble humate extracts in dry blends. They also may be dissolved in liquid soil drenches with soluble fulvic extracts. Feeding inputs to the soil biology in this fashion delivers them to the soil's fungi which retains and delivers them to plants.

Crusher Dusts

Siliceous rock powders such as granite, feldspar or basalt crusher dusts only

[9] *The pot liquor left after extraction of table salt from sea water contains every element.*

provide silicon from the surfaces of their particles, so fineness is important. But they can be helpful in repairing silicon deficiencies while the soil biology gets going enough to release more of the soil's silica reserves. Siliceous rock powders can be fed to the soil biology along with humates as a food source and the soil's actinomycetes and mycorrhizae will gradually weather the particles and release silicon. Crusher dusts are especially effective when fed to pigs and their manure is composted. Silica powders also can be added to or spread with composts. Generally 2 or 3 tons per hectare will get a helpful response, and usually these rock powders also release boron, which is especially needed by legumes.

Lime, Rock Phosphate, Potassium Sulphate, etc.

Each of these inputs has its own story, and, as Pfeiffer discovered, total tests are a better indication of whether these are needed than soluble tests. Any of these inputs can be built into soils along with composts or humates. Just be aware; avoid adding bulk lime to composts at more than 0.1% of the total mass. Otherwise lime tends to drive off nitrogen as ammonia. It can be spread along with finished composts, but when added to compost piles at more than a kilo [2.2 lbs.] per ton it tends to waste valuable nitrogen.

Visual Soil and Crop Assessment

In order to evaluate how well the soil biology is going and what can be expected of it, visual soil assessment is helpful. New Zealand soil scientist Graham Shepherd, has published a book[10] on this, and while it may not be the last word, it is a really good start toward first hand evaluation of soils, their conditions and their biological activity. This system assesses texture, structure, porosity, mottling, soil colour, earthworm activity, aroma, root depth, drainage and vegetative cover.

There also are many visual clues to mineral deficiencies. For example, hollow stem clover, lucerne (alfalfa), beans, potatoes, etc. indicates boron deficiency. Boron deficiency is also indicated by high brix in the early morning, which shows plants are holding their sugars in their foliage and the cycle of root exudation is not occurring at night because of insufficient moisture uptake.

Dwarf leaves in clover indicates zinc deficiency. Purpling of grass and clover in winter indicates copper deficiency, as does a reddish, scruffy tinge to the coats of black livestock. Poor chlorophyll development and pale, yellowish green vegetation often is magnesium deficiency on a magnesium rich soil. This is

[10] ***Visual Soil Assessment Volume 1: Field guide for cropping & pastoral grazing on flat to rolling country*** *by Graham Shepherd.*

common where the soil is too sulphur deficient to release magnesium properly. Under these conditions foliar analysis may show high sulphur because what little sulphate is present is soluble and plants take it up. But if growth is slow, sulphur builds up because it is not being used. Adding magnesium to a high mag soil will only make matters worse, while the real cause of magnesium deficiency is the first priority of all soil amendment programs—sulphur.

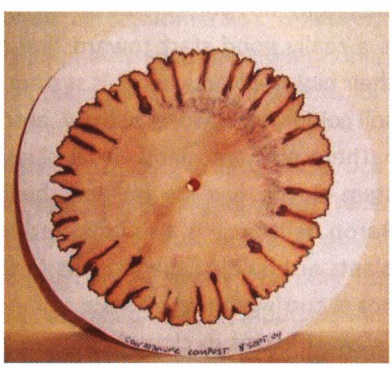
Harsh, watery taste and weak feel of vegetation can be clues to excess nitrate uptake and poor photosynthesis, while complex, delicious flavours and strong cell structure indicate high brix and nutritional density. Biodynamic growers should be aware that their own senses tend to be the best guides for determining what is going on with pastures and crops. Sending soil and plant specimens to laboratories is useful for learning what things look like, but once one knows what to look for, first hand observation is quicker and probably more informative.

Nitrogen Fixation and Silicon Release

These two elements, nitrogen and silicon, are present in enormous abundance. Nitrogen fixation and silicon release should be our highest priority in agricultural research. Access to nitrogen and silicon in abundance would eliminate most fertiliser costs, as well as weed, pest and disease expenses. Unfortunately little funding is available for such research since industrial profits from fertiliser sales would suffer if this knowledge was wide-spread.

Currently the nitrogen fertiliser industry uses ten units of methane to manufacture one unit of gaseous ammonia. Ammonia can then be injected directly into soils or converted into urea. With straight urea applications to the soil, losses of 50% and more are normal, since half of the urea evaporates as nitrogen nitrous oxide [N_2O]. This is terribly inefficient.

On the other hand, it takes ten units of sugar from photosynthesis to fix one amino acid, and the losses and greenhouse gas emissions are nowhere near as great. The grower's challenge is to make photosynthesis efficient so the energy is available for abundant biological nitrogen fixation. This requires silicon release.



A paper disc chromatogram of poorly composted feedlot manure shows strong solubility of silicon in its outer boundaries and lack of internal organization due to nitrification.

Potentially, nitrogen fixation is more robust when plants have steady access to all the necessary requirements—especially silicon—for efficient photosynthesis. This is what produces the necessary energy for nitrogen fixation. Grasses do this best, and the plants themselves many contain endophytic nitrogen fixing microbes. Biodynamic farms attain this level of efficiency when everything is working near optimum and lime and silica are in balance. Spraying horn silica [501] works wonders for engaging silica in case this is the missing link. Realistically, it hardly makes sense to wait for funding to conduct trials when there isn't any money to be made from the research. Farmers should just do it. Some will succeed with relative ease while others will find it difficult. Some may not sort it out at all, which is how life is.

Silicon, Nitrogen and the Soil Food Web

A previous section on soil testing indicates optimum levels of minerals for plant efficiency and nitrogen fixation. These are the levels needed for efficient photosynthesis, especially at cooler temperatures. This is particularly true for silicon, which is almost always deficient in conventionally farmed soils. Silicon, and its co-factor, boron, are basic to fluid transport, and fluid transport determines how fast sunlight is converted into sugar.

Unlike amino acids, nitrates, nitrites and other salty forms of nitrogen impair the silicon chemistry of the plant as well as the symbiosis between plants and their microbial partners in the soil.

Raw manures and poorly composted manures are detrimental because the amino acids turn into nitrates, which flush the soluble silicon out of both plants and soils. How well a plant picks up silicon from the soil depends, at least in part, on the level of actinomycete [aka actinobacteria] activity at its roots. This in turn depends on the extent to which the soil opens up and is aerated, which in turn depends on sulphur levels and soil microbes such as *Archaea* which digest siliceous rocks. Nitrates impair these microbial activities.

On the other hand, animal activity in the soil close around plant roots provides freshly digested amino acid nitrogen, which plants take up before the freshly digested amino acids can oxidize to nitrates. This encourages rather than discourages the release of silicon from the surfaces of soil particles. Living in partnership with plants, *Actinomycetes* then form a fine fuzz along the root exudate zone of young roots. This is the ideal home for nitrogen fixing microbes. In this process the actinomycetes use silicon and boron to form their fine, fuzzy hairs. As roots age and mature these microbes are eaten by protozoa all the way

up to earthworms. These animals excrete freshly digested nutrients containing amino acids and amorphous fluid silicon in ideal measure right where nutrients are being taken up around plant roots. No artificial system can compare.

Some soil microbes, such as *Actinomycetes,* access silicon at the surfaces of soil particles where moisture, air and warmth interact. The rest of the soil's silica is locked up. Nitrogen fertilisers suppress this type of delicate microbial silica release and that shuts down efficient photosynthesis and nitrogen fixation. On the other hand, if actinomycete activity is robust, the soil food web freely provides a luxury supply of amorphous fluid silica *and* amino acids.

Quantum agriculture aims to promote this kind of activity as a way to achieve quality production that sustainably and efficiently rivals the bulk yields of chemical agriculture. The bonus comes when environmental conditions are less than ideal. Then quantum production easily surpasses chemical yields.

The Humus Flywheel

Maintaining Biological Momentum

There is a common belief that humus is the result of the breakdown of organic materials in the soil. While this is true it is less than the full truth. Although organic materials do break down into simpler compounds, to form humus they must be built back up into large, complex carbon molecules by soil organisms whose role is to store nutrients for rainy days. These organisms, primarily actinomycetes and mycorrhizae, work in tandem with plants, storing humic acids in an easy to access form. Humic acid molecules are too large for organisms such as bacteria to absorb. Yet they are accessible to the actinomycetes and mycorrhizae as insoluble but available nutrients. That's how we want nutrients to be held in the soil—insoluble so they are not easily lost when it rains, but available when needed.

The NPK theory that all soil nutrients must be soluble all at once is rather like feeding pigs six months' worth of ration in one meal—initially it is too much. Try though the pigs will, they can't handle it all. As time goes on the banquet sours and the pigs are left lacking a balanced diet while flies, yeasts, moulds and various pests move in.

This is modern agriculture, and it's not very healthy—you wouldn't feed your kids that way. While plants are more resilient than pigs, they aren't *that* different.

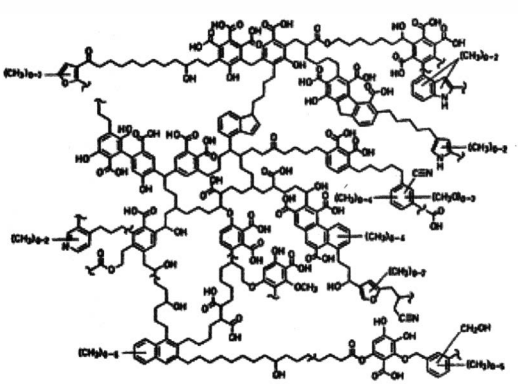
Basically we do not want most of our nutrients to be soluble. Rather, we want them to be insoluble but available. A

"Dreadlock Roots" *--Rich soil adhesion on pasture grass occurs when root exudation feeds the soil biology sugars from photosynthesis while the soil biology in turn feeds the plant minerals and amino acids from the digestion of actinomycetes and nitrogen fixing microbes.*

plant can only consume a small amount of nutrients every day. By having more than the daily optimum floating around soluble, we invite unwonted guests to the table. This creates unnecessary problems for crops. Nature, left to her own devices, provides insoluble but microbially available nutrients in the humus flywheel. Crop-symbiotic micro-organisms mop up loose nutrients and store them in the humus reserve in large, carbon complexes.

The Humus Flywheel

When conditions are good, plants photosynthesize and make rich nectars that are shared with the soil as root exudates. Certain symbiotic microbes store surplus root exudates as clay/humus complexes--like storing honey in the honeycomb. When times are tough these humus loving microbes return a steady stream of quality amino acids and mineral complexes to the plants—like mother's milk—which makes it easy for crops to assemble their proteins and grow regardless of ups and downs in clouds and sunshine. Humus also provides energy for soil microbes that unlock minerals, fix nitrogen and feed the soil's digestive activity—which in turn provides the milky, mineral and amino acid rich food for growth. Observation of this millennia old interplay in nature is honoured in Mosaic Scripture as a land flowing in milk and honey. Humus is the flywheel whose momentum fosters and sustains the milk and honey flow through thick and thin—the better the storage and access of insoluble but available nutrients, the more momentum the system has.



One of many proposed structures for humic acids.

Soluble Problems

Soluble nutrients, such as the salts of nitrogen, phosphorous and potassium, must be extremely dilute or they interfere with the sensitive micro-life of this humus flywheel. Like urine, these salts are the wastes of microbes that fix nitrogen, make phosphorous soluble and release potassium. In concentration these salts shut down the microbes that might otherwise make more complex nutrients available because they are awash in

their own waste. If these salts are applied at rates sufficient for a couple months' supply, they kill off soil microbes and release their nutrients as well—which results in a flush of crop growth; but it also tends to leach key minerals such as sulphur, boron, silicon, calcium, copper, zinc and manganese.

Chlorides tend to sterilize the soil, while phosphates and sulphates, though useful to soil microbes, can still cause harm in excess. Nitrates are especially notable for causing a flush of available nutrients and a lush response that looks good, but it's like the long haul trucker taking drugs, keeping double log books and driving five day runs in 48 hours. The result is problematic and carries a price.

Humic and Fulvic

Both humic and fulvic acids are so complex and varied they are only distinguished by the size of their molecules. Fulvic acids are low enough molecular weight they can pass through bacterial and plant cell walls as food. Humic acid molecules are larger and can only be consumed by silica oriented microbes like fungi and actinomycetes (aka actinobacteria) that can take their carbon skeletons apart. Since fungi and actinomycetes often live in close partnership with plant roots, especially those of food crops, they provide access to the humic complexes in the soil. They strip out the silicon and carbon frameworks of the clay/humus colloids and release all the other nutrients held on these structures. However, like bees drinking nectar and concentrating it into honey, these microbes also can mop up nutrients and root exudates and store them as humic acid complexes.

Many bacteria are consumers that thrive in a nutrient rich broth and break things down. When soluble nutrient levels are high in the soil, the bacteria that fix nitrogen, solubilize phosphorous and release potassium can't function because they are awash in what amounts to their own waste. This is why tilling in a green manure crop requires a waiting period of at least 3 or 4 weeks to allow rampant bacterial breakdown to subside. Once humus formation resumes and the excesses are stored in insoluble but available complexes, crops can be planted and a stable plant/microbe partnership established. But if crops are planted immediately after tilling in fresh vegetation or manures they cannot grow properly.

Justus von Liebig, the 19th century chemist who introduced chemical agriculture, in his retirement acknowledged his mistake in assuming productive soils required nutrients to be soluble. But by then chemical industries could see great prospects, and Liebig's last wish was treated with contempt and ignored. Today the belief that solubility is good still continues.

Consider that most crop seeds are large enough to contain a food supply. They

give off nourishment for beneficial microbes and build their microbial team by attracting and multiplying their partners as their roots emerge. By contrast, most weeds have tiny seeds. They soak up loose nutrients by design, sprouting and growing vigorously when vegetation or raw manures are tilled in. Most weeds do not rely on the humus flywheel nor do they feed its microbes.

It doesn't take much experience to see the difference between using raw manures and using humified compost—the former feeds weeds and the latter feeds crops. When we apply large doses of soluble fertilisers—anhydrous ammonia, superphosphate and muriate of potash—our crops have to compete with weeds that love soluble salts. It is only when we apply humified compost that we feed the crop/microbe interactions that grow weed free healthy crops.

Soil Testing

Most soil tests use mild acids that do not reveal what is stored in the humus flywheel. The assumption behind these tests is the crop's nutrients must be soluble or plants can't get them. But in reality feeding a plant is a lot like feeding your kids. Plants grow best with small amounts of food on a steady basis. Too much on the table at once is a worry. A total test reveals what is in the pantry rather than the dinner plate. We need tests that show what would be available to the soil biology from the humus reserves. What if the reserves are deficient?

Many organic growers take it on faith that if they simply build organic matter they will have good crops and their problems will all go away. However, this is rarely the case. Clay/humus complexes are the soil's storehouse of carefully preserved food. Unless this storehouse has the right proportions of everything, growth will still be limited to whatever is in shortest supply.

Since *sulphur* is the bio-catalyst that acts as the key in the ignition to expose the surfaces of soil particles, when it is deficient both soil and plant life suffer. Then when *boron*—which leaches unless held in clay/humus complexes—is deficient, nutrient uptake lags because boron's interaction with silicon is what draws fluids through the plant's capillary system. *Silicon*, which lines the capillaries themselves, must also be abundant for capillary action to transport calcium and other nutrients efficiently. *Calcium*—which is essential for nitrogen chemistry and cell division—must be sufficient for growth as well as soil crumb structure. *Magnesium* is essential for photosynthesis. But too much tends to make the soil lock up and not even deliver enough magnesium, let alone other nutrients. And too much soluble potassium gets in the way of magnesium–and sometimes calcium—uptake. And even if everything else is working, without sufficient

phosphorous and its trace element co-factors, chlorophyll burns up because it can't transfer energy into making sugar, which follows *potassium*. So, all things need to be stored in the right proportions. Then when crops are drawing on the humus flywheel they get the right mix of major and minor nutrients.

Understanding the Mix

In some of the world's premier soils, such as the Ukraine, Western Missouri or Australia's Liverpool Plains and Darling Downs, nature provided black, crumbly clays with cation exchange capacities of nearly 80. Without fertilisers, the first couple plantings of wheat or other cereals on these soils yielded crops beyond anyone's previous experience. Yet, with insufficient management and understanding these soils went straight downhill and their momentum was lost.

Nevertheless, measurements of the carbon to nitrogen ratios in unexploited remnants still in their virgin state are between 9 and 10 to 1. Interestingly, it takes roughly 10 units of sugary carbon to fix one unit of amino acid nitrogen, so this does not seem mere coincidence. Comparing hundreds of total acid digest tests to field responses also revealed that roughly a 6 to 1 nitrogen to sulphur ratio is desirable (60 to 1 carbon to sulphur). When these two ratios are achieved and major and minor nutrient targets are approached so that microbial partnerships interact efficiently with the humus flywheel, then the only limit to nitrogen fixation is the energy provided by root exudation.

Grasses make more sugars and can get them to their roots faster than legumes, so they can feed several times the nitrogen fixation of legumes. Yet legumes are singled out as the 'nitrogen fixers' for their follow-on effects. This is because legumes, with their oxygen rich root exudates, unlock the lime minerals, Ca, Mg, K, Na and traces far better than grasses. They can feed nitrogen fixing microbes in nodules on their roots and kick off nitrogen fixation in an otherwise mineral deficient soil. Since they unlock several times the minerals they use, they leave these behind in accessible form, providing a follow on nitrogen fixing effect. Their role is getting nitrogen fixation going under tough conditions.

It is easy to measure legume nodules and estimate how much nitrogen was fixed. And the follow-on effects are so obvious. But they can be due to more than just the nitrogen fixed by the legumes. Once legumes make sufficient minerals available, grasses can easily supply the energy needed for further fixation by free fixing organisms in the soil.

Soil tests help with blending the right amounts of major and minor nutrients into composts or fossil humate fertilisers to ensure that both grasses and legumes

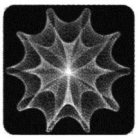
have what they need. Composts; raw humates and mineral supplements make good humus based fertiliser programs.

Manure composts are richer in minerals and nitrogen while fossil humates are generally deficient in nitrogen, sulphur and minerals. Both composts and fossil humates are a good way to feed complexed minerals to the soil biology. Even at a quarter of a ton per acre, with the needed minerals blended in, both composts and humates are good for delivering trace mineral adjustments.

Fossil humates generally need a little nitrogen and sulphur along with whatever else is applied as rock phosphate, gypsum, borax, copper, zinc, manganese or sea minerals. But 50 kg ammonium sulphate per 250 kg raw humates per hectare [50 lbs per acre] is a reasonable rate. Since ammonium sulphate is not allowed by organic certification programs, it can work to use chicken manure at twice the rate for ammonium sulphate—mix well and give this at least three weeks to react.

The total test ratios of carbon to nitrogen and sulphur should be used for nitrogen and sulphur targets while calcium, magnesium and potassium targets are derived from their percentages in the soluble portion of the soil colloids, which is known as the cation exchange capacity. Other targets vary depending on the test used, and achieving these targets is likely to require many partial adjustments. Exact formulas for restoring optimum balance in soils is the job of a professional consultant. In general, however, never add more at one time than 10 kg/ha borax, 15 kg/ha copper sulphate, 25 kg/ha zinc or manganese sulphate or 1 kg/ha sodium molybdate, cobalt sulphate or sodium selenate.[11] Blend mineral supplements in with humic materials to turn an expense into a capital investment.

[11] *Whenever metric rates are given in kg/ha [kilograms per hectare] these can be converted using the same rates as lbs/acre [pounds per acre] with sufficient accuracy even though this rounds off the decimals in the calculations.*



The Biodynamic Preparations

Imparting Life to the Land

Science depends on mathematics for rigor, but this has proven difficult when dealing with life and living organisms. Throughout the twentieth century science has gradually developed a mathematics of life; but at the time of Rudolf Steiner's medical and agricultural lectures he alone amongst his mathematical peers had connected the dots between projective geometry, biochemistry and agricultural practice. His key insight was that life arises at boundaries and a farm should be a self-contained, living entity whose internal organisation produces most of what it needs within itself, as a reflection of the surrounding cosmos impinging on its boundaries. Steiner's use of homeopathic medicines and the investigations of his agricultural preparations by Lily Kolisko show that patterns which give rise to specific biological activities not only can be prepared from materials produced on farms, these patterns can be imparted over and over again with remarkable ease, economy and efficiency.[12] *Yet, as we will see, they are dependent on the rhythms of the universe.*

When Steiner introduced his biodynamic preparations as a way to impart a new organisational impulse to the land he was so far ahead of the times that many have heard about these methods from a scoffing or intemperate source and concluded "Pity that they've lost their minds." Many biodynamic practitioners are unable to explain why the preparations work, and just say, "Try it and see for yourself . . ."

At first glance the methods for making and applying the biodynamic preparations may seem more like alchemy than farming. Some try using these preparations and see profound results, while others see no significant benefits. Often the making and using of the preparations seems puzzling and too hard. Almost no one who sees little result when trying their hand at making and using biodynamic preparations is sure they did everything

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[12] *The book,* ***Hugo Erbe's New Bio-dynamic Preparations****, details 22 biodynamic remedies in addition to the basic nine in Steiner's agriculture course. Lily Kolisko thoroughly investigated Steiner's agricultural remedies and their homeopathic application in her book,* ***Agriculture of Tomorrow****. George Adams and Olive Whicher's projective geometry text,* ***The Plant Between Sun and Earth*** *unfolds the mathematical side of Steiner's agricultural work. Chaos Theory, which supports Steiner's biodynamic preparation applications, is explained in James Gleick's* ***Chaos, Making A New Science****. Quantum theory, which is accessible to the layman with Lynne McTaggart's* ***The Field****, shows how far ahead of his time Steiner was—and still is. Rupert Sheldrake's* ***Morphic Resonance*** *rounds out 20th century efforts to join quantum physics with the life sciences. In all these avenues of scientific advance, Rudolf Steiner was one of the great pioneers.*

properly, as not many know what is truly required. This is scientific trailblazing with all of its trials and pitfalls.

Today various biodynamic associations have undertaken the work of making large quantities of preparations—horn manure, horn silica, horn clays, the herbal composting preparations and combination preparations such as barrel compound, cow pat pit or soil activator. There is compelling evidence that making these preparations again and again in the same places builds up the biological energies that make better preparations. By the same token, those who make their own preparations shouldn't be discouraged with the results from first attempts. Use them and make more. They probably will get better and better. In the meanwhile, preparations of good quality can be ordered when needed from central sources that support the spread of this method. Search the internet.

Composite preparations that combine preparations, such as soil activator, have become popular because they save time and money. Soil activator extends the various preparations as well as combining them in a one step, easy-to-use form. Methods that promote ease and efficiency are certainly welcome. Many other innovations are bound to come to the fore as biodynamics increasingly is recognised as the most scientific, most comprehensive and most all-embracing agricultural method.

Like seeds growing into a forest, life is something that starts tiny and grows large. When we use the biodynamic preparations to sow the seeds of life into a field or a compost pile we should not be surprised that these organisational activities grow from small beginnings and influence not only a field or a compost pile but whatever grows thereafter in that field or anywhere the compost is spread. The biodynamic preparations are an essential part of quantum agriculture because they impart life, and life grows.

Some Background

Biodynamics and quantum agriculture are unique among agricultural methods in their understanding of life and life processes. From his earliest mathematical studies Rudolf Steiner, who introduced these core principles and practices, discovered that every geometric system of defining objects by their internal components had a counterpart that defined the same objects relative to their surroundings. Steiner had the profound insight that the mathematics of living organisms required *both* points of view. Mathematics had to describe living organisms from their content *and* their context. Life arose at the boundaries between content and context. Living organisms *reflected* their surroundings. At the time of his agriculture lectures in 1924 Steiner, alone amongst his scientific peers, realised how the outer membranes of organisms, their cell walls, skins or epithelial tissues were where organisms responded to their vast and complex surroundings—and these surroundings were their source of life. In short, the cosmos drives life processes, bestowing both organisation and significance.

The surrounding universe meets the human body at the skin, the digestion, the eyes and other senses, but most importantly in the lungs and the diaphragm. Life would expire in mere minutes without breath. Thus when Steiner looked at the earth as a living, breathing organism he compared the earth's surface to the human diaphragm.

The activities we see working into the soil from above relate to Mercury, Venus and the Moon and how they affect the digestive tract, the urinary/excretory system and reproduction. These influences enter the soil from the atmosphere and become active within the earth in the processes of mineral release, nitrogen fixation, digestion and nutrient uptake.

On the other hand, what we see working outward from within the earth relates to Mars, Jupiter and Saturn and how they affect the limbs, the liver, the heart and respiration. These influences stream forth from within the earth to become active in the processes of photosynthesis, blossoming, fruiting and ripening.

The dynamics of the Moon, Mercury and Venus, which occur between the Sun and earth, drive the activities below the surface within the soil. The dynamics of Mars, Jupiter and Saturn, which occur beyond the Sun and earth, drive the activities above the surface of the soil. This was a key realization.

Making agriculture thrive requires increasing and enhancing the interplay between what goes on below the surface and what goes on above.

Steiner contrasted the hungry, grasping lime activity between the sun and the earth with the aloof, aristocratic silica activity beyond the sun and the earth. In agriculture there is always this dance between lime and silica, night and day, winter and summer, nitrogen and carbon, legumes and grasses, soil and atmosphere, inner and outer planets, sedimentary and igneous rocks, plant reproduction and food production. Here on the earth we are the clay that mediates between these two dynamics. This way of looking at things assigns everything a place and every item is part of the picture. The below ground processes relate to mineral release, nitrogen fixation, digestion and nutrient uptake, while the above ground processes relate to photosynthesis, blossoming, fruiting and ripening.

As a conceptual system, biodynamics and quantum agriculture help us balance and enhance agricultural activities. We see how everything fits into bigger and bigger pictures and what the causes and consequences of various things may be. It helps us understand how to balance and strengthen the biological activities on our farms so they thrive and produce beautiful, delicious, nutritious results.

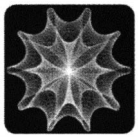
For Steiner, knowing things included putting them to work. He drew great

inspiration from Goethe, who studied the work of Paracelsus, the renaissance physician who established the role of chemistry in medicine. Paracelsus described a remedy as 'like a spark that, though it has no weight, can set a house afire.' Steiner's remedies for agriculture were like sparks of life that could take root and grow. Like seeds, these remedies could be sown and re-sown, again and again bringing generation after generation of living activities to the soil, the air above it and all the participants in the biosphere.

These remedies, known today as the biodynamic preparations, are of three sorts—the field sprays, the herbal compost preparations and the peppers. Steiner's field sprays used cow horns as sheaths to focus the resonant energies of the earth on materials packed within the horns and buried either over winter or over summer in the soil. This thoroughly imparted the characteristic energies of the season, transforming the substances within the resonant cavity of the horns. For the lime processes he filled mature cow horns with cow manure from lactating cows and buried them over the winter. For the silica processes he used extremely fine silica powder buried over the summer. He identified clay as the mediator between lime and silica and alluded to making a clay remedy in his second lecture, but he did not give specific recommendations for this in his agriculture course. All we have is an oral tradition that in making these remedies he sealed the open end of each horn with a plug of clay. With this in mind it has become common practice in Australia to make summer and winter horn clay.

He also gave instructions for making six herbal remedies made from yarrow, chamomile, stinging nettle, oak bark, dandelion and valerian to improve and enhance composts, and a seventh herbal remedy, a decoction from meadow horsetail, to use in case of excessively wet conditions, accompanied by nitrification. These procedures can be found in Steiner's *Agriculture Course* and other biodynamic publications, as well as this book.

During the Nazi years biodynamic practitioners were persecuted by Himmler's SS, and a code for referring to the preparations was adopted. Horn manure was 500, horn silica was 501, and the various herbal preparations were numbers 502 through 507. The horsetail preparation was referred to as 508. This numbering system is still in use today. To avoid confusion the preparations are referred to here by their full names with their corresponding numbers in brackets.



Spraying Biodynamic Preparations

Stirring and Spraying

The biodynamic preparations are the practical measures that make biodynamics effective. No one owns them. For many, including those with reasonably modern scientific educations, they are the hardest part of biodynamics to understand simply because extremely small amounts of specially prepared materials are used to produce profoundly beneficial results. These pre-potent preparations can be thought of as sparks that ignite life, or as catalysts that initiate reactions. Some think of them as seeds. How they work is open to interpretation and debate as explanations vary. What is certain is that quality and nutritional density of crops improve with their use—sometimes markedly. Plants and animals recover from impairment and diversity of soil life is restored. There is good reason to use them over the widest possible areas of the earth. Methods for using them are explained here in the spirit of openness, freedom and encouragement to learn. They need not be followed as dogmas.

Hydrogen and Its Oxide, Water

Hydrogen is profoundly organisational in the way it bonds with oxygen to create structures in water and in carbohydrates such as sugars, alcohols, oils and waxes. Because of hydrogen bonding, water has a memory for patterns built into its molecular structure. These patterns become embedded in water structures. They provide organisation, which is the basis of life, and life increases and multiplies itself. By doing what it does, life reverses entropy, giving rise to order out of chaos. Hydrogen inspires life. Oxygen is its carrier.

During Steiner's time science was deeply enthralled with the belief that all dynamic systems ran down and lost their available energy. Never mind that this concept—entropy—failed to explain how living organisms grow and reproduce. The opposite of entropy—syntropy—is where living processes build up energy and complexity within their limits, much as a summer thundershower does. From small beginnings it gathers and condenses moisture from the surrounding air, builds into a storm, releases its concentrated energy and dissipates.

We commonly notice things that run down and lose their integrity, but what about living organisms that so obviously accumulate energy, grow and reproduce? The key point is the life processes of living organisms follow patterns that favour

the accumulation of energy. Water, with its capacity for memory, is the perfect medium to impart these patterns to both soil and atmosphere. After all, no matter how dry the soil or the air may be, they always contain a certain amount of moisture. Water is easy to drench the soil with, or to spray into the atmosphere. We only need to know how to impart the patterns we desire into water we spray with.[13]

Vortexial motion organises water molecules into layers that slide across each other with the utmost intimacy in what is called laminar flow. Laminar flow allows a thorough penetration of the patterns of such things as the biodynamic preparations into an aqueous medium. This penetration reproduces and intensifies them, while serving as a means for application. Laminar flow can be produced by hand stirring, stirring machines, flow forms and succussion, using water for applying biodynamic preparations. There are, of course, other means.

Water Quality

Since water is the universal solvent, it contains traces of many things. It is never absolutely pure, but the water used for biodynamic applications should be the cleanest and clearest available, whether spring water, rainwater, bore water or whatever. If using chlorinated, fluoridated municipal water, expose it to the sun and air for a day or two to evaporate as much as possible of these powerful halogens. If using bore water, avoid high levels of metals such as iron, sulphur or sodium.

In cool climates farmers may warm their water to blood temperature, usually by wood or gas fires. This is individual preference since many farmers report good results without warming their water at all. However it is recommended to pre-warm some water to dissolve soil activator, horn manure, etc. prior to introducing them into a stirring operation or a flow form. For further information it may help to google *structured water*.

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[13] *Study of the nature of water is one of the many scientific initiatives inspired by J. W. von Goethe and developed further by Rudolf Steiner, Victor Schauberger and others. Further understanding of the nature of water and its use in biodynamic agriculture can be gained from lectures on the internet about biodynamics and biodynamic preparations by Dennis Klocek (see dennisklocek.com). For more in-depth study, read* ***Sensitive Chaos*** *and* ***Water—The Element of Life*** *by Theodor Schwenk. Also highly recommended is* ***Living Energies*** *by Callum Coats, along with* ***Living Water*** *by Olof Alexandersson.*

Hand Stirring

This is usually done in a level, circular vessel, such as an earthenware crock or 20 litre (5.3 gal) bucket. Stir round and round to create a strong vortex. The water will become organized into laminar layers so that the cooler, denser water moves to the middle and sinks while the warmer layers seek the edges and rise. The appearance is one of a spinning funnel. Once the vortex is mature, reverse the direction of stirring. The water will churn and froth in chaos until a new vortex is formed. When that vortex is fully formed, reverse direction again and form a new vortex. Repeat this again and again, back and forth, for an hour. Each time a new vortex is established a new generation of organization is born, and organization is the basis of life. By creating generation after generation of order, we build up a cosmic evolution of order. This can be thought of as a meditative process that charges up the remedy with life force while imparting the intentions and vibrations of the person doing the stirring. Then what one intends, one will grow.

If the area to be covered is small, the preparation can be stirred in a bucket, an old copper or an earthenware urn. It is important to choose a container that will comfortably stir the amount of water needed. For example, half a hectare would require approximately 17 litres of water, or an acre would require 3 gallons.

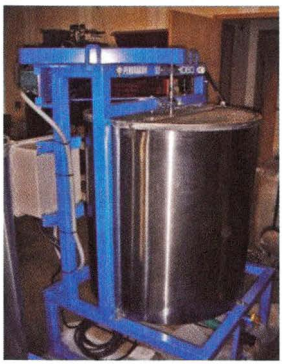
It is okay to pause and watch the patterns in the water, but the idea is to keep the water in motion insofar as possible for a full hour.

Some choose to stir alone for a quiet, meditative, reflective experience. Others may listen to the radio, read a book, or get family and friends involved. Often for a gathering or workshop, preparations are stirred at the start of the event as a way of introducing newcomers to the activity. For larger areas, perhaps up to five hectares or more, a 200 litre drum [55 gallon barrel] or multiples of this can be used with pole(s) suspended from a limb, beam or bracket(s). This will stir about 170 litres [44 gallons] per barrel. Some prefer a tripod set up over a wine barrel.

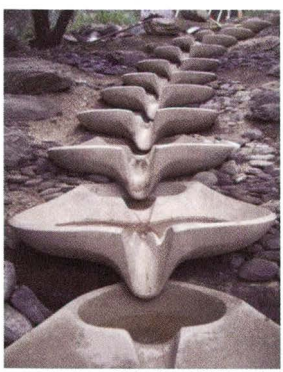
Mechanical Stirring

Two types of mechanical stirring devices are available.

- Stirring machines: These were adopted approximately 50 years ago, and depending on their design they usually enable 160 to 400 litres [42 to 105 gallons] of preparations to be stirred at one time.
- Flowforms: These are a more recent development, gaining acceptance about 30 years ago. Depending on their designs, they enable farmers to stir 500 to 2800 litres [130 to735 gallons] at one time.



These innovations have helped the uptake of biodynamic practices by larger commercial farmers and graziers. Both devices create effective vortices and can easily operate for an hour. Stirring machines create vertical vortices as with hand stirring, while flowforms create both horizontal and vertical vortices leading to an energetic pulsing of the water.



Stirring Machines

These are usually made with copper or stainless steel tanks and are built to stir in one direction, then switch directions to create chaos and a new vortex in the opposite direction. Normally the paddles in stirring machines develop a vortex in 18 to 24 seconds, then rest for 5 seconds before starting into the reverse cycle.

Flowforms

Studying water and how it automatically produces vortices as it cascades downwards over forms gave rise to the development of flowforms. Flowforms are a series of bowls that allow gravity to vortex the water so it flows around in a vortical lemniscate over both sides of a double bowl before dropping into the next lower bowl. It does the same thing in each successive bowl until it reaches the bottom container and is pumped or lifted back up to the top bowl to repeat the journey. Flowforms provide vortical motion and laminar flow that can activate biodynamic preparations on a very large scale. In the words of flowform designer, John Wilkes:

"Everything living is rhythmical. Everything is born through the watery realm. Water cannot refuse; it's the most sacrificial element."

John Wilkes of the United Kingdom (flowform.net), Jennifer Green (waterresearch.org) of the Water Research Institute in Blue Hill, Maine and Phil Sedgeman (livingwaterflowforms.com) in Byron Bay, NSW have pioneered the use of flowforms in the application of biodynamic preparations. Flowforms are often used for activating the sprays for aerial applications over large cattle stations and rough terrain. They are flexible and offer the ability to expand the number of bowls, with a range of models varying from three bowls that handle 1000 litres/hour [260 gal/hr] to 5 bowls and 1900 litres/hour [500 gal] to 7 bowls and 2800 litres/hour [735 gal]. There also are smaller models that can handle 70 to 500 litres/hour [18 to 130 gal] for smaller properties.

Fieldbroadcasters

These are stationary, self-driven induction field devices that are designed like crystal radio sets and driven by ambient electron flow between the soil and atmosphere. Present designs cover an area of up to 2,500 hectares or 6,000 acres, and will set up energy patterns derived from the biodynamic preparations in the biological zone between the subsoil and the immediate lower atmosphere where the warmth and light ethers work on most crops. More information on this subject along with product availability can be found at www.quantumagriculture.com

Hand Application

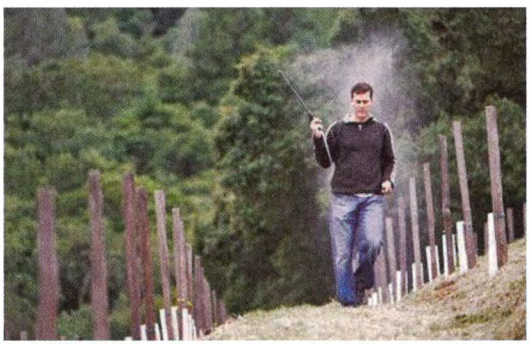
As with any procedure, the equipment used will vary depending on the area involved. If doing a garden or small block of no more than one or two acres hand application with a large brush or whisk broom is used. For larger areas, backpack sprayers or larger mechanised equipment are more realistic.

Spraying

Biodynamic field sprays are of two types.

- Soil preparations
- Atmospheric preparations

Soil Preparations include Horn Manure [500], Winter Horn Clay, Barrel Compost [Cow Pat Pit], and Soil Activator [includes all the preparations] Fermented horsetail or sheoak decoction[14] may be included with these preparations. The horn preparations are usually stirred for one hour, and are applied in large droplets to soak into the soil in late afternoon (generally after 3 p.m.) when the earth begins to breathe in.



Applying Horn Silica as a mist into the atmosphere

Atmospheric Preparations include Horn Silica [501], Summer Horn Clay, fresh horsetail or sheoak decoction [508]. This may include insect pepper sprays. The summer horn clay can be stirred for an hour along with horn silica, while other sprays, such as the horsetail or peppers, are stirred for 15 or 20 minutes.

Spray Rigs

All Tanks should be clean and preferably not previously used for toxic chemical applications. Tanks can be cleaned using warm water and rinsed with bicarbonate of soda at a rate of 0.5 kg/1000 L water. All rubber or plastic fittings and nozzles should be replaced if the tank is not new. For large droplet sprays a central three jet nozzles mounted low to the ground for horizontal spraying will give between 10 to 15 metres [12 to 18 yards] coverage at pressures of 10 to 40 psi [0.7 to 2.1 bar]. For mists, fine nozzles and higher pressures of 25 to 100 psi [1.5 to 7 bar] are used. If your sprayers do not meet these specs, so what? Do your best and spray anyway. If you don't spray you can be sure the biodynamics won't work. Do it.

Filtering

It is important to filter all biodynamic preparations through a fine mesh filter

[14] *The horsetail used for making 508 usually is Equisetum arvense; The sheoaks used usually are Casuarina equisetifolia or Casuarina cunninghamiana.*

sock or stocking before going into the spray rig or irrigation system to avoid clogging of pumps, pipes and nozzles. It also is advisable to have an in-line filter between the pump and the nozzles as accidents happen that can waste time.

Pumps

Diaphragm, vane or gear pumps are usually used for applying preparations. Soil sprays are usually applied between 0.7 to 1.5 bar [10 to 25 psi]. Atmosphere sprays usually are applied at 5.3 to 6.8 bar (80 to 100 psi).

Spray Nozzles

Spray nozzles can be made from pipe caps as per John Priestley's design.

Use 20mm / ¾ inch brass end caps with holes drilled as illustrated

For horn manure [500] holes 1 & 5 x 2mm,
holes 2, 3 & 4 x 1.5mm

For fish, seaweed emulsion and molasses,
holes 1 & 5 x 2.5mm,
holes 2, 3 and 4 x 2mm

For horn silica [501] drill 5 x 1mm holes as shown.

Frequency of Application

A basic minimum program would be to apply all the soil and atmospheric preparations twice per year, in spring and autumn. However, some use both the soil and atmospheric preparations monthly for the first year. This can help firmly establish the biodynamic preparation processes so they improve soil structure, increase root depth and increase photosynthesis and boost sap flow. Others, perhaps not in a hurry, simply apply the preparations in autumn and in spring.

Ensuring Success

Where important nutrients are critically deficient they need to be supplied. Plants generally give indications of deficiencies, and if these are supplied growth will improve. Soil tests can provide a useful reference for improvements.

Meanwhile, the imagination and ingenuity of the farmer is the chief limiting factor in the methods and types of equipment used for applying biodynamic preparations. These preparations are living substances. Despite their resilience and ability to recover from stressful conditions, they should be stored with care. Preparations should not be allowed to dry out, nor should they be sealed too tightly. If ordering preparations from elsewhere, try to order what you will use within the following month so storage is not an issue.

Other Methods

Shane Joyce on his cattle station near Theodore, QLD found some particularly economical methods for applying the preparations over large areas. By spraying his boundaries and roads and a matrix of north/south, east/west laneways across his cattle station he applied preparations to the property as a grid. He also used bags made from shade cloth filled with soil activator [made on his cattle station] in his watering troughs. The cattle drank the water from these 'tea bags' and spread the influences. The effects seemed evident from the urine patches in his pastures that spread and joined up with each other. He also invested in three field broadcasters to broadcast the patterns of the biodynamic preparations within the cattle station's boundaries—another way to establish the preparation processes.

By no means is this the end of innovation. Doubtless even more economical means will be found to answer Steiner's challenge that the most important thing is to provide the benefits of the biodynamic preparations to the widest possible areas of the entire earth for its healing and the improvement of its produce in every respect. We will see more along these lines with quantum non-locality and entanglement in the section on radionics.

Goethean Phenomenology

Studying the Bigger Picture

Biodynamics and quantum agriculture developed out of a different scientific tradition from what we are usually taught. J. W. von Goethe not only understood that the observer and the phenomena are inseparably linked, but his approach to knowing was different.

The usual method in the inorganic sciences is to form an idea or hypothesis and then set up experiments to prove or disprove it. Comparisons look for differences. For physics and chemistry this works wonders, but in the life sciences this method fails to reveal the more subtle processes that occur. What happens when life processes shift gears and vegetative phase growth moves into blossoming and fruiting or the plant goes into dormancy?

There are some things that require a different method. 14 day weather forecasts are often wrong. Darwinian evolutionary theory fails to explain why evolution has proceeded in magnificent bursts followed by glacial change. What happens when insects pupate?

Weather forecasting assumes that processes we see going on at present will continue—but the weather itself doesn't work that way. New weather systems arise and others disappear, even though a certain equilibrium seems to prevail where extremes balance out.

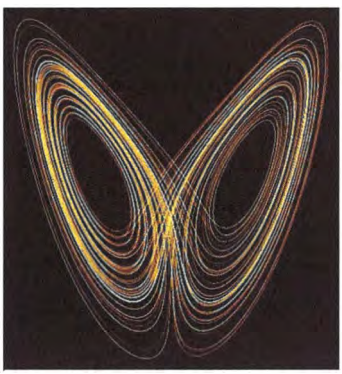
Darwinian evolution presumes survival of the fittest, but this fails to explain mass extinctions or the subsequent furious proliferation of new species that fill the void. Obviously more than survival of the fittest is involved. How can we explain or predict this?

As with human medicine, the study of agriculture requires another approach, a Goethean approach, known as "phenomenology." This explores how phenomena unfold over time according to patterns that can only be seen when the entire field of observation comes into focus. Once the behaviour of the field as a whole is grasped, the emergence and development of future phenomena can be predicted with accuracy. However, any attempt to form a hypothesis before seeing the bigger picture is futile since the phenomenological approach to science is not based on cause and effect the way physics and chemistry are.

Chaos Theory

Science evolves in interesting ways. Many of the paths for change are blocked because recognized authorities at the tops of their fields defend the discoveries and beliefs that made their reputations, and these beliefs become the dogmas that dominate peer review and stifle innovation. One of the early architects of quantum physics, Wolfgang Pauli, described this inertia to change with the wry comment, "Science advances one funeral at a time." Nevertheless, change is

irrepressible, and if it doesn't take place along old, established paths, then new avenues arise. One such event occurred in the mid 1950s when Edward Lorenz, a mathematician working on early computer models of weather prediction, discovered what became known as the "butterfly effect" where even the smallest changes produced very different results. Interestingly, the results were far from random because they oscillated around something so potent and obscure it became known as a "strange attractor." This gave rise to the new science of chaos, born as a result of Lorenz's computer crash.[15] The attraction of seemingly different results to an overall pattern is considered strange because we do not know why the attraction occurs. Yet the phenomenologist acknowledges this attraction exists even though no cause and effect relationship is seen.



Strange Attractor

Phenomenology

In a broad sense, phenomenology is a study that helps observers grasp the underlying patterns behind living phenomena. The pattern may only be apparent at the end of a long series of observations which reveal similarities and attractions. Setting up experiments to prove or disprove a hypothesis isn't much help in getting there because those sorts of experiments reveal differences rather than common threads.

Goethe's treatise, ***The Metamorphosis of Plants***, is the story of what plants do that is so plant-ish. It is an example of studying plants of all sorts until the fundamental character of plant processes emerges.

In order to edit Goethe's scientific writings, Rudolf Steiner made an in-depth study of Goethe's phenomenology, without which the biodynamic method might never have been born. Where the standard approach goes from hypothesis to experiment and homes in on differences, the essence of phenomenology is to look for coincidence, attraction, synchronicity and similarity—in other words, character. Two events that show synchronicity could easily be part of a larger whole that is not yet perceived. Synchronous timing of rhythmic events suggests underlying features of a bigger picture. The Goethean approach is to keep looking

[15] *This story is well told in James Gleick's book,* ***Chaos: Making a New Science***.

for coincidence, attraction, synchronicity and similarity as bigger and bigger pictures emerge. For example, in his book about climate, Dennis Klocek states:

> *"The lunar orbit is a rhythmic phenomenon. The migration of air masses is also a rhythmic phenomenon. The juxtaposition of the movements of the Moon with abrupt shifts in stable air masses makes it possible to track the movements of the Moon by watching the atmosphere over the northern hemisphere."*[16]

From the viewpoint of Goethean Phenomenology it is hard to deny the synchronicity between the months, seasons, weather events and crop failures or bumper harvests of various different years and the motions relative to the earth of the Sun, Moon and planets against the starry background of the universe.

On-Going Observation

For Goethean phenomenology the process of observation never ceases. Our modern educational system teaches us to answer a question with a single answer and then move on—as though all questions had one and only one answer. The problem with this is we learn to accept substitutes for the real things, as though we could take a picture of a horse and call it a horse. Yet, the more we watch cycle after cycle of living activity the less we can pretend the corpse of a butterfly in a specimen case is the butterfly itself. The living, breathing butterfly is sometimes in the form of an egg, or it is a caterpillar or a pupae depending on its circumstance and timing. No matter how we look at a living butterfly, change is occurring. If not, then we are looking at a dead object which once housed something called a butterfly which now has vanished.

Just looking at a butterfly egg; what is there to suggest the sort of caterpillar that will emerge or where it will go and what it will eat? In the caterpillar what do we see to suggest the pupae or the adult it will become? The transformations are as brief as they are radical. The root does not itself reveal the tree trunk, its foliage or its fruit. And yet, within each tree there lies a *gestalt* that includes all phases and forms of that type of tree's development and how it may respond to every situation where its seed may fall or its roots take hold. This *gestalt* only emerges from a long process of observing the tree in as many situations and circumstances as possible, including its seeds and where they go. Biophysicist

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[16] ***Climate: Soul of the Earth*** *by Dennis Klocek, page 63.*

Rupert Sheldrake calls this *gestalt* the organism's morphogenic field.[17] Observation is never truly complete since more and more of bigger and bigger pictures keep emerging over time.

Our Reality, Our Hope

From the viewpoint of Goethean phenomenology the dating of geological processes based on what we know of the past few hundred years is like studying a ten year old dog for a month and estimating how old it is based on the changes that occurred over that month. This in no way reveals the speed of its growth as a puppy, its youthful behaviour or the senescence of its last year of life. To calculate the life cycle of dogs and envision their pasts and futures based on a month of first hand observations of a ten year old dog is enormously misleading. A bigger picture and a broader understanding has to emerge to achieve an accurate comprehension—simple as that.

Solving agricultural riddles involves much the same process as the psychologist who asks his clients a cycle of questions:

a) *What is the Problem?*
   Thank you.
b) *How have you participated in this problem?*
   Thank you.
c) *How have you tried to solve it?*
   Thank you, and
d) *How does it seem now?*
   Thank you.

The psychologist gets a clear answer to every question and acknowledges each answer as simply as possible. By the time he returns to the first question, *What is the Problem?* He is likely to get an entirely new description of the problem. As he works through the following series of these questions more and more of the picture emerges. Each time he starts the question cycle over again the description of the problem has changed—as though peeling a large, colourful onion. From this an overview of the problem emerges. Usually this repetition of a series of questions resolves the client's problem because, for the first time, the client sees the true nature of his problem emerge from the tangle of his previous considerations.

The agricultural consultant might also ask the same cyclical questions over and

[17] ***Morphic Resonance: The Nature of Formative Causation*** *by Rupert Sheldrake.*

over so that each time the grower's situation is examined anew. The grower usually has an enormous amount of information already, but what resolves his problem is seeing the bigger picture. This overview often involves the aims and choices of the farmer himself. The bigger picture is never a matter of one crop on one soil over one season in one set of circumstances. Any puzzle can be examined with this approach to observation, always looking for the coincidences, attractions and similarities that lead to comprehending the bigger picture. This is a very different approach to knowledge than the analytical method.

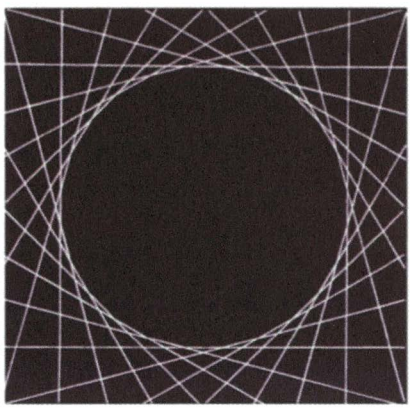
The quest for uncovering the processes of nature is far from hopeless. Biodynamics and quantum agriculture, which have grown out of Goethean phenomenology, have made a promising start at seeing far bigger pictures that lie behind the everyday circumstances of growing food. Our quest to understand nature can be carried a lot further as long as we grasp Goethean phenomenology and we learn how to use it.

We do not claim that the Biodynamic Method completely counteracts insect pests. This would create a false impression. The important question is not: "Are insect pests present?" but rather, "Do they spread out and do they produce measurable damage?" A few insects may be present, this is always possible. They may be wind-borne, or move in from infected areas. That is bound to happen occasionally. But we have found, in our years of biodynamic farming experience, that they definitely did not spread or do great economic damage in most regions.

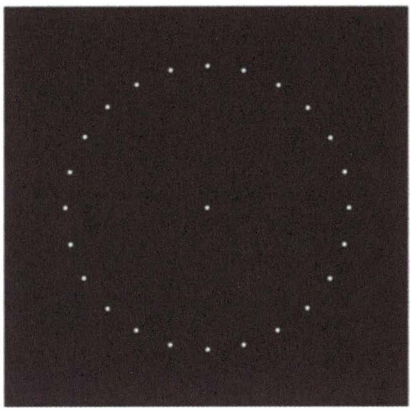
The question of insect pests is usually one of biological balance and control. Poisoning sprays have not solved, nor can they solve, the problem. If the biological balance is restored the situation will be entirely different.

–Ehrenfried E. Pfeiffer

Context and Content



*Linewise Circle**



*Pointwise Circle**

The above two images from The Plant Between Sun and Earth by George Adams and Olive Whicher are both representations of the same circle. The Pointwise Circle on the right is drawn from the perspective of Euclidean Geometry which describes the circumference as a function of the circle's centre using the formula $C = 2\pi r$. This describes the content of the circle. The Linewise Circle on the left is drawn from the perspective of counter-Euclidean Geometry which looks at the circumference as a function of rotating a line tangent to the circle (extending to infinity in either direction) through 360 degrees of arc. This takes into account the context of the circle. Rudolf Steiner realized that we cannot develop a mathematics of life and living organisms without considering both the content and the context. Fortunately, astronomy provides a way of looking at the context, which gives us a framework for times and places of observations that can be used to discuss or interpret the Goethean Phenomenology of agriculture.

** Illustrations from **The Plant Between Sun and Earth** by Adams and Whicher.*

Planting Calendars

Why Are They Important?

The planet earth and all the life upon it is surrounded by a cosmic ballet of planetary and galactic movement of which we are largely unaware. Quantum agriculture and biodynamics acknowledge life on earth exists within this context of cosmological events—the kaliedoscopic relationships of Sun, Moon and planets in front of the constellations of the zodiac. Rudolf Steiner launched his first lecture on agriculture by pointing out that we, as human beings, tend not to notice how this affects our lives. We eat food grown and harvested a year or more previously, and the same is true of much else that nourishes and inspires us going back centuries. We tend not to notice how much more closely animals are tied to the present, or how utterly plants depend on current circumstances.

Steiner's early education in projective geometry inspired his realization that the inner organization of living organisms arises out of the surrounding context. Alone amongst his peers he grasped that an organism's outer boundaries—its skin, cell walls and epithelial tissues that met met the universe—are the key to its inner vitality. Steiner realized that a true mathematics of life depended on looking at how the inner geometry of content interacts with the outer geometry of context. Anything less fails to explain life. The vast expanses of the surrounding universe are reflected in each organism's inner organization.

It is easy to think that biodynamic or quantum agriculture is based on astrology since they use an 'astrological' calendar. We should note, however, that most western astrologers talk about the signs of the Tropical Zodiac, which is based on where the Vernal Equinox was at the time of Ptolemy, the Roman astrologer of 150 A.D. Biodynamic and quantum calendars are based on the constellations, which the British Navy and the US Naval Observatory meticulously observe and map for navigation. After all, ships, like plants, are immersed in the here and now. This exactitude in translating observations into tables of planetary positions gave Galileo his early training in mathematics. Biodynamics and quantum agriculture rely on current observations and ephemerides.

Modern astrology provides a framework for interpreting what astronomical observations mean. Astrologers say biodynamic calendars are sidereal, meaning they are based on the positions of actual stars around the solar equator rather than the Tropical Zodiac. When a biodynamic calendar says the moon is in Taurus, a Tropical almanac will say the moon is in Gemini. Keep this in mind if you have both calendars and get confused. Biodynamic calendars are based on modern observation, while tropical astrology is a philosophical system that uses thsee observations with an earlier frame of reference dating to 150 A. D.

In its defense, western astrology provides a useful system for interpreting astronomical events, and most biodynamic calendars use this. If one prefers the Indian, Persian or Chinese systems these are also valid though they are different. The observations are the

same for all systems but the methods of interpretation vary.

When we look outward at the universe we see 360° of complexity everywhere. Interpreting this requires holistic methods—such as the circular astrologer's chart. In biodynamics and quantum agriculture we look for broad and immedeate indications that tell us which dates and times are favourable or unfavourable for what we want to do. For the most part, the closest and fastest moving bodies—Moon, Sun, Mercury and Venus—are our main considerations, and It may be surprising how much this can tell us. But this could be taken a lot further, and at some point it will be.

All methods of interpreting astronomical data are holistic rather than analytical. This in no way invalidates how they explain the past or predict the future—which, incidentally, is the Holy Grail of science.The universe is coherent, and the movements of heavenly bodies—such as our sun, moon and planets—are an integral part of the seemingly unlikely and unpredictable choices and coincidences of our lives. The fact that our choices matter, shows the universe is non-linear and enormously complex—which is what gives our lives meaning. Keep in mind that we live in a world where 12.011 grams of carbon is 6.02 times 10^{23} number of atoms—602 sextillion atoms[18]. That, in anyone's book, is complexity.

When we look outward at the universe we see a similar complexity to what we see at the atomic level. If context matters, then the chemistry going on at the atomic level within us also relies on holistic interpretation.

Keep in mind that where there isn't much life there isn't much cosmic influence. The more our farms and gardens teem with life, the more important our Astro Calendars[19] become. Favourable times for planting, cultivating, pruning, haying, harvesting, breeding, making weed and pest peppers, and so forth assume more economic importance the more our farms come alive.

Moon Rhythms ☽

The moon is our closest astronomical companion with the fastest apparent

[18] *A sextillion is a billion times more than a trillion—yet in talking about a gram atomic weight of carbon atoms we are talking about only 12 grams of something that is pouring into the atmosphere by the billions of tons per year. This number is known as an Avogadro's Number after Amedeo Avogadro, the Italian scientist who, in the mid nineteenth century, first developed the concept of the number of atoms in a gram atomic weight.*

[19] *Sherry Wildfeuer's* ***Stella Natura*** *is popular in America, Maria Thun's* ***Working With the Stars*** *is widely used in Europe and Brian Keats'* ***Antipodean Astro Calendar*** *is used in Australia.*

motion. Waxing and waning moons are major lunar features. A complete moon cycle from New Moon to the next New Moon takes roughly 29.5 days. New Moon to Full Moon is a waxing Moon, while Full Moon to New Moon is a waning Moon. At New Moon, the Moon and Sun are conjunct. That is, they are in the same constellation, aligned with the earth. At Full Moon, the Moon and the Sun are in opposite constellations on opposite sides of the earth. Solar and lunar eclipses occur with an exact alignment between the Sun, the Moon at a node and the Earth. At solar eclipses the Sun and Moon are in the same constellation, while at lunar eclipses they are opposite. Some points to consider are:

- In the 48 hours leading up to Full Moon there is a distinct increase in the moisture content of the earth.
- At Full Moon the leafy growth forces of plants are enhanced.
- As the waxing Moon approaches Full it favours above ground growth, quick seed germination, and rapid regrowth of mown or pruned plants.
- During this period there is an increase in cell division and a tendency to extension and broadening of vegetative growth.
- Seed germination is prompt but may be a bit lush and prone to fungal attack, particularly with warm conditions and high humidity. [caution]
- Full Moon favours fungal growth when nitrification occurs. This tendency increases if the preceding period was dry and then turned wet.
- Full Moon goes hand-in-hand with easy absorption of liquid manures, which also may relate to nitrate uptake and lush growth.
- There also is an increase in visible activity of insect larvae, slugs, snails and worm parasites, as these are tied to nitrogen.
- There usually is a stronger tendency for rain to occur near Full Moon.

Considerations for the Waxing Moon

- Sow seeds near Full Moon at times of low humidity and warmth [48 hours before].
- Apply liquid manures. [48 hours before Full Moon].
- Fungus control – spray with Equisetum decoction, or 8x potency of this decoction along with a 0.5% sodium silicate or potassium silicate solution.
- For insect control follow the same procedures as for fungal control.
- For chewing and sucking insects., consider applying a garlic/ginger/chilli pepper spray, natural pyrethrum, or neem oil.
- For slugs and snails, dust susceptible plants with diatomaceous earth.

- Drench animals for internal parasites 48 hours before full moon—for example, on an empty stomach with garlic and apple cider vinegar.

Considerations for the Waning Moon

- Avoid sowing seeds for leafy, flowering or fruiting crops. Plant root crops.
- Fell timber, cut hay, harvest grains, tan hides, clean out barns, dry in new construction.
- Cultivate weeds, plough in cover crops, study weather patterns.
- Traditional Indian agriculture recognizes the day before New Moon as *No Moon* day, a day on which no agricultural work is done.

Ascending and Descending Moon

Another Moon rhythm is the Ascending and Descending cycle, which involves the northern and southern arcs of the Moon's orbit. The Moon is not quite in alignment with either the earth's equator or the solar ecliptic. It travels both north and south. When viewed from the northern hemisphere, as it arcs from east to west, it climbs when ascending and sinks when descending. This is a 27.2 day cycle, and each ascending or descending period lasts roughly two weeks.

Though it is a monthly cycle, the effects are similar to seasonal rhythms. An ascending lunar period is like spring and summer when the Earth breathes outward in growth. With an ascending moon, sap carries growth forces upwards more strongly and may increase nitrogenous activity. This should be tempered with silica for balance. Although germination takes place below ground, the upward striving of ascending moon makes growth unfold above the surface. To restrain this in wet weather, spray horn silica [501] or horsetail decoction. However, if it is dry, use horn manure [500] first and follow with 501.

A descending Moon cycle is like autumn and winter when the earth breathes its growth forces in. This energizes the lower parts of the plant, particularly the roots. This is when to cultivate and spread compost prior to planting. It also is when to apply horn manure [500], especially if conditions are dry.

Cereals and Fruits	Fire, Warmth Ether	Leo, Sagittarius and Aries
Leafy Greens, Broccoli	Water, Chemical Ether	Cancer, Scorpio and Pisces
Flowers (not broccoli)	Air, Light Ether	Gemini, Libra and Aquarius
Roots, Potatoes	Earth, Life Ether	Taurus, Virgo and Capricorn

Considerations for Ascending Moon

- Use an appropriate constellation for sowing/cultivating according to crop.
- Spray with horn silica [501] in the early stages of growth, using an appropriate constellation as above.
- Harvest in an air/light constellation (e.g. Gemini, Libra) for fruit and veg.
- Plant and harvest herbs for medicinal purposes, particularly those for making biodynamic preparations.
- Plant and harvest field crops such as silage and hay. Spray with 501 two days before harvest. This is more important when weather is cloudy or wet.

Considerations for Descending Moon

- Spray horn manure [500], horn clay and cow pat pit [CPP]—or soil activator—in the afternoon on descending moon in autumn and early spring.
- Make and spread compost, lime or other minerals; cultivate soil.
- Take cuttings and root them; transplant seedlings, vines, bushes and trees.
- Harvest root crops for storage on earth constellation days such as descending moon in Taurus.
- Prune fruit trees in the appropriate season on fire constellation days such as descending moon in Aries.
- Prune flowering trees and shrubs like roses in autumn or winter in air constellations, such as descending moon in Aquarius.

North and South Moon Nodes ☊ ☋

The moon's nodes are where the Moon's path crosses the path of the Sun. This is nearly a fortnightly rhythm. The influence of a node lasts for approximately 2 hours on either side of the node, and the effect is similar to an eclipse, as eclipses occur at nodes. It is best to avoid any agricultural or horticultural work for this brief period.

Apogee and Perigee

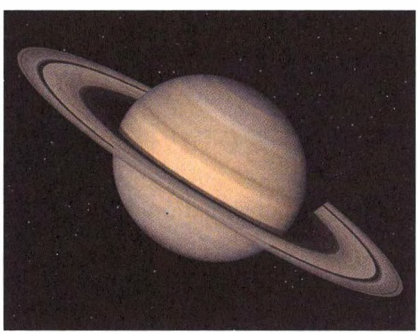
This is a bit different from the nodes. The moon moves around the Earth in a somewhat elongated circle called an ellipse. Unlike a circle, which has a single centre, an ellipse has two focal points. With the Moon's ellipse, the earth is at one of these—which means the Moon has a furthest and a nearest point from the earth. Apogee is the furthest point; perigee is the closest. The apogee/perigee cycle takes 27.55 days and apogee and perigee are similar in their effects to solar and lunar eclipses.

During Apogee there is always a multiplication of forms. This seems to be a good time to plant potatoes for quick harvest of multiple 'marble potatoes'. At perigee there are fewer but bigger potatoes, which may be better for use as 'French fries'. Keep in mind that Perigee, when the Moon is closest to the earth, brings greater moisture and a tendency towards fungal growth.

Exact apogee and perigee are stress periods and seed sowing should be avoided 12 hours on either side of these times (except for marble potatoes).

Moon and Saturn in Opposition ☽☍♄

Among the strange co-incidences of the solar system is the fact that the Moon, our nearest visible heavenly body, travels roughly the same distance around the zodiac in a day as Saturn, our most distant visible planetary body, travels in a year. This emphasizes the contrast between these two planetary bodies.



The cycle of Moon opposition Saturn occurs every 27.5 days when the Moon and Saturn are standing on opposite sides of the Earth and their forces are encountering the Earth from opposite directions. It might help with understanding this to observe that Full Moon is Moon opposition Sun—the Moon is rising in the east as the Sun sets in the west. This is usually visible, but Moon opposition Saturn usually is not.

The Moon's relationship with Saturn is particularly interesting since the Moon takes nearly 30 days to complete a trip around the Zodiac while Saturn takes nearly 30 years. When considering whether there is a master plan to the universe, the relationship of a day to a year should be taken into account. Also, the Moon has profound influences on water and moist conditions while Saturn is the solar system's gateway to warmth and evapouration. Water seeks horizontal motion while warmth rises vertically; so the Moon and precipitation is related to the lime axis while Saturn and evapouration is related to the silica axis. Plants need both lime and silica—moisture and warmth—to grow. This makes times when the Moon is in opposition to Saturn particularly interesting. However, we also need to consider the constellations where the Moon and Saturn are, as well as the other aspects they form on that day. Are we sowing in heavy drought or rain? Consider an Aries/Libra opposition with its overtones of fire and air could be different from

a Cancer/Capricorn opposition where water and earth are dominant.

Moon forces bring in the lime processes connected to propagation and growth, while Saturn forces bring in the silica processes connected to crystralizing form and establishing structure. Having a balance between these warmth/light and chemical/structure processes can produce strong plants from seed sown at this time. Spraying with horn silica preparation [501] at Moon opposition Saturn tends to strengthen plants' resistance to diseases and insects. Studies have shown the 48 hours leading up to ☽☍♄ can override ascending or descending Moons depending on the constellations involved. However, if this monthly event is missed, choose from other favourable times.

Notes for Moon Opposition Saturn ☽☍♄

- Sowing and transplanting may be favoured at this time, taking into consideration the weather and other circumstances.
- Spray in the morning with horn silica [501] either on the day or the day before Moon opposition Saturn for fungus, mildew or botrytis on grapes, rust on oats, fusarium on tomatoes, mildew on tamarillo, greasy spot on passion fruit, mildew on cucurbits, etc. Equisetum decoction [508] may be helpful.

  Note: Neither horn silica [501] nor Equisetum [508] are fungicides, but they strengthen plants and help them resist or overcome fungus if Saturn influences are weak.

Moon in the Zodiac

The Zodiac is a belt of fixed stars grouped in constellations. It surrounds the ecliptic, the path of the Sun. All the planetary bodies move in front of the Zodiac.

The Moon is the fastest moving body in our sky. It traverses the Zodiac every 27.3 days. Because the Moon's speed varies and the Zodiac's constellations are different sizes, the Moon may spend between 1.5 to 3.5 days per constellation. Each constellation provides different conditions, and the Moon channels these influences while it passes in front of each constellation.

Depending on where the Moon is, the influences of various constellations can be brought into the soil through cultivation, the use of composts or liquid manures and the planting of seeds. These activities connect the soil and its life forms to the rhythms of the cosmos. Earth constellations [Taurus ♉, Virgo ♍ and Capricorn ♑] are related to roots, air constellations [Gemini ♊, Libra ♎ and Aquarius ♒] are related to flowers, water constellations [Cancer ♋, Scorpio ♏ and Pisces ♓] to leaves and fire constellations [Aries ♈, Leo ♌ and Sagittarius ♐]

to fruits. If we are unable to plant on days when the Moon's position favours the type of results desired, the appropriate influence can be emphasized by cultivating or weeding in appropriate constellations. Ideally one would plant, cultivate, prune and pick when the Moon is in favourable constellations.

The word 'month' comes from the Moon, and the Moon forms every aspect to every other heavenly body once a month. For example, New Moon is when the Sun and Moon are conjunct, while Full Moon is where the Sun and Moon are in opposition. Conjunctions combine the qualities of both heavenly bodies where oppositions contrast these qualities, so New Moon provides the least contrast to solar influences where Full Moon provides the most. We can expect things to draw in and tighten up near New Moon, while at Full Moon they unfold.

Seed Sowing

Certain times can be beneficial for planting:

- Moon opposite Saturn
- 48 hours before Full Moon
- Waxing Moon for above ground crops (avoid Nodes, Perigee, Apogee and New Moon)
- Waning Moon for below ground crops
- Sow at the following times for the particular constellation effect:

Air/Light	flower	Gemini, Libra, Aquarius
Water/Tone	leaf	Cancer, Scorpio, Pisces
Warmth	fruit	Sagittarius
Warmth	seed	Aries, Leo
Earth	root	Capricorn, Taurus, Virgo

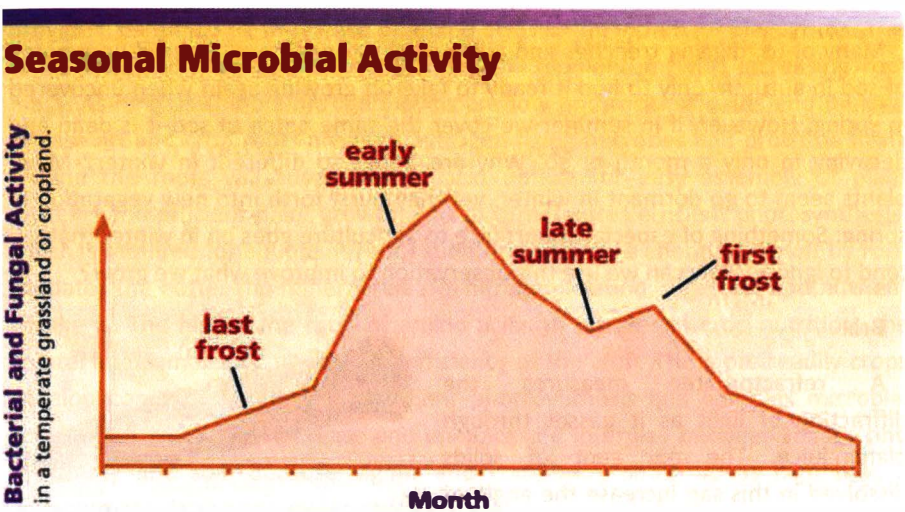
Harvesting

Generally crops such as fruits, green vegetables, hay and silage keep better and maintain quality in storage better if harvested during flower days in air/light constellations such as the Moon in Gemini or Libra. Avoid harvesting crops that need to be stored dry at Full Moon, Perigee and leaf days, especially when the Moon is in Cancer, Scorpio or Pisces. These are times that favour leafy activities. Crops harvested in these constellations may retain too much water for satisfactory storage. If there is a choice when harvesting seeds or grains, do this when the Moon is in Leo. Root vegetables and potatoes are better harvested in a

descending period with the Moon in an Earth sign such as Capricorn or Taurus. Liquid manure applications are taken up best just before Full Moon. Liquid manures can be used several times during a crop cycle.

On the other hand the need for fungus control is greatest at perigee and at Full Moon when the Moon's watery influence is strongest. Use the equisetum [508] before and after these periods if there is any tendency toward fungal growth. It will strengthen the silica processes, which often are weaker than they should be.

A lot more regarding the influences of Mercury and sun spots on the weather and many other related topics could be considered. A good website to visit for daily information might be ***Suspicious Observers*** on You Tube.



The Importance of Winter

More than Meets the Eye

Without using Goethean phenomenology, a great deal of what occurs in nature would pass us by, unseen, unconsidered and under-utilized. Just such a thing is what goes on in nature during winter. One might wonder why so many of the biodynamic preparations are made in winter. Of course, there are reasons, and there is more to it than meets the eye. Scientists may debate the observations that follow, but ultimately they cannot dispute that in winter things are different than in summer. Here Goethean phenomenology looks at the bigger picture and sees more in the similarities than is apparent in the differences.

Many of us, digging trenches and piling up the spoils, have covered up a patch of sod in autumn, only to find it ready to take off growing again when uncovered in spring. However, if in summer we cover the same patch of sod it is dead and decaying in only a month or so. Why are things so different in winter? Many plants seem to go dormant in winter, yet they burst forth into new vegetation in spring. Something of especial importance to agriculture goes on in winter that we tend to ignore. How can we use this observation to improve what we grow?

Brix

A refractometer measures the diffraction of light as it passes through plant juice. The per cent of solids dissolved in this sap increase the angle of diffraction, which is measured on something called the *brix* scale. Sugars and carbohydrates tend to make up roughly 90% of plant sap, even though this sap also contains enzymes, hormones, mineral chelates and amino acids in a wide spectrum of complexity. High brix usually means rich plant chemistry, not just high sugar—with one important exception. Under dry conditions plants taking up nitrate, potash and other salts can run short of water and can be high brix but low complexity. In this drought scenario, high brix means low sugar, low energy and a plant with little life force. This exception proves the rule that ordinarily high brix means efficient, high energy crops which pests and diseases find too dense and complex to digest.

Generally, low brix warns a grower that something needs to be done to boost

plant vitality. If the right things are done, brix will improve—sometimes dramatically. However, since a refractometer does not say what to do, relying on it can lead to false hopes for fixing things once they are broken. Remedies may fall short, and even expensive inputs like kelp and foliar chelates may fail to lift anaemic crops if these remedies don't address the true causes.

Experience shows that vigour commonly lags and crops run out of puff after the summer solstice when sap flow tapers back from its peak. What we fail to understand is that what happens in winter can set the stage for strong sap uptake and high brix even into the later part of summer.

Life Processes

As crop seeds sprout they give off nourishment for nitrogen fixing microbes. Protozoa and other soil animals then digest these nitrogen rich microbes and provide a continual fresh release of amino acids in the vicinity of plant roots. This process follows root development and gains momentum with increasing root mass. As long as soluble nitrogen levels are low and root exudates and mineral release around crop roots are high, nitrogen fixing microbes and protozoa living around the roots will supply amino acid uptake for easy assembly of plant proteins and efficient plant growth. This in turn assures efficient photosynthesis, which is required for abundant root exudation. The more energy given off by root exudates the better the mineral release, nitrogen fixation, digestion and nutrient uptake is. The higher the ratio of amino acids to nitrates in crop nutrition, the greater the complexity, vitality and efficiency of the crop. The more readily crops develop complex amino acids, efficient photosynthesis and complex microbial activity; the more they increase and enhance the interplay between foliage and roots, sky and soil. Because vigour and complexity show up as high brix, a refractometer is an easy way to measure crop complexity.

How Life Force Works

The key characteristic of life energy is it accumulates—it flows from lower concentration to higher concentration. Because of this, life begets more life—life is the only thing that does this. In biodynamics this life force is called *ether*.

There is both free flowing ether, such as accumulates in clouds or crystals, and there is bound ether as in what goes on within the skins or outer membranes of living organisms. Ether organizes the elements, which in the classical view are fire, air, water and earth. Ether permeates these with the processes of warmth, light, tone and life, and ether accumulates most strongly where carbon is plentiful. Thus

clouds organise moisture better and produce more rain over dense forests and carbon rich grass lands than over bare landscapes.

Since the Sun is by far the most organized body in the solar system, warmth spirals into the solar system from the cosmic background, passing through the vortexes of Saturn, Jupiter and Mars as it condenses into light, which we see reflected off of the photosphere of the sun. These warmth and light ethers bring with them the influences of Saturn (ripening process), Jupiter (fruiting process) and Mars (blossoming process) as they soak into the earth on its back side and flow upward towards the sun on the side facing the sun. Warmth and light are the forces that organize the earth's atmosphere. They are flowing and focused always on the sun. Thus, they soak into the earth when the sun is below the horizon.

Warmth and light work on the substances of plants in the upward flow of sap and in the process of photosynthesis. The extent to which they are incorporated into the plant is a measure of the plant's vitality and how well warmth and light work into the plant's chemistry and structure.

The situation is somewhat different with the tone and life ethers which organize the plant's chemistry and its structures. Although the Sun is the focus of warmth and light, the Sun, with its huge mass, further condenses the warmth and light ethers into tone and life ethers, whereupon these tone and life ethers are reflected back onto the earth through the vortexes of Mercury, Venus and the Moon. The tone and life ethers are what provide the processes of digestion, mineral release and nitrogen fixation which feed plant growth. In contrast to warmth and light the etheric processes of tone [chemistry] and life settle horizontally into the soil in the evening as the upwelling tension in the atmosphere relaxes. These denser chemical and life ethers are reflected onto the earth most strongly in the light of the full Moon.

In summer, especially in the higher latitudes, the warmth and light ethers flow forth strongly and soak in weakly. In winter this situation reverses as the sun spends more of the day below the horizon. Then the outward flow of warmth and light is weak and the inward flow is strong. This means the warmth and light ethers recede into the soil where they combine with the tone and life ethers over the winter. This joining up of the four ethers over winter has profound effects on the soil food web. Instead of warmth and light carrying the tone and life upwards in summer growth, in winter all four ethers build up together in the moisture and soil structure. They draw organization most strongly into the earth's biosphere—oceans and soils—at this time of year. This winter ether enrichment is why so many of the biodynamic preparations are buried over the winter.

Lime, Sand, Clay and Humus

From his studies in analytical chemistry, Rudolf Steiner realized lime and silica are the basis for the horizontal and vertical axes in the chemistry and structure of living organisms. Lime has a close relationship with sulphur, oxygen and amino acids which fill things out and make them fat. Silica, on the other hand, is related to carbon and the covalent bonding found in stems and transport structures, fibres, connective tissues, capillary vessels and skin. Steiner viewed this lime/silica interaction as an earthly/cosmic [horizontal/vertical] contrast. Clay and humus mediate between these two axes.

In spring and summer the buoyant 'cosmic' warmth and light work upward from within the earth via silica towards the sun. Due to the activity of clay and humus the warmth and light carry lime, amino acids and trace minerals from their embrace within the soil into plant growth, blossoming, fruiting and ripening. Warmth and light flow from beyond the earth toward the Sun, and as the summer reaches its longest day, the light forces reach the peak of their upwelling, after which sap vigour declines because the days get shorter—even though the warmth in the atmosphere is still increasing. Thus late summer crops tend to suffer if the earth has not stored up enough warmth and light ether in the clay/humus complexes of the soil food web over the previous winter.

In autumn and winter the denser 'earthly' forces of chemistry and life—reflected from the Sun via Mercury, Venus and the Moon—predominate. Along with these processes, warmth and light are drawn back into the earth. As the earth absorbs the fallen materials of summer growth, the tone and life processes work on them, digesting and incorporating them into the soil as stable clay/humus complexes. In this season the tone and life combine with warmth and light, and enliven the soil's chemistry and structure, building toward a maximum in mid-winter. Winter is when the earth wakes up to its inner life.

A Mystery Solved

We may have thought that in winter the earth goes to sleep; but winter is when plants above the earth senesce and their leaves and other materials are digested. This is when the warmth and light recede into the soil. In winter the earth becomes inwardly sensitive and alive. The summer atmospheric processes of warmth and light interact with the soil's winter lime processes, joining up with tone and life in clay/humus complexes. Both lime and silica, and the humus and clay they interact with, are enlivened by the way they complement each other at this time. As spring comes, the soil dozes off to sleep again and 'dies' as plant

growth outwardly expresses the activity that took place within the earth in winter when the soil was most sensitive and alive.

In winter many perennials go dormant above ground while their root growth becomes the focus of their activity. What warmth and light do within the earth is seen in how sweet the low-growing leaves of winter cereals are as they hug the earth during winter. This shows us a sugar making process of a different nature. It is even more apparent in the abundant upwelling of sugars in Canadian maples in the spring. The amount of sugar produced by maple tree roots beneath the winter snow speaks volumes about what warmth and light do within the earth.

Thus in the sod that survives while being covered over winter we see how the forces of the warmth and light ethers—which in summer worked in the foliage above ground—in winter join up with the tone and life ethers at the roots. In summer plants supply the connection between the warmth and light in the canopy and the tone and life in the soil. In summer when we interfere with this connection and create a barrier between the foliage and the soil, the plant dies. But, in winter this connection occurs within the soil itself.

Summer crops express the dreaming of the earth by growing upward into the atmosphere. It is no accident that 'awake' winter crops like wheat, barley and rye cling to the soil's surface all winter, spreading out a network of fine, sensitive roots brimming with life. As the earth dies off in spring, they rise in a tremendous spurt of growth, ripening their waving heads of grain in the summer warmth.

Balance and Remedy

If the earthly and cosmic streams of the inner and outer planets are imbalanced, crops can either be under-nourished and burn up from insufficient lime activity, or they can be too lush to ripen properly and thus be easily digested.

We should strengthen both cosmic and earthly streams in a balanced way. Understanding life forces and how they arise can help us balance and enrich either or both streams as needed. Building balanced life forces into the soil over winter ensures that warmth and light will carry the tone and life organization upward into crop production strongly enough to last throughout the summer.

Rudolf Steiner's *Agriculture Course* introduced horn manure and horn silica as preparations made by using cows' horns as focal devices to build coherent forces into the substances used to fill them. Once these preparations are unearthed again, the remedies can impart new vitality to the earth and its produce.

Because the ethers are organizational, energy flows from lower to higher concentration and like attracts like. The highly organized horn manure enriches

and enhances the flow of tone and life ethers while the intensely organized horn silica enriches and enhances the warmth and light ethers. Because the ethers in horn manure and horn silica are so rich, they attract their respective ether streams quite strongly to the areas where they are applied. And, as the life forces associated with lime and silica build in the soil, they draw in stronger and stronger streams of their respective ethers from their surroundings. Winter is the perfect time of year to boost both polarities by applying horn manure and horn silica together to the soil. Then over the following summer both earthly and cosmic forces stream back more strongly. And, as Steiner suggested in the second lecture of his *Agriculture Course*, if our soil does not carry these influences upward into plant growth strongly enough, we can make a clay remedy [such as horn clay] to intensify the rhythmic day and night interaction between lime and silica.

If boosted with horn manure only, the tone and life ethers associated with lime can build up so strongly over winter that they predominate over warmth and light the next summer. Without sufficient silica forces, the digestive and nutritive processes may overwhelm the fruiting and ripening processes, leading to low brix after mid-summer when the light starts to recede. Under these conditions early crop growth can be luxuriant only to succumb to pests and diseases that digest these crops before they ripen. To prevent this, combine horn silica [501] with horn manure [500] in winter.

Then the following spring phosphorous, which works with nitrogen in humus, will reveal itself in the light activity of the flowering process, and the flowers will have plenty of sugary nectar on the silica/female side while on the lime/male side there will be ample protein-rich pollen. In the blossoming process, the plant separates its lime and silica processes and re-joins them to produce a new generation of plant. If we have applied our biodynamic remedies properly, then a more vigorous and better balanced new plant can be born from the seeds.

Biochemical Sequence

Beyond sulphur, the minerals plants need from the soil have a hierarchy of importance. Elements early in the sequence must be working before anything later in the sequence can work. Boron and silicon, which occur first in this sequence, affect everything else profoundly. Silicon provides the capillary action that allows plants to draw water and nutrients from the soil and distribute these in their canopy.

All biological transport tissues are rich in silicon, which is most stable when it forms four chemical bonds. Boron's strong affinity for silicon embeds it in the

silica transport linings, but boron only forms three bonds. This leaves silicon seeking a fourth bond, and it only takes a small amount of boron to make silicon so thirsty for extra electrons that it draws on water and nutrients from the surrounding soil. Thus boron is responsible for sap pressure or silicon wouldn't conduct water and nutrients so well.

Boron and silicon are essential for plants to take up the calcium and amino acids needed for protein chemistry. Everything else in the plant suffers if either or both are deficient. This is particularly true for making chlorophyll where magnesium, phosphorous and its co-factors are involved in photosynthesis. If photosynthesis suffers, root exudation suffers. Then the soil food web is deprived of energy and it can't fix the nitrogen needed to supply a rich nutrient stream.

Phosphorous is essential for all energy transfers in both plants and soil. In plants it transfers energy from chlorophyll to make carbohydrates. In the soil, microbes use phosphorous to release energy from carbohydrates so they can fix nitrogen and supply plants with a steady stream of fresh nutrients. Phosphorous uses iron, copper, zinc, manganese, cobalt, molybdenum and traces of lesser significance as co-factors in all the enzymatic and hormonal processes in life chemistry. Even though energy is first captured via photosynthesis, phosphorous and its co-factors play a huge role in the soil food web in providing nourishment to feed crop growth. This is why phosphorous is a key element in seed coatings and liquid inject planting formulas.

Lastly, if the rest of the soil chemistry is working and plants grow, potassium, as the most mobile element, is the electrolyte responsible for plant communication and the movement of fluids.

NPK fertilisers use soluble salts which strongly shift the delicate equilibria of the soil food web and shut down or impair the sensitive microbial partnerships of nitrogen fixers, phosphorous solubilizers and actinomycetes [aka actinobacteria]. The net effect disrupts the soil food web, as well as breaking down organic matter and depleting soil reserves of trace elements. Once the soil food web and trace minerals are depleted, NPK fertilisers lose their effectiveness. NPK fertilisation ignores the life giving importance of sulphur and the biochemical sequence. The reality is the life processes of living organisms are what build energy and complexity into the soil food web.

The Hieronymus Experiment

An interesting illustration of how life energy interacts with plants was T. Galen Hieronymus' (1895–1988) experiment, *Conducting Chlorophyll Energy over Wires,*

where he sprouted seeds in lightless boxes. This experiment—which eventually led to inventing what he called a 'Cosmic Pipe'—could be replicated almost anywhere.

As a summer project Galen built a wooden platform about six feet off the ground on the south side of his house in Kansas. On this platform he placed seven copper plates varying in size from 2 inch x 4 inch and 4 inch x 8 inch to 8 inch x 10 inch. One of these was copper wire screen. He connected these copper plates via insulated copper wires to aluminium foil under the lids of seven 2 inch x 2 inch x 4 inch wooden boxes on a light excluded shelf below ground in his basement. Aluminium foil was also placed in the bottoms of the boxes and grounded with wires to an underground metal water pipe near the basement wall. An eighth box was used as a control with no foil sheets or wires connected to anything.

A half inch of fine, sandy soil was placed in the boxes, and oat seeds selected for uniformity were placed equidistant on the soil in two rows of five seeds each. A 5/8 inch layer of soil was then sifted on top of the seeds and they were watered. The covers were closed on each box and the boxes placed on the light excluded shelf. Thereafter the boxes were inspected daily by flashlight and watered.

All the seeds sprouted about the same time, but there was no chlorophyll in the ten plants in the control box which had no connection to the sunlight outside, whereas all the plants in the boxes which were connected to the outside plates had good chlorophyll. Notably, the plants connected to large outside plates appeared to have been subjected to excessive heat. All of the plants were kept in the dark all of the time except when examined by flashlight, and yet an organizing, organic force that turned the plants green flowed between the copper plates exposed to the sun on the raised shelf and the grounded plants in the dark basement. Clearly a solar energy effect occurred, although it is also clear there could be a flaw in the assumption that only *light* drives photosynthesis.

Keep in mind, the Hieronymus experiment took place in summer and involved an outside shelf that was six feet off the ground. It revealed that something previously unsuspected contributes to the vitality and organization of plants.

The Big Picture

The universe is coherent and synchronous—a unity of substances and activities. Spin, which produces magnetism, is something all particles have. But even at the subatomic level they don't spin in isolation. Their spins affect each other. Usually spins balance out, left and right. In the case of paramagnetism there is a weak imbalance. With ferro-magnetism there is a stronger imbalance.

A compass needle points north because the magnetic field of the earth, as a whole, aligns the compass needle, though the field is delicate and shifts slightly all the time. We also know the Sun and planets have magnetic fields which influence the entire solar system. Our galaxy has a magnetic field that our solar system interacts with, and indeed, the entire universe has a magnetic field.

The gravitational fields of the Sun and planets also interact, and each affects all the others. Sir Fredrick Herschel (1738-1822) found Uranus by calculating what mass at what location could account for disturbances observed in the predicted motion of Saturn. Neptune was found by Urbain Le Verrier (1811-1877) the same way. Today numerous planetary bodies are found around stars beyond the Sun. Astronomers accept that our sun is spiralling toward some 'great attractor' in the region of Scorpio/Sagittarius; but since the universe appears to be expanding we don't seem likely to get to this celestial goal in the foreseeable future.

The Moon interacts with ocean currents, tides and weather patterns, and the Sun emits charged particles called the solar wind, as well as large scale events known as solar storms, flares and coronal mass ejections. The subtle effects of these 'sun spots' may strain the limits of our detection with scientific instruments, but living organisms are more sensitive. It is not surprising to find sunspot related effects in crop production and stock market prices. It is scientific ignorance for pundits to say the forces at work in the universe around us—particularly in regard to the Moon and planets—have nothing to do with what happens in agriculture.

Agriculture of Tomorrow

To investigate these etheric energies, Steiner enlisted Lily Kolisko (1889-1976) and her husband Eugen Kolisko (1893-1939), a pair of Stuttgart physicians, to do extensive studies of crystallization and other phenomena having to do with organizational forces and their influences on substances—both in summer and in winter and above and below the soil's surface. Early on they shed light on one of the baffling riddles of chemistry. Every chemistry student finds that on some occasions crystallization produces large, light-weight crystals, and on other occasions crystals are smaller and much denser.

At her laboratory in Stuttgart Lily Kolisko set out dishes of supersaturated solutions of various salts to crystallize at the lab window, at the soil surface and at one meter depths up 16 meters below ground in a 1.5 meter square shaft at various hours of the day and night, phases of the moon and months of the year over a period of several years. She climbed up and down in a pit dug into the earth and exhaustively documented the results by weighing and photographing

the crystals of various mineral salts. For the most part she used salts associated with the Sun, the Moon and planets.[20] There was considerable variation, and it was clear the forces of crystallization were greatest at Stuttgart in the depths of winter in February, despite variations corresponding to the positions of various planets. The documentation of her experiment was so extensive she published only a small portion in her book, *Agriculture of Tomorrow*.

Just for researching this question—which every chemist encounters—of the influences that affect crystallization, she should have won a Nobel Prize. Presumably this could still occur posthumously.

This says nothing of Lily Kolisko's extensive studies of homeopathic potencies where processes rather than substances come into play. When she published her work in 1939 the world of science was not ready for it, and cynics made no effort to honestly duplicate her studies. Even at the Goetheanum in Dornach, Switzerland, those administering the Natural Sciences Section of The Anthroposophical Society seemed to ignore her work. But for anyone interested in further study, *Agriculture of Tomorrow* can be found online at:

http://www.soilandhealth.org/01aglibrary/01aglibwelcome.html)

A general study of her research with an honest and open mind reveals a great deal about the forces at work in agriculture, from the local earth environment to the edges of the universe—especially in regard to the Sun, Moon and planets. Lily Kolisko's work challenges many assumptions and paints a new picture of what actually happens in agriculture. Among other things her research points to the crucial importance of what happens in winter.

Imparting Forces

Chaos is a dynamic state where things are highly disordered. Order, which is also dynamic, is the opposite of chaos. It arises out of chaos. Chaos theory was born in 1961 with Edward Lorenz's (1917-2008) discovery of the Butterfly Effect, and it amounts to a search for the infinitesimal factors that give rise to organisation. Chaos theory explains how modalities such as homeopathy, radionics and biodynamic preparations work. A brief introduction can be found at:

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[20] *In keeping with the traditions of alchemist/physicians such as Paracelsus (1493-1541), Kolisko used salts of gold, mercury, copper, silver, iron, tin and lead to examine seasonal relationships over a period of several years with the Sun, Mercury, Venus, Moon, Mars, Jupiter and Saturn.*

http://www.schuelers.com/chaos/chaos1.htm

Order, the basis of organisation, arises at boundaries. Any boundary with an inside and an outside is capable of organising and accumulating energy. As fractal geometry shows, defining boundaries gives rise to enormous complexity. If we want to impart life to our farms or our environment we can do so by establishing patterns using homeopathic biodynamic remedies. Glen Atkinson of New Zealand does this with his BDMax homeopathic formulas, which have been verified effective by independent scientific studies. See: www.bdmax.co.nz

While carbon provides a framework for patterns, water makes a good medium for pattern transfer, as its memory for patterns and their propagation is legendary. In homeopathy patterns are usually transferred using water or lactose pillules. However, there are also other means, as for example Hieronymus demonstrated pattern transfer using conductive metals such as copper, along with various resistance components, as the basis for his radionic analyser patent and his 'Cosmic Pipe' design.

With radionics, pattern transfer occurs via quantum non-locality and entanglement. Only the pattern, which has no mass, is transferred. The results depend on how well the pattern affects the activities and substances in the recipient organisms. A radionic instrument can pick up patterns at its input and transfer them to the output where a 'witness' is quantum entangled with the recipient. This transfers patterns over any distance, and it does this instantaneously without loss of pattern density.

Organisational patterns can be easy to transfer since they propagate and build from what Rudolf Steiner called 'smallest entities'. At the level of wave forms, dynamic patterns have complexity without mass—even though they may serve to organize large amounts of substance. Paracelsus compared the pattern of a remedy to the spark that sets a house on fire.[21]

Patterns for Agriculture

With these options for transfer, the question is what patterns to use. While

[21] *"The remedy should operate in the body like a fire, and its effect on the disease should be as violent as that of fire on a pile of wood. This mystery of fire should also apply to what you call dosage. How would it be possible to weigh the amount of fire needed to consume a pile of wood or a house? No, fire cannot be weighed! However, you know that one little spark is heavy enough to set a forest on fire, a little spark that has no weight at all." — Paracelsus*

various colours, sounds, chords, minerals, herbs, gemstones, geometrical and astrological designs can be useful, Steiner and Kolisko's work went a long ways towards answering the question of what patterns to use by developing a range of patterns based on animal/herbal/seasonal/mineral factors. This included several herbal preparations; one for each planetary process, ensuring whatever was needed could be supplied.[22] A much deeper understanding of these things would go a long ways toward meeting the challenges we face in agriculture.

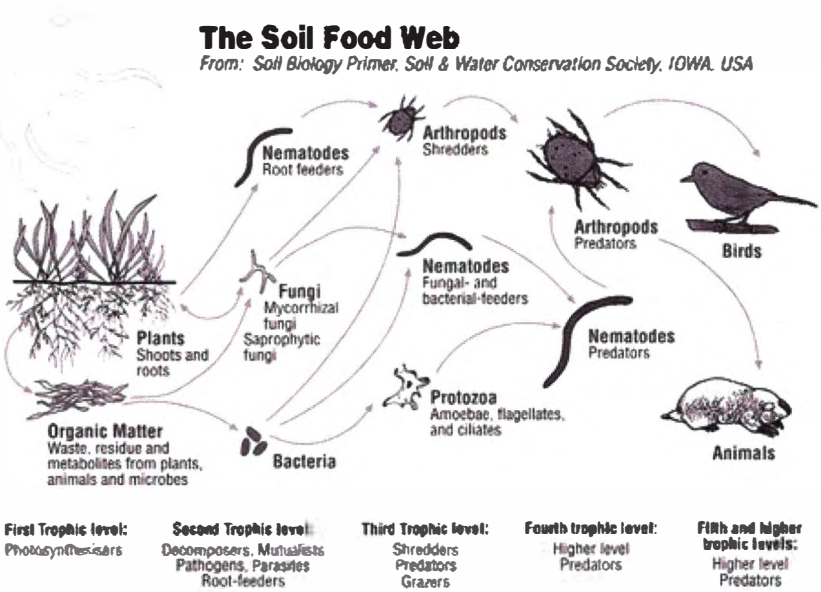
Application

Which techniques we use to impart life energy to our farms and gardens matters less than whether we impart life forces in a timely, balanced way. The original method, introduced by Steiner, of stirring the agricultural preparations and sprinkling them over the land, is an adaptation of homeopathy that works well on a small scale. Its main cost is likely to be labour. Of course, if there are enough participants this can work for large acreages. Back in 1924 in Germany, Steiner envisioned families pooling their energies and applying the remedies festively. Stirring and spraying preparations could be done by children, with their sensitivity to life forces, and this could provide enormous benefits. Fortunately or unfortunately, what was true concerning labour in Germany in 1924, may no longer be true in most of western society. In parts of India, China or elsewhere in the third world it may still be true. Where people can put their hands to such tasks very little other investment is required. Although machinery may be used, these remedies can simply be stirred and sprayed a few times a year as a family affair. Initially it may take repeated applications to firmly establish the patterns, but once established they may only need boosting from time to time.

For large scale operations without available labour a variety of methods have come into use. These include stirring machinery, flow forms, vortex brewers, homeopathy, irrigation/fertigation, spray rigs, aerial applications, radionics and field broadcasting. Though some of these may appear technological, despite any prejudices and rivalries, all methods have proven effective. *See www.quantumagriculture.com for information about Field Broadcasters and radionic applications.*

[22] *Biodynamic preparation remedies can be obtained from Hugh Courtney in America, 276 930 1377; from Biodynamic Agriculture Australia, P. O. Box 54, Bellingen, NSW 2454, Ph: (02) 6655 0566; and from various other sources—or make your own.*

Regardless of how the biodynamic remedies are applied, transferring organizational patterns works within the realm of the living. The patterns are so highly organized that they give rise to life. Organisation is the basis of life, and life begets more life. The remedies work on the wider realm when attached to trees. They work on cattle stations where they are placed in canvas bags in watering troughs and irrigation channels so the livestock drink them and carry them out onto the land. And the most appropriate time for applying these preparations tends to be the most ignored—winter.



The Australian Government Department of the Environment and Heritage Australia State of the Environment Report 2001 reported the Australian average continental rate of soil loss is 6.97 tonnes/hectare/year.

Making Preparations: Part One

Field Sprays

Near the end of Rudolf Steiner's life he developed a series of remedies for agriculture as a last effort to cross the Rubicon of helping people rise above their handicaps of personal ambition, illusions and petty jealousies. Along with several herbal 'composting' preparations, he proposed the use of horn manure [500], horn silica [501] as treatments for large areas. This was followed by the development of additional biodynamic field spray formulas such as Dr. Pfeiffer's Field Spray, Maria Thun's Barrel Compound, Cow Pat Pit, horn clay[23] and a formula called Soil Activator that includes all the other biodynamic preparations in one easy-to-use formula.

When Steiner introduced these remedies, he indicated that the benefits of these preparations should be made available as quickly as possible to the largest possible areas of the entire earth, for the earth's healing. It remains to be seen how successful this has been. It doesn't seem like much has been done. Yet the use of biodynamic preparations keeps becoming more widely accepted. Certainly the remedies have stood the test of time.

Growers can follow the recipes given here, and participate in preparation making parties whenever possible. These remedies are often made as a group activity; and lest we forget, once the preparations are made they need to be applied. Use them up and make more. They don't do any good hoarded in sheds and cellars—better if they get washed away in a flood. Be creative with them. Give it thought. Maybe some new method of application will turn into the next new thing to do—like traveling around and burying bottles of 500, 501 and horn clay at strategic locations in watersheds and ecosystems.

Horn Manure [also known as 500]:

This remedy is made by filling mature cows' horns with manure from lactating, grass fed cows and burying these horns in fertile soil over the winter. Mature cows' horns are preferred because they are thicker and have a heavier weight to volume ratio, which provides a stronger resonance and makes a better preparation. Tests of the manure from lactating cows showed significantly greater availability of calcium than with the manure from dry cows. The winter season could mean from the autumn equinox to the spring equinox, but in practice a little

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[23] ***Agriculture***, ***Rudolf Steiner***, *Copyright 1993 Bio-Dynamic Farming and Gardening Association, Inc. Kimberton, PA, Creeger-Gardner translation. pp 33, 34.*

more latitude is taken. The burial period for horn manure in the southern hemisphere usually is from late March to sometime in October, and in the northern hemisphere from late September to sometime in April. Dates generally vary according to when a gathering of people can share in the preparation making events. Horn burials are often spread over several days.

Horn manure [500] acts as a catalyst for organizing the lime polarity processes at work between the sun and the earth. These processes are related to the activities of the planetary bodies between the sun and the earth, namely Mercury, Venus and the Moon. We see these activities in the breakdown of organic materials that are digested and absorbed back into the earth to provide for the next summer's growth. As the summer warmth and light recede into the earth, the animal life of the soil and the chemical activity of the lime complex—calcium, magnesium, potassium and sodium—consume and transform what falls to earth so the soil becomes enlivened. Use of this preparation encourages:

- Healthy humus formation
- Mineral retention and availability
- Improved crumb structure and tilth
- Beneficial soil microbes, including nitrogen fixers
- Rhyzobial activity (nodulation) on legumes
- Soil animal life from protozoa to earthworms
- Improved absorption and retention of water
- Fine, highly developed, robust root systems
- Improved nutrient uptake by plants

In spring, usually after Easter, the finished horn manure [500] is lifted from the ground, knocked out of the horns and screened into tubs or vats enclosed in wooden boxes lined with peat (or other fibrous organic materials such as coconut fibre) for indoor storage as in a cellar. Like fine wine this preparation should improve with age. Normally it is applied at a rate of 1.25 ounces per acre in 3-4 gallons of water or 85 grams per hectare in 37 - 40 litres of water. Normally warm water is used for stirring, or it is warmed to blood temperature. The horn manure is stirred in intensively for one hour and then sprinkled over the designated area.

Some practitioners like to combine horn manure with barrel compound or cow pat pit [CPP], which is a cow manure compost that is specially prepared with the six herbal preparations. They either add the CPP to the horn manure at the beginning or for the last 20 minutes of stirring. Winter horn clay also may be combined with the horn manure. These preparations can be thought of as organs

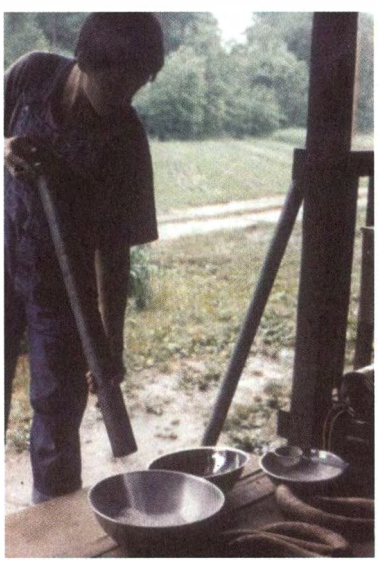
or processes of organs that are part of the agricultural organism. Some believe they work better together than if applied separately. Certainly for pastures and broadacre applications to large areas it is more economical to combine sprays.

Spraying Horn Manure

The horn manure [500] spray should soak into the soil, much as does the dew, and probably is best sprinkled in the late afternoon or early evening in large droplets. Each droplet radiates its influence up to a metre and a half or more, so there is no need for uniform coverage. A pail and a wallpaper brush or whiskbroom is sufficient for applying this remedy in gardens or to small blocks. Large quantities may require spray equipment such as pumps, tanks and boom-less jets. For very large areas or broken terrain, aircraft may be the best option.

A Word of Caution

Sometimes practices are found to be preferable, pleasant, even artful or personally significant. For example, rain water may be warmed over a wood fire to 40°C and stirred in a wooden barrel or a copper tank. Sometimes such formal procedures evolve into dogmas, and expedients like plastic buckets and municipal water may be frowned on as heresy. It is a worry when perfect gets in the way of good. Use what is available and just do it. Find what feels good and establish a personal procedure without judging self or others as right or wrong. Make your procedure easy and enjoyable. Keep in mind that using these sprays more frequently gets better results.



Horn Silica [also known as 501]

Traditionally this remedy is made by smashing quartz rock in a steel pipe that is sealed on one end, using a steel plunger and screening the results through a sieve. The fines are then ground to a colloidal powder between two sheets of glass. Quartz crystal is commonly used, but even feldspar and orthoclase were recommended by Steiner if these are available. The fine silica powder is moistened, packed in cow horns and buried over the summer season in a prominent, sunny location. This preparation

acts as a catalyst for organizing the silica forces at work beyond the sun and the earth. These are related to Mars, Jupiter and Saturn.

Over the summer season vegetation springs forth into the atmosphere, feeding photosynthesis, plant growth and animal activity in the air above the soil. It is as if the soil goes to sleep while warmth and light rise upward to enrich the atmosphere, and the summer's blossoming, fruiting and ripening is the earth's dreaming. Use of this preparation encourages:

- Better photosynthesis
- Improved sweetness and flavour
- Stronger, more compact, more resilient growth
- Stronger root exudation and nitrogen fixation
- Better expression of genetic potential
- Robust flowering, fruiting and ripening
- Improved immunity to insects and diseases
- Greater nutritional density
- Higher butterfat in milk production
- Stronger fibre in cotton or wool

In autumn the horn silica preparation is lifted, removed from the horns and screened into glass containers to be stored in a sunny, airy location like a window sill.

Variations of Horn Silica

In recent years John Priestley and others in Australia have experimented with making horn silica using finely ground diatomaceous earth. This nearly pure mined silica retains the skeletal organization of the organisms that formed it. It makes an organic 'soft' horn silica that may have special importance for orchard and vineyard growers concerned with ripening fruit. John notes that after using it

his mandarins developed a reddish blush to their skins for the first time—a sign of exceptional fruit quality.

In working with biodynamic vineyards in California, Dennis Klocek[24] has experimented with using finely ground amethyst for making horn silica, and he suggests that in Australia we should consider making our horn silica from powdered opals. One thing is clear; we have a lot more experimentation to do with this preparation. We are fortunate in Australia to be blessed with an abundance of warmth and light, which horn silica provides the organisation for. This is an opportunity not to be wasted.

Stirring 501

Normally 2.5 grams per hectare (1 gram/acre) are intensively stirred in 17 litres of warm, good quality water for an hour in a similar fashion as with horn manure. Alternatively a flowform is used. This vortex, chaos, counter vortex, chaos, etc. style of stirring ensures a thorough penetration of the patterns of the preparation(s) into the water. This is standard procedure for activating all biodynamic preparations.

Spraying 501

Unlike the horn manure which works downward into the soil, the horn silica usually is sprayed as a mist or fine spray in the early morning after sunrise as the dew starts to rise. Only in winter is it sprayed on the soil. This mimics the action of silica in the environment, which works upward from deep within the earth to find expression in the photosynthesis, blossoming, fruiting and ripening processes in spring and summer. Bio [life] dynamics [processes] is about the life processes that drive all agricultural enterprises. When adding minerals such as rock powders and mineral salts we are only supplying building materials. The carpentry, masonry, cement finishing skills and the interior decor that create the household of nature are activities, which is what biodynamic preparations impart.

Preferably the application of horn silica [501] follows an application the previous evening of a lime polarity soil spray [*e.g. horn manure, cow pat pit or soil activator].* This is because the up-welling forces of silica are forces of containment, transport and maturation, and these need something fertile and nutritious such as lime and amino acids to transport and contain. Otherwise the effect of the horn silica is likely to simply lead to maturity without providing much

[24] *Dennis Klocek,* ***Sacred Agriculture, The Alchemy of Biodynamics.***

growth. For example, a hayfield that was sprayed a month prior with horn manure, cow pat pit and winter horn clay may bolt to seed when the horn silica is applied unless a second application of lime polarity preparations is made just prior to the horn silica spray.

On the other hand, if horn silica is used to thin orchard fruit in the early stages of fruit development in case there is more fruit than can be filled, then horn silica should be used by itself *without* any recent lime polarity sprays.

As with combining cow pat pit or winter horn clay with horn manure, the horsetail or casuarina decoction [508], which also is a silica polarity preparation, may be combined with the horn silica for the last 20 minutes of stirring. The same is true for summer horn clay, which may be combined with horn silica to improve sap uptake and root exudation.

A Word of Caution

Silica dust can be harmful if inhaled. Although the amount of actual silica powder in 501 is only a couple grams per hectare, if exposure to breathing horn silica spray is a possibility, wear a mask or respirator.

Horn Clay

Unlike horn manure and horn silica Steiner did not give a specific recipe for making this in his agriculture course. In lecture two of the course there is a suggestion that he meant to give recommendations, but later he did not.[25] However, by some accounts it seems when he buried his first experimental preparations he made a sort of winter and summer horn clay by closing the last centimetre of the open end of the horns with a plug of clay. Whatever the case might be, the horn clay mediates between the lime and silica. Summer and winter horn clays activate and organize the clay component of the soil. And they seem to work quite well on

[25] ***Agriculture, Rudolf Steiner,*** *Lecture 2, Creeger-Gardner translation, page 33. "Let me remark here that if we are dealing with a soil that does not carry these influences upward during the winter as it should, it is good to furnish the soil with some clay, the dosage of which I will indicate later." (Later Steiner did not give an indication.)*

heavy clay soils. Some say it isn't needed, and why would you do it? Others say it is the missing biodynamic preparation and their farms or gardens really took off when they started using it. Some believe horn clay provides:

- Improved sap flow in plants
- Improved root exudation and amino acid uptake
- Better utilization of energy
- Better DNA expression
- Improved photosynthesis
- Improved root exudation
- Improved nitrogen fixation
- Improved digestion
- Improved nutrient uptake
- Improved overall growth

Horn clay is made in two basic versions—**winter horn clay**, which is buried over the winter, usually in the same pit as horn manure, and **summer horn clay**, which is buried over the summer in the same location as horn silica. For a combined summer and winter horn clay influence horn clay may be buried for a full year either from spring to spring or from autumn to autumn. Alternatively summer and winter horn clays can be combined in one application. Generally, winter horn clay is used with horn manure and summer horn clay with horn silica. Some farmers store their winter horn clay mixed in with their horn manure, and the same with summer horn clay and horn silica. Horn clays are included in the easy-to-use, all-in-one preparation, Soil Activator, which contains all the biodynamic remedies.

Refining Clay

The clay used to make horn clay can be refined from the soil of any farm or garden by stirring up a quantity of that soil in a bucket or barrel full of water, filtering out all the coarse bits through a sieve and then filtering again through a paint filter sock, leaving a fine suspension of clay to settle. Settling may take a few weeks, and water may be poured off while the clay is left behind. The sediment will actually be a clay/humus complex, as humic acids plaster themselves onto clay particles, which, strictly speaking, are aluminium silicates. This fine clay can be further dried until it is concentrated enough to fill horns or to plaster the ends closed when burying horn manure or horn silica. Of course, refined clays, such as calcium Bentonite drillers' mud can be used, but they will lack the farm or garden's own humus component.

The amount of clay in a soil has little relationship to the effectiveness of horn clay. Horn clay should be used regardless of the soil's clay content. If anything, the more clay the soil contains the more it requires organisation. Though horn clay may not increase the amount of clay in the soil, it does affect how well the existing clay makes minerals available and promotes nutrient uptake and root exudation for nitrogen fixation, digestion and amino acid availability. Horn clay provides an archetypal dynamic for the soil to grow into. This may take some time, or it may happen quickly depending on the history of the area and the skill of the farmer. Adding biodynamic compost made with the herbal preparations affects the activity of clay as well, and the combination of both compost and horn clay will help co-ordinate the balance between sand, clay, humus and lime.

Stirring and Spraying

Normally winter horn clay is stirred and applied along with horn manure, and summer horn clay is stirred and applied along with horn silica. Or, depending on the grower's judgment about what is required, they may be applied separately—as in sequential spraying to moderate the weather. Ten grams per hectare is the usual dosage and the stirring procedure is the same as for the other field sprays.

A thought picture for spraying horn clay is to create a diaphragm at the soil's surface that establishes a robust give and take between what goes on in the soil and what goes on in the air immediately above it. This may mean applying horn clay as a thin, diaphanous film or membrane over the soil's surface in the period just past noon or early afternoon. It may help if there is a drizzle or light rain so the horn clay soaks in a bit and bonds.

Other Field Sprays

Over the years several composite sprays have developed. Amongst the earliest in America was the Pfeiffer Field Spray, which is a field spray combining horn manure and homeopathic potencies of the herbal composting preparations.

Maria Thun's recipe for barrel compound came into use first in Europe and spread to America. Then it caught fire in Australia and New Zealand as Cow Pat Pit [CPP] manure, which Biodynamic Agriculture Australia [BAA] makes available to the public. Presently, BAA also makes a field spray called Soil Activator that is

similar to CPP while containing *all* the biodynamic preparations.

In Australia, Alex Podolinsky makes a version of horn manure, called Prepared 500, that has the herbal preparations [502-507] imparted to it. This is also available in North America from Hugh Courtney.

Cow Pat Pit or Barrel Compound

Cow Pat Pit/Barrel Compound is a complex preparation which is an extension of the yarrow, chamomile, nettle, oak bark, dandelion and valerian preparations that deal with the nitrogen processes characteristic of the sun, moon and planets. Each planet, including the 'luminaries' of sun and moon, brings in a different aspect of the nitrogen processes that nourish plant development.

The silica activities of photosynthesis, blossoming, fruiting and ripening relate to the Sun [nettle], Mars [valerian], Jupiter [dandelion] and Saturn [horsetail]. These silica activities interact with the lime activities of nutrient uptake, digestion, mineral release and nitrogen fixation that are related to the Sun [nettle], Mercury [chamomile], Venus [yarrow], and the Moon [oak bark}.

Both the outer, silica planetary activities and the inner lime planetary activities need to work together to engage silica and nitrogen—which otherwise tend to be inert despite their abundance. For large scale composting or for ploughing under green manures and digesting no-till crop residues, cow pat pit or barrel compound is an economical way to apply these herbal preparations.

Using Cow Pat Pit/Barrel Compound

Cow Pat Pit/Barrel Compound is known by various names around the world. It is a specialized compost made from cow manure, crushed egg shell (or coral calcium powder) and basalt dust using the compost preparations 502 – 507 and sometimes 508. After stirring in water for 20 minutes it is used as a field spray:

- To assist breakdown of compost, green manures and crop residues
- To make a superior form of compost tea
- To apply to tree bark to stimulate cambium growth
- To soak seeds prior to planting
- To root cuttings for plant propagation
- To combine with horn manure for added astral influences

Making Cow Pat Pit/Barrel Compost

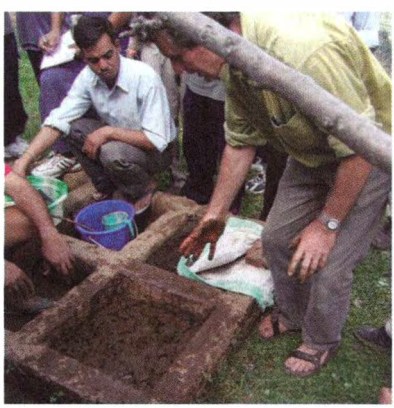
This is made by collecting cow manure and adding eggshell powder or other organic calcium; primary siliceous rock powder such as basalt or granite dust and

perhaps a bit of clay. Formulations vary and what follows is a more or less standard recipe.

- Two 20 litre [5 gallon] buckets of fresh, fairly firm manure from grass fed lactating cows
- 170 gm (6 oz) egg shells, finely ground
- 820 gm (30 oz) basalt rock powder

Mix ingredients well for one hour using a shovel or hoe in a wheelbarrow or on a mortar board—or mix mechanically in a cement mixer.

Once this step is finished, pour the mixture into a pit prepared for it in the ground and smooth off the top. Make 5 holes 7 cm (3 inches) deep, one in each corner with one in the centre. Place a different preparation in each hole before smoothing over the surface. Stir the valerian tincture for 10 minutes in 1 litre (1 qt + 1 oz) of warm water. Make two additional holes on either side of the centre and pour a quarter of the valerian in each hole. Sprinkle the remaining half of the activated valerian over the manure and around the pit.



David Hogg demonstrates making cow pat pit at a workshop in Uttaranchal at Binita Shah's farm.

Cover the pit with a damp hessian (coarse burlap) sack and protect it with an opaque waterproof, cover. Leave for 6 weeks. Then remove the cover and re-mix the contents of the pit, by folding the outside edges into the centre, over and over. Smooth, cover and leave for at least 6 more weeks. During this time, spray lightly with water if the manure looks dry. The cow pat pit preparation is ready when it is black, crumbly and clean smelling.

Rub the finished Cow Pat Pit/Barrel Compound through a sieve and store along with other preparations in large glass or earthenware jars with breathable lids in a cool dark place. If left in the pit, worms may consume it. To make the pit:

- Dig a 100cm long x 60cm wide x 15cm deep (40 inch x 24 inch x 6 inch) hole in good garden soil.
- Build a bottomless box 30cm (12 inches) deep, with untreated timber or bricks around the edge. Some build the entire enclosure out of bricks and stucco it with a layer of mortar to keep tree roots or other vegetation out.

The first time it is used it may be inoculated by smearing it with a culture of mature CPP/BC and *Trichoderma*, a protective soil fungal culture.

- Mound soil up around the edge of the box.
- Pour in the pre-mixed manure/eggshell/basalt preparation.
- Smooth the top, make 5 holes and place three grams of compost prep in each hole. Make a further 2 holes on either side of the centre hole. Stir or succuss the valerian tincture [507] in 1 litre (1 qt 1 oz) of water for 15 minutes and pour half into these holes. Sprinkle the rest over the pit and surrounding soil.
- Cover the manure with a clean, moist hessian or burlap sacking and cover the entire pit with a waterproof lid. Keep the sacking moist and allow to compost. Re-mix or re-screen in six weeks.

Soil Activator

Originally biodynamic soil activator was intended to remediate badly degraded, out of balance soils. Like cow pat pit or barrel compound, it is based on composting cow manure, but all the biodynamic preparations are used—horn manure, horn silica, The herbal compost preparations [502 – 507], Equisetum [508], winter and summer horn clay, horn basalt and crushed eggshells (or finely ground coral calcium). The manure is moistened with equisetum decoction. More holes are made in the pit and more preparations are inserted. The result is a simple, effective way to apply all the biodynamic preparations in one easy step.

This has become a favourite of gardeners, orchardists, broadacre farmers and graziers. It is economical and easy. It is good as a first application. Use it again and again as a general booster. All the preparations working together will quickly bring the farm organism to life. Fine tune with individual preparations as needed.

Each biodynamic preparation relates to a specific function, and one situation may need more liver (dandelion, Jupiter) while another may need better digestion (chamomile, Mercury). Whatever needs are identified, emphasize the appropriate preparation along with a general application of Soil Activator.

Some say easy application will make farmers careless and the preparations won't be applied as well. Others think that difficulties means the preparations won't get used, or not as often. This school of thought believes ease and frequency leads to a better understanding of what each preparation can do.

For Use in a Home Garden

Around 3 p.m. take 15 grams [1 heaping tablespoon] of soil activator in a 20 litre (5 gal) bucket with 12 litres (3 gal) of good quality water. Stir by hand or with

a stick as with stirring horn manure or horn silica. Sprinkle on the soil as with any lime polarity field spray. This should cover an area of an acre to half a hectare.

Horsetail [or Sheoak] Preparation [508] This preparation is a decoction made by using 800 gms (1.75 lbs) of dried horsetail or sheoak herb to 17 litres (4.5 gal) of water and simmering this for at least 20 minutes. The fresh decoction [508] is generally used as a foliar spray, particularly in periods of wet weather.

It also can be fermented to use as a soil spray to prevent fungal problems such as damping off, pythium or rhizoctonia. Horsetail decoction is sometimes added along with stirring horn silica [501] if both are desired. Or both may be used in sequential spraying for purposes of weather moderation.

Take Home Message

Be creative and use imagination in finding ways to apply preparations. Spray them on garden or farm tools. Apply them along with seeding cover crops. Apply to all roads, paths, fences and other boundaries. Use the preparations in whatever fashion seems feasible.

The practical application of the biodynamic method.

(Is it something for only a privileged few, or can it be used by everyone?)

It has been said by persons outside biodynamic circles that the Biodynamic Method represents the cream of organic farming principles. This does not, however, mean that the method is restricted to a small group. It can be applied easily by anyone who cares to improve his handling of manure, composts, soil cultivation and crop rotation.

The steps to be taken:

A. Build, and properly treat, manure and compost piles. Do not waste any organic offal. Do not burn leaves and trash, but compost them. Collect everything. Do not apply crude, under-composted organic matter to the fields or garden but make use of the beneficial effects of micro life by first composting manure and all other organic material. Apply – immediately prior to planting or seeding – only pre-digested material, which will not tie down nitrogen, phosphate and other fertilizer elements, but will increase their availability. *The use of Biodynamic Compost Preparations or Biodynamic Starter will greatly help in reaching the goal: good humus.*

B. Introduce soil-protecting crop rotations and cover crops.

C. Introduce green manuring, but take care that the green manure crop is properly ploughed or disked under without tying down the soil life and nitrogen.

D. In a garden, or wherever feasible, introduce mulching.

E. Improve your soil cultivation practices.

F. Establish proper environmental control, wind protection, good drainage, control of the watershed.

--Ehrenfried Pfeiffer

Biodynamic Spray Application Table		
USE	**WHEN**	**TIMING**
HORN MANURE PREPARATION [500]		
Builds soil structure, humus, water holding capacity, earthworms, *Azotobacters*, bacteria and fungi.	2–4 times per year. For balance, use 1–2 days prior to Moon opposition Saturn.	Late afternoon. To avoid a too lush response, use on descending Moon
WINTER HORN CLAY		
Mediates between atmosphere and soil. Increases mycorrhizae.	Use with soil sprays – 500, cow pat pit. 2–4 times per year.	Late afternoon
FERMENTED EQUISETUM OR SHEOAK BREW		
Use as soil spray – helps grow beneficial fungal hyphae in the soil.	Use on own or with afternoon soil sprays.	In conjunction with Horn Manure [500] as part of a spray program
COW PAT PIT Also known as barrel compound		
Humified cow manure with the compost preparations, eggshell and basalt powder.	Great for compost tea. Fosters bacterial and fungal activity, builds humus diverse soil life.	Weekly, monthly, with the rest of the soil preparations, horn manure and horn clay.
SOIL ACTIVATOR with horn manure, horn silica, horn clay, compost preps and fermented horsetail		
Soil and plant tonic. Aids fertility, stimulates bacteria and fungi. Brings trace elements into the soil.	Recommended for new growers. Use weekly or monthly in conversion. Stir 20 minutes.	A good spray to get started with biodynamics. Connects the land to the cosmos immediately.
HORN SILICA PREPARATION [501]		
Increases brix, root exudates, dry matter weight. Reduces insects and diseases. Increases brix.	2–4 x per year, after soil sprays or prior to harvest. Fruit and vine crops use for ripening.	Early morning, after evening soil sprays of horn manure, cow pat pit and winter horn clay.
SUMMER HORN CLAY		
Improves the ebb and flow of sap between roots and canopy,	Use with atmospheric sprays 501, 508	Early morning
FRESH EQUISETUM OR SHEOAK DECOCTION [508]		
Prevents fungal diseases. Use as a foliar to firm up plants. Include with 501 sprays or use alone,	With horn silica x 2-4 per year. Extra as required if in stressed fungal conditions.	As needed for fungal conditions. Use with horn silica [501] as part of total spray program

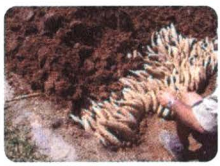



Biodynamic Spray Application Table

RATE OF APPLICATION	STIRRING TIME	CAN MIX WITH
		HORN MANURE PREPARATION [500]
85gm per ha in 34 litres water or for the home garden 35gm per acre in 13 litres water. Droplets onto soil.	1 hour in vortex/chaos/vortex by hand, stirring machine or flowform.	Winter Horn Clay, Cow Pat Pit and fish emulsion.
		WINTER HORN CLAY
4 grams per acre 10 grams per ha	1 hour, add to horn manure 500 and cow pat pit for soil spray.	Horn Manure [500]. Cow Pat Pit and fish emulsion.
		FERMENTED EQUISETUM OR SHEOAK BREW
1 litre per ha diluted in 20-40 litres water. Soil spray.	Stir for 20 minutes	On its own or with Horn Manure [500] and Winter Horn Clay.
		COW PAT PIT Also known as barrel compound
Use 150 grams per ha for gardens and 75gm per ha for broadacre. Effluent, use 10 kg per 50,000 litres.	Stir for 20 minutes	On its own or with Horn Manure [500] and Winter Horn Clay. Also used for effluent treatment.
SOIL ACTIVATOR with horn manure, horn silica, horn clay, compost preps and fermented horsetail		
75gm per hectare in 26 litres of water. Use for cow pat pit, 500 and 501.	Stir for 20 minutes	One application stirred and sprayed launches all the biodynamic processes.
		HORN SILICA PREPARATION [501]
0.7 gm –1 gm for 1 acre in 13 litres, 2 gm per ha in 17 litres water. Sprayed as light mist. Adjust volume to wind.	Stir one hour. Fresh Equisetum or Sheoak (508) may be added at end.	By itself, with Summer Horn Clay and with fresh equisetum or casuarina tea.
		SUMMER HORN CLAY
4 gm per acre 10 gm per ha	1 hour, add to Horn Silica [501].	Horn Silica [501]. Fresh equisetum tea.
		FRESH EQUISETUM OR SHEOAK DECOCTION [508]
10 litres 508 to 400 litres water @ 34 litres per ha. 10 litres 508 in 400 litres horn silica 501 1:40 foliar spray.	Stir 20 mins. Add to stir for one hour or add for last 20 mins.	Horn silica [501]. Summer Horn Clay.






Lime Preparations:

BD 500: Basic lime polarity—calcium, nitrogen fixation, digestion, nutrient elaboration, transformation and coherence. Builds a healthy soil food web and boosts soil organization.

BD 502: Works with sulphur, potassium, fluid flow and the outer edges and surfaces of things. Recycles urea. Good relationship with copper and zinc.

BD 503: Works with digestion, calcium/amino acid complexes and nutrient uptake. Good relationship with nutrition, cell division and growth.

BD 504: Works with calcium, proteins, magnesium, iron and phosphorus in energy transactions. 504 also works with chlorophyll and haemoglobin as well as other enzymes and hormones. This preparation is balanced and rich like blood.

BD 505: Uses calcium and carbon to prevent the oxidation of amino acids in both soil and leaf. It limits lush growth and protects against fungal attacks.




Silica Preparations:

BD 501: Basic silica polarity—photosynthesis, blossoming, fruiting and ripening. It is good for flavour and keeping quality as it maximizes sunlight and atmospheric organization.

BD 506: Works with silica and potassium. Great for fruit set and fill as it improves the size and appearance of fruit, especially when used with BD 503 and horn clay.

BD 507: Works with phosphorus between the male, lime and female, silica streams to enrich the light ether and flowering process. For fruiting use with BD 506. This preparation is often used to protect from light frost.

BD 508: Works with amorphous fluid silica to strengthen cell walls, connective tissues and transport vessels. It hardens and prevents weak, watery growth. Often fermented and used on soil, 508 stimulates mycorrhizal growth as it promotes internal warmth. Freshly made, it is good for ripening fruit.




Clay Preparations:

Cow Pat Pit (CPP): Combines 502-507 with cow manure, basalt and egg shells to coordinate nitrogen processes and integrate plant and animal activity.
Winter Horn Clay: Organizes the clay/humus complexes to enliven nutrients and boron/silicon complexes in readiness for summer activity.
Summer Horn Clay: Works with the ebb of sap that feeds the plant's microbial symbiotes to elaborate silica and fix nitrogen.
Esophageal Clay: From Hugo Erbe. This is used to strengthen the forces which mediate between the lime and silica processes, such as the ebb and flow of sap.

Suggested Combinations

· **Lime Polarity**—*Lime, Gypsum, Guano, Rock Phosphate, Humic and Fulvic acid:* BD 500, Spring-to-Spring Horn Clay or Fall-to-Fall Horn Clay, Cow Pat Pit (CPP) BD 502, 503, 504 and 505.
· **General Nutrition**—*Fish emulsions, Seaweed, Compost Teas, EM. Fertigations*—CPP, horn clays and special emphasis on 505, 504, 503 and/or 502 for roots; 503, 504, 505 and 508 for leaves; 503, 504, 506, 507 and 508 for fruits.
· **Silica Polarity**—*Diatomaceous Earth, Siliceous Rock Powders, Potassium Silicates, Humic Acid, Aloe Vera*—501, horn clays, 504, 506, 507 and 508.

Some Tandem Sprays

- To have amino acids fill fruit—503 evening, followed by 506 morning.
- To reduce nitrates & disease—505 evening with 508 next morning.
- To induce flowering & fruiting—504 evening, 504, 506 & 507 next morning.
- For vegetative growth—503, 504 evening, 504, 508 morning.
- For danger of frost—503, 506, 507 evening 508 morning.
- To take up potassium—502 evening, 506 morning.
- To take up sulphur—502 evening, 508 morning.
- To take up calcium and zinc—502, 503, 504 & 505 evening, 506 morning.
- For nitrogen—502, 503, 504, 505 evening; 504, 505, 506, 507, 508 morning.
- For soil emphasis—500 and Winter Horn Clay
- For atmospheric emphasis—501 and Summer Horn Clay

For convenience in application any of the above tandem sprays can be used in combination

Polarities, Modes, Processes

There are Two Intersecting Axes, sometimes called polarities. The first is the *silica* axis which works in the vertical activities in and around the plant. The second is the *lime* axis which works in the horizontal activities in and around the plant. The silica axis builds the up and down transport system while its activity works with warmth and light to produce carbohydrates and root exudates. In turn, the lime axis is engaged by carbohydrates from root exudation. It works with chemistry and life in the soil as well as in stems and leaves to fix nitrogen and produce amino acids, proteins and the plant chemistry. Plants bring these two polarities together in a dynamic interplay.

There are Four Plant Modes. The root/dormancy phase where plants become organized; the leaf/growth phase where plants accumulate energy; the blossom/sexual phase where they give off energy; and the fruit/reproductive phase where they invest their energy in seed and fruit.

There also are Seven Organic Processes—not all of which occur within the plant itself.

- There is the up and down circulation of sap which relates to the Sun (☉, 504). This includes the intake of carbon in the foliage and the intake of nitrogen around the roots.
- There is growth and reproduction, involving proteins, DNA, cell division and reproduction. This relates to the Moon (☽, 505).
- There is digestion, which takes place around plant roots providing amino acids and minerals to nourish plant growth. This relates to Mercury (☿, 503).
- There are interactions taking place at surfaces between cells and at the borders of plant tissues involving refinement, purification and excretion. This relates to Venus (♀, 502).
- There is cellular metabolism involving photosynthesis and respiration. This relates to Mars (♂, 504 or 507).
- There is assimilation of the mineral and protein intake from digestion that fattens fruit. This relates to Jupiter (♃, 506).
- For the organism's boundaries, they relate to Saturn (♄, 507 or 508).

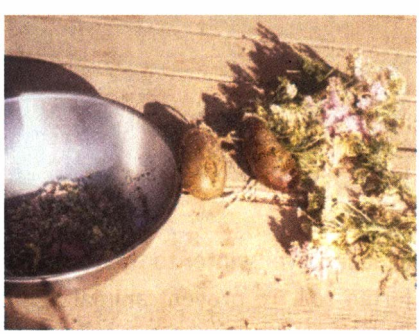
Making Preparations: Part Two

Compost Preparations

Although growers just getting into biodynamics can hardly be expected to make their own preparations, the recipes are no secret. It is good to know how the preparations are made, as it gives insight into life processes, particularly those involving nitrogen and silicon. These processes correspond with the planets of the solar system because the organizational energies of the cosmos stream from the broadest reaches of the universe through these channels and into life on earth.

Living organisms are amazing. Biodynamic agriculture looks at their complexity as a product of the surrounding influences that come to bear on them. Steiner points out in his first lecture how human beings are more or less emancipated from the immediate, hourly and daily rhythms of our solar system.[26] We eat stored food, some of it several years old, and we eat it whenever we please. We hardly pay any attention to when or where it grew. Animals are not so independent of the circumstances and cycles that produce their food, and plants are completely dependent on their surroundings each and every minute. Plants live in the here and now[27]. To understand plants we must understand this. Some of the influences around us are retained in the environment and we need to know which ones.

Yarrow Preparation [502]



This preparation is made in early summer, and is related to the planet Venus. Yarrow flowers are collected and the florets cut off of the flower heads. These may either be fresh, or dried and remoistened. They are sewn up in a male stag, elk, deer or kangaroo bladder which

[26] ***Agriculture***, ***Rudolf Steiner***, *Copyright 1993 Bio-Dynamic Farming and Gardening Association, Inc. Kimberton, PA, Creeger-Gardner translation. Chapter one, pp 15 - 26.*

[27] *Visit www.suspiciousObservers.org for daily updates on what goes on in our cosmic neighbourhood,*

is packed as full as possible, sewn closed and suspended above head high in the sun for the summer. It should be protected from damage by birds by encasing it in a cotton sock. Hanging it in the warmth and light exposes the bladder and its contents to the summer atmospheric influences. In autumn it is buried in a well-marked location in fertile soil to expose it to the soil's chemical and life activities over the winter when the warmth and light recede into the soil. To prevent the buried preparation from animal damage it may be necessary to make a pouch out of nylon window screen [carbon rather than metal] with the edges folded over and stapled to exclude earthworms and other animals. In spring these bladders are dug up, screened and stored to be used as the yarrow preparation [502][28].

Originally the European stag, a more or less archetypal antlered animal of the northern hemisphere, was used for making this preparation. But in Australia kangaroos fill a very similar ecological niche despite their lack of antlers.

It is believed the yarrow preparation [502] helps to open up the soil by combining sulphur with other minerals, starting with potassium and the lime complex. It is thought to mobilize, purify and excrete nitrogen compounds and associated minerals that may be locked up as clay and humus complexes. In human anatomy yarrow stimulates the sebaceous and sudoriferous glands in the skin as well as the functions of kidneys and bladder. In the soil it is connected to the planetary rhythms of Venus and similar ecological activities of purification.

Chamomile Preparation [503]

This preparation, which is related to the planet Mercury, is made by stuffing the small intestine of a cow with well moistened chamomile flowers, as though making sausages. Dried flowers can be remoistened with a little chamomile tea. These chamomile sausages are then exposed over winter to the chemistry and life ethers joined by warmth and light in fertile soil. To prevent animal damage it may be necessary to protect them in a pouch as with the yarrow preparation. Then in spring these chamomile sausages are lifted and screened for storage.

The chamomile preparation [503] is believed to improve the soil's digestive activities. This preparation's pattern of activity is how the soil food web provides

[28] *See the section on storage of preparations.*

nutrition to plants so they grow to their full genetic potential. It can help supply the plant with a rich complexity of milk-like, freshly digested amino acids and minerals, provided by the animal life of the soil.

Stinging Nettle Preparation [504]

Dutch physician, B. C. J. Lievegoed, associated this preparation with Mars[29]. Maria Thun associates it with the Sun as the principal luminary of the solar system. Certainly it is foremost among herbs for its high level of protein and rich mineral content, so similar to blood.[30] Nettle is the herbal remedy for anaemia and is used whenever extensive blood loss occurs. To make this preparation, collect a large amount of stinging nettle leaf and stem in the vegetative stage. When dried this herb loses its stinging property, but use gloves if handling it fresh. Usually this awareness provoking herb is dried and remoistened to make this preparation. Earthworms are extremely attracted to buried stinging nettles so this preparation usually is packed into clay tiles with worm proof mesh tied tightly over both ends. These tiles are buried in autumn in fertile soil, in a pit lined with peat moss or coconut hull fibre. They are left buried for an entire year— sometimes a little more.

In Australia's tropical rain forests the leaves and tender stem portions of the stinging tree [*Dendrocnide moroides*] are sometimes used in place of stinging nettle and are said to make an excellent 504. Those unfamiliar with this plant

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[29] ***Study Material, B. C. J. Lievegood****; Issued in 1951 by the Experimental Circle of Anthroposophical Farmers and Gardener.*

[30] ***Agriculture, Rudolf Steiner****, Lecture Five, pp 98, 99, Creeger-Gardner translation. "Stinging nettle is a real jack-of-all-trades; it can do many different things. It too contains sulphur, which, as I have already explained, plays an important role in assimilating and incorporating the spiritual. Stinging nettle also carries the radiations and currents of potash and calcium, but in addition, it has a kind of iron radiation that is nearly as beneficial for the whole course of nature as the iron radiations in our blood are for us."*

should be unusually careful in handling it as its hair-like stingers tend to detach and float in the air where they can be inhaled.

The stinging nettle preparation [504] is believed to be central to the vitality of the farm organism. Nettles are rich in chlorophyll, which becomes haemoglobin when iron replaces magnesium. Nettles are rich in sulphur and phosphorous as well as iron and other traces. They also are well balanced between silica and the lime minerals—calcium, magnesium, potassium, and sodium. Stinging nettles can take up nitrates and turn them into amino acids, the nutritious form of nitrogen. They are also thought to unlock phosphorous and its co-factors and produce complex proteins that support both plants and animals.

Oak Bark Preparation [505]

To make this preparation, which is related to the Moon, grind up the outermost bark of an English oak tree (*Quercus robur*), pack this into the cranial cavity of a cow or sheep skull and submerge it in a watery seep over the winter. Where this feature of the landscape is missing, use rain barrels.

Normally a fresh skull with most of the flesh removed is used. The brains are scooped out and the empty cavity is filled with finely ground oak bark. If placed in a winter spring dug out of a hollow in the hills, be sure to cover it with a heavy rock or screen, as dogs, coyotes, dingos or jackals may be drawn to it.

In different parts of the world other species of oaks are used. In North America white oak, *Quercus alba* is commonly used. Since in Australia there are no native oaks, other barks have been used. The Australian silky oak, *Gravillea robusta* may be an excellent choice as it has exceptionally strong sulphur and calcium gestures.

The oak bark preparation [505] is intended to draw nitrates back into the living activity of the soil. The tendency for free amino acids to nitrify is strongest at full Moon, especially when water saturates the soil. This preparation is meant to protect against lush, weak growth and fungal diseases. It also helps plants attain their true archetypal forms, while engaging lime [particularly calcium] to interact with carbon and nitrogen.

Dandelion Preparation [506]

To make this preparation, which is related to Jupiter, gather dandelion flowers as they first open and dry them. In autumn use a cow's mesentery, an 8 to 10 cm wide fatty membrane that suspends the small intestines from the upper abdominal wall. Use this to enclose wads of dandelion flowers [moistened in their own tea] which are sewn up like little pillows in sections of cow mesentery. Bury these—again in a protective pouch made from window screen—in a well-marked place in good soil over the winter season from early autumn to the spring equinox.

The mesentery is the organ where the nutrients absorbed from the cow's digestion begin their transformation from foreign substance into cow protoplasm. In plants the nutrients, especially potassium and sodium, are taken up into the plant sap via the activity of silicon. Each node or stage in the plant development acts like the cow's mesentery to refine and transform what is flowing upward from the soil to become the plant. This transformative process is at work from the root to where fruit and seed formation occurs. Dandelions are exceptional because they do this entire job of transformation in the leaf whorl at the soil's surface. They have a remarkable ability to transform what their roots absorb. This makes them ideal, in combination with a cow mesentery, for making this preparation. Once nutrients are in the sap flow, each cell has doorways in its cell walls where potassium and sodium regulate the absorption of nutrients. This preparation contains the patterns of this process.

The dandelion preparation [506] is intended to stimulate both the silica containment and transport and the potassium mobility in soils and plants. These activities enable highly refined and efficient plant growth. This is particularly intended to optimize the early cell division of embryonic fruit so they attain large size, strong structure, resilience and high quality. This Jupiter process is especially helpful in making food as nourishing and tasty as possible.

Valerian Preparation [507]

A tincture of fresh valerian flowers is one of the easiest preparations to make. The fresh florets of valerian are trimmed off their flower heads into a bowl,

ground up into a doughy paste and their juice extracted. A wheat grass juicer works for this if there are enough flowers, though some use a hand mill to grind the flowers and a cotton cloth to twist up with the paste inside to extract the juice, which is stored in dark brown glass bottles. If there are not enough flowers, water may be added in the grinding and pressing process.

Lievegoed, who was an anthroposophical doctor, believed stinging nettle was related to Mars and valerian was related to Saturn. Saturn is the gateway for warmth, and one of the things this preparation is famous for is making a foliar to ward off light frost. Nevertheless, Maria Thun makes a good case for stinging nettles being related to the Sun--which raises the question of what is related to Mars. Harvey Lisle suggested the Mars process related to blossoming and that meant valerian, which clearly works with the blossoming process which is a burning process where plants give off energy. Harvey pointed out if valerian was related to Mars, then what was the preparation for Saturn? This, Harvey asserted, was horsetail, the last of the herbal preparations recommended by Steiner.

The valerian flower tincture [507] is believed to stimulate the phosphorous process, which involves all the energy transfers in the soil food web—plants, animals and microbes. It also is believed to promote the interactions between lime and silica, not only in photosynthesis but particularly when it comes to flowering and reproduction. Flowering is where the two polarities of the plant chemistry separate and the male side [*lime, protein*] produces pollen while the female side [*silica, carbohydrate*] produces nectar.

The valerian tincture is also believed to impart warmth to compost heaps and soil surfaces and aid in forming humus. Used as a foliar spray it affords a couple degrees of frost protection. It can be combined with the dandelion, chamomile and horsetail preparations, along with small amounts of Acadian kelp powder, to make a foliar intended to prevent all but the hardest frost damage.

Horsetail Preparation [508]

This is made by simmering horsetail herb in water. It is not usually considered to be a compost making preparation, although there are reports of making

excellent composts by scattering this herb over the heaps. For those who think the stinging nettle represents the Sun and the valerian represents Mars, this preparation represents Saturn.

If Lievegoed was right that the nettle is related to Mars and the valerian to Saturn, then what preparation is related to the Sun? Some say the horn silica is the Sun's preparation, but what does that make the horn manure? There may not be a single right way to view these things, and debate is open. Expressing opinions is healthy; while dogma tends to be un-productive.

Using the Compost Preparations

Using the compost preparations may involve seasonal activities depending on the best times to recycle accumulated wastes. These preparations usually are made in cooperation with several farms or by a regional or national organisation. They may be distributed in small sets [1 gram of each] or as larger sets depending on circumstances. At least one small set of compost preparations is used in every compost heap or in each 200 litre [55 gallon] herbal ferment or manure tea. A full set is also used for each batch of barrel compound, cow pat pit or soil activator. For large compost heaps, larger quantities may be required. Alternatively, BC, CPP or soil activator can be used to impart the preparations to large scale composts by using these field sprays in water used in forming or turning compost windrows.

Orchard and Vineyard Maintenance

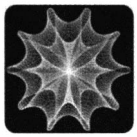
In Autumn the potassium and silica processes draw life back into the soil. Yarrow [502], Dandelion [506] and Horsetail [508] may help. If weather is wet, Stinging Nettle [504] and Oak Bark [505] may also help. After harvest, feed the soil with composts, rock powders, trace minerals, etc. Pruning should begin. Combine 500 and 501 sprays and spray these on the soil.

Orchard and Vineyard Maintenance cont.

In Winter the silica processes unite with the lime processes as clay/humus complexes are formed in the soil. Soil Activator combines 500, 501, CPP [BC} and horn clay into one easy application. Finish spreading amendments. Continue pruning in favourable weather. Apply biodynamic tree paste after pruning. For large orchards, combine tree paste with dormant oil spray.

In Spring the blossoming processes give off nectar on the silica side and pollen on the lime side. Bees and other pollinators may offer clues to any imbalances, and 500 or 501 may be emphasised as needed. The yarrow [502] and horn clay can trigger bud burst while the valerian [507] and horn clay can stimulate blossoming. Once fruit set begins, the fruiting process should be assisted by chamomile [503] and dandelion [506]. If there is potential for late frost, combine 503, 506, 507 and 508 as a foliar. For stress in case of frost, add 400 gm/hectare of soluble kelp powder and a litre of liquid fulvic acid along with stinging nettle [504] as a foliar. Supply nutritional needs according to visual signs and plant analysis. Formulas of fulvic and micronized lime, gypsum, diatomaceous earth, guano, etc. can be applied with fertigation or as soil drenches along with appropriate biodynamic preparations. Stimulate protozoal activity for better release of amino acids and minerals with 40 gms/ha [17 gms/acre] of vitamin B-12 as a soil drench along with 503 and 504 once a month. To keep amino acids from mineralizing, keep soil pH above 6.3 and apply 5 L/Ha [0.6 gal/acre] activated EM or equivalent with 504 and 505 once a month. For any transition from dry to wet, apply 504, 505 and 508. 508 should be prepared in advance and fermented. Use radionics wherever feasible.

In Summer the lime and silica processes interact between the soil and the canopy. By day warmth and light draw carbon into the leaf. By night these carbohydrates feed fruit as well as the soil food web. Nutritional needs can be addressed with foliar sprays or soil drenches (fertigations) along with appropriate biodynamic preparations. To improve sap flow, drench with summer horn clay and boron. Use no more than 0.5 kg/ha/month solubor [200 gms/acre/month] with 5 litres/ha liquid humic acid [0.6 gal/acre]. Apply silica for disease and pest resistance as 5 L/Ha [0.6 gal/acre] liquid potassium silicate. If stagnant weather occurs, use sequential spraying to re-enliven the ethers so rain can occur. As fruits and nuts mature, potassium and sulphur processes replace lime and nitrogen. To ripen fruit, soil drenches should shift from the lime/nitrogen emphasis of 503 and 504 to 502, 504 and 508. If weather turns wet, or rain is immanent, apply 505 and 508 as soon as possible.



Tree Paste

Understanding the Nature of Trees

This important preparation is painted or sprayed on the trunks and larger branches of trees rather than on the soil or as a foliar. Tree paste was inspired by the insight that the bark of perennial trees and vines is quite similar to the surface of the soil where compost and other amendments might be applied. Tree paste is a form of fertiliser.

Tree paste is made by combining cow manure, clay and fine sand, powdered silica (or diatomaceous earth) with [stirred, potentized] biodynamic preparations. In some cases, as with dormant trees, a small amount of a resinous vehicle such as raw linseed oil is used. This makes something similar to a latex paint that adheres well and won't wash off.

The following is a testimonial about biodynamic tree paste:

Mark Trela [a biodynamic consultant] was here about five years ago in early March to lead a BD workshop at our farm. Toward the end of the class he suggested making up a batch of BD Tree Paste and putting it on our oldest orchard trees. We had a good laugh (to ourselves) thinking Mark just doesn't know Pacific Northwest weather. It will rain from now to early June and that tree paste will slip off by Tuesday. Nonetheless we made up a batch and the class put it on each of our ancient apple trees, trees so old with apples so scabby we couldn't even tell what variety they each were.

The tree paste went on and miraculously adhered. Bud-break was already on the branches so it was too late for anything to help that year and the apples came in just as scabby and gnarled as they had in prior years. And then we sort of forgot about it.

But the FOLLOWING year, 1.5 years after application, with tree paste still stuck on the trunk in the fall, the apples came in pristine. Glorious. Perfect.

Apparently the work the tree paste does takes a little bit of time and because we were late in the spring doing this, after the sap had already risen and insects beginning to hatch, etc, it wasn't early enough in the season to stem the damage.

The second autumn was a completely different story and we were (and are still) amazed how much of a difference this simple little formula made. We were able to get the apples identified, found out one is even a relatively rare old tree (Winter Banana).

Now we tree paste ALL our trees, rotating them so we do each tree every other year. It's made such a positive difference on our 35 fruit trees that this year we are even thinking we may add in applying the tree paste to the maples and other deciduous trees for extra nourishment to them, too.

Warmly,

Jacqueline Freeman, Portland, Oregon

Back in the 50s and 60s most highways were 2 lane rural affairs, and on our

family's summer vacations it was common to see orchards where one or another sort of lime wash was painted on the tree trunks up at least to the first limbs. I asked mom and dad about it, and they said it was to strengthen the bark and keep the trees healthy. I always remembered that.

When I started farming one of the first problems I became aware of was beetle larvae riddling beneath the bark at the base of my young apple trees. This came to light when I met Peter Escher, who became my farming mentor. Peter, a financial partner to Ehrenfried Pfeiffer in setting up Threefold Farm and the Pfeiffer Labs, was a biodynamic apple specialist who introduced biodynamic tree paste.

When I met Peter we were at my neighbour, Shabari's house. The first question I asked him was what could have killed one of my young apple trees? Peter said he didn't know—let's go see the trees. Right away he discovered the boring beetle larvae, but they were not the cause, he said. He pointed to too much raw manure, which weakened the trees and set up unhealthy conditions. Prominent among the indications was fire blight, an apple and pear disease that plugs up the trees' circulation and kills branches, limbs—sometimes whole trees. Though the apple industry generally doesn't recognize nitrate as the cause of fire blight, Peter was firm in this opinion. Moreover, he reckoned if a tree had trouble early on it was best to start over with a new tree, and I needed to get the soil right before planting new trees. At that time he didn't even mention tree paste. I wasn't ready and neither were my trees. That came later.

Biodynamic Tree Paste

Getting the soil right wasn't something that happened overnight. It required a change in mindset. Peter sent me a pamphlet by H. H. Koepf entitled *"Nitrate: An Ailing Organism Calls For Healing"*. He also referred me to Rudolf Steiner's *Agriculture Course.* In Steiner's view we should consider the trunk of the tree as if it was 'mounded up soil', though it was soil 'in a more living condition than the soil in which our herbaceous plants and grains are growing'. The [tree] plants are 'rooted in the twigs and branches of the tree just as other plants are rooted in the earth'[31]. Though it was a struggle in my first few years of farming, I gradually began to understand that giving a lime wash to the trunks of fruit trees was akin to making a lime application to the soil. Elsewhere in his Agriculture Course (p 68) Steiner talks about the desirable effect slaked lime has with stabilizing nitrogen in the soil and in composting. Later on when I began to use tree paste I found it was

[31] ***Agriculture, Rudolf Steiner****; Creeger/Gardner translation, pp 139-140.*

a more complete treatment than painting on lime wash to enrich the 'mounded up soil' of the tree. It had very desirable effects on what was going on under the bark, just like a lime application had to the soil; and insofar as possible it should be tailored to the needs of the trees just as the fertility program should be tailored to the needs of the soil.

After Peter's death Harvey Lisle became my mentor, and it was with Harvey in his apple orchard in Norwalk, Ohio that I had my first encounter with making and applying biodynamic tree paste. Though nearly eighty at the time, Harvey was always learning, experimenting and thinking outside of what 0others thought were the boundaries. Thankfully my background prepared me for Harvey's approach to tree paste, which was always fresh and creative.

We took a bucket about ¾ full of Harvey's soil, a clay-rich mud, and stirred it vigorously, first in one direction and then in the reverse direction, alternating back and forth for 15 minutes in a bucket with about 2 or 3 gallons of horsetail extract that we made the previous evening by simmering a pound of dried meadow horsetail herb on the kitchen stove. [In Australia I use the dried foliage of a river sheoak tree.] Harvey and I poured the mud soup through a kitchen sieve, and then through a paint filter, and it came out the consistency of latex paint. This was our base, to which we added biodynamic horn manure, biodynamic barrel compound [aka cow pat pit] and biodynamic horn silica in proportion to how many trees we were applying this to and how much acreage that represented.

Harvey's view was we needed to impart ALL of the forces of the biodynamic preparations to our trees or we wouldn't have a balanced and complete set of life processes needed to treat our soil/tree bark as a living organism. We also added 6 or 8 ounces (around 200 gms) of fresh cow manure and 100 grams each of builder's lime for calcium and basalt powder for silica, alumina, magnesia, potash, phosphates and trace elements. Harvey reasoned we wanted to bolster the trees in all these materials especially the lime and silica.

Harvey had discovered dowsing as a way to access intuition, so we dowsed for the quantities of each of the materials added. Perhaps in different circumstances the mix would be different, but like a fine chef in a kitchen, we gauged the circumstances and the quality of our ingredients rather than following an exact formula. At this point we had between 3 and 4 gallons of mixture to which we added half a pint or so of raw linseed oil as a binder to help the paint-like mixture stick to the tree bark. Harvey had made this mixture many times and found the term 'paste' a bit misleading. As a final step we 'potentized' the entire lot for 15 minutes in the typical biodynamic fashion of stirring a vortex in one direction and

then reversing it and creating a counter vortex. We alternated back and forth, left and right vortexes, to get a thorough penetration of the forces into the tree paint.

In applying it Harvey and I used large brushes suitable to pasting wall paper and we soaked it into all the cracks and crevasses of the bark up into the lower limbs. When we did this we first cleaned away all vegetation around the base and removed any lichens we found growing on the bark, leaving the tree with what amounted to a fresh overcoat—energetic, organic and mineral—on all its lower portions. We gave the base of each tree a bit extra, as where the soil met the tree was where the greatest weaknesses were likely to occur.

Tree Paint

Perhaps calling it 'tree paste' implies a stiff mixture, and in practice we applied Peter Escher's tree paste like latex paint. By using one coat every year or every other year, the intent is to build, strengthen and enrich the bark and trunk of the tree—which can be thought of as the 'soil' out of which the tree's vegetative growth springs. For large orchards biodynamic tree paint can be filtered and applied with spray painting equipment, or perhaps with an orchard fogger in the dormant season. This is a major improvement to the lime wash old time fruit growers used.

BD Tree Paste reclaims a neglected apple tree in Binita Shah's apple orchard in Uttaranchal

Although Harvey only had a small orchard, with a large-scale operation the tree paste could be sprayed on at the finish of annual pruning. One of the things biodynamic tree paint does is help heal wounds.

These days I would be inclined to use one part in a thousand of fulvic acid and a similar amount of concentrated sea minerals—the pot liquor left over after evaporation of sea water and removal of most of the sodium chloride. If I had any homeopathic preparations made from ashing pests—perhaps the troublesome boring beetles—I would also add these.

The recipe may vary a bit from place to place with the needs of the soil,

landscape and circumstances as well as the type of orchard or vineyard where this is applied. If I knew I had a specific mineral deficiency, such as manganese or molybdenum, I might add a highly dilute dose (a few parts per million) of these as well. If I had access to a clay with superior characteristics, such as Azomite, Desert Dyna-min or zeolite, I would mix that in with my local clay—and I'd dowse for the quantities, always checking my intuition before considering my reasoning. Though the mix should vary to suit the circumstance, a basic recipe might go like this:

A Basic Recipe

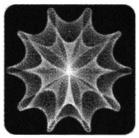
1. First obtain 10-15 kilos or so [22-33 pounds] of fine clay extracted from healthy, clean-smelling soil. This can be produced by dissolving, stirring and filtering soil—first through a sieve and then through a paint filter, and then letting the filtered clay settle out over a couple weeks' time and pouring the water off as if refining potter's clay. Add 10% Azomite, Dyna-Min, zeolite or other specialized clay if available.
2. To 15 litres [3.5 to 4 gallons] of she oak (horsetail) decoction—a well-simmered extract—in a 20 litre [6 gal.] bucket, add enough of the above clay to arrive at the consistency of paint. For calculating amounts for coverage of large orchards, mix up this size batch, see how far it goes and multiply the recipe accordingly. Much depends on the method of application, how big the trees are and how thoroughly the trees or vines are painted. Let experience be your guide.
3. To the above, add half an acre's unit of horn manure [500], horn silica [501], cow pat pit (barrel compound) and horn clay. Any insect or pest peppers may also be added at rates appropriate for the acreage.
4. Add 5 ounces [150 mls] liquid fulvic concentrate and the same amount of liquid sea minerals. Earthworm leachate may be substituted for the fulvic acid. Add a pinch or two of trace minerals (i.e. borax, copper sulphate, zinc sulphate, manganese sulphate, etc.) if these are indicated by soil testing.
5. Add a couple hundred grams or so each of powdered lime, siliceous rock powder [or diatomaceous earth] and fresh cow manure. Also add a hundred grams or so of gypsum or rock phosphate if sulphur or phosphorous are deficient in the soil's total test.
6. Add 6 to 7 ounces [200 mls] or so of raw linseed or other similar oil so the coating sticks to the bark and doesn't wash off with heavy rains.
7. Stir or potentize for 15 minutes by the vortex/reverse vortex method before application. Alternatively, use a paint stirring tool on the end of an

electric drill. After cleaning around the tree's base and removing any lichens, the tree paint can be applied with a large brush or spray gun.

A more advanced tree paste formula could contain, soil activator, biodynamic nettle tea, Acadian kelp and ORMEs and the mix could be filtered through a paint filter for spray application.

It should be emphasized that insofar as possible, loose bark, lichens, moss, etc. should be removed all the way to the base of the trees or vines. Normally the tree paste is applied in the winter after pruning, and it has the effect of strengthening the bark and sealing over crevices where pests might over-winter. This enlivens and nourishes the bark and cambium layer of trees or perennial vines, while sealing and protecting any wounds.[32] On small orchards tree paste can be applied with a paint brush as a thick paint from the base of the tree upwards into the branches. On larger orchards the tree paste can be applied using orchard spray equipment. Either diatomaceous earth or colloidal silica powder should be fine enough to pass through spray nozzles.

[32] ***Agriculture, Rudolf Steiner***, *Lecture Seven, page 141, Creeger-Gardner translation. "Thus, in the tree, we can see how the solid, earthy element has grown up into the air, and why it therefore requires more internalized vitality than ordinary soil, which only has ordinary roots in it." –Rudolf Steiner*



Compost

Engaging Atmospheric Nitrogen

Making compost using the biodynamic compost preparations is not especially difficult, but misconceptions abound and beginners usually require guidance. People with extensive hands-on experience will advise the use of soil in making compost. Those with mostly theoretical experience are more likely to think this is unnecessary, or even stupid. Perhaps this is because some theorists fail to appreciate that the reason for composting when recycling organic materials—especially manures—is to stabilize and conserve the nutrients as clay/humus complexes. This is especially true for nitrogen, phosphorous and potassium [NPK], let alone for sulphur, boron and other traces. Without soil with a clay component, organic materials don't form the desired sorts of stable but available complexes. Clay holds nutrients and losses are minimized while the soil food web and its microbes have access. Composting involves decomposition, but it is also a transformative process that builds nutrients into large, stable, humic compounds and stores them, similar to the way bees store honey.

Biodynamic Compost

The aim in composting is to recycle manures and organic wastes with minimal loss of carbon, nitrogen and nutrients so they become insoluble but available to the soil food web and crops. This is not difficult, but it helps to be observant. All crops need soils that maintain and improve their mineral balance, humus content and soil food web activity. It is this last category that is our topic—making humified compost that feeds the soil food web, which involves:

- Observation and careful cultivation of the soil—avoid over-work or unsuitable conditions where soil structure is damaged or lost.
- Crop rotations, inter cropping, succession plantings and diversity—green manures should include something like 15 annual species counting weeds; permanent pastures should have more than 50 perennial species.
- Application of well-humified compost.

Compost is Useful For

- Conserving both carbon and nitrogen

- Feeding the soil biology and crop needs
- Improving soil structure and tilth
- Providing a stable source of insoluble but available nutrients
- Storing water, carbon and nutrient reserves
- Long term benefits that last for many years
- Opening up the soil and helping it drain and breathe
- Promoting soil aggregation and preventing erosion.

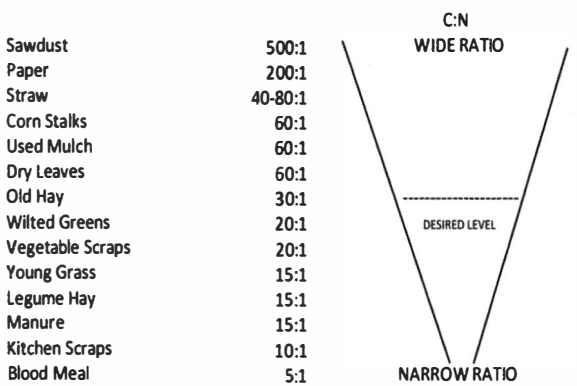
There are two stages of composting. First is the initial bacterial breakdown phase, where rapid breakdown of proteins and carbohydrates occurs. This is where temperatures can reach 74 degrees Celsius (165°F) and last for up to six weeks before dropping back into the 20s or 30s (70 - 100°F).

In the secondary stage more stable types of bacteria and fungi take over and tie up loose nutrients in clay/humus complexes. This takes longer but is necessary to ready the compost for use. These secondary stage microbes include nitrogen fixers, phosphorous solubilizers and humus formers which give soil its clean smell, and set up highly beneficial relationships with most crop plants.

Sometimes heavy feeding crops need an immediate boost, and it is tempting to apply immature compost. As long as the rapid, hot stage is fully finished and there are no ammonia or manure smells this is 'okay'. Just keep in mind that the best responses for pastures, vineyards, orchards, hayfields or market gardens come from mature compost. Be expedient, but whenever possible, plan for best results.

Starting Materials

A balance between carbon rich 'brown' materials and protein rich 'green' materials is key to making proper compost. Twenty five or thirty parts carbon to one part nitrogen [30 : 1] is an ideal carbon to nitrogen ratio for producing a desirable end product.



SOURCE CULTURE AND HORTICULTURE: Wolf Storl

Protein Rich 'Green' materials may include fresh manures, fish waste, animal

processing wastes, lawnmower clippings, fresh green weeds, seaweed and road kill. These materials would tend to putrefy if just piled up on their own.

Carbon Rich 'Brown' materials' include hay, straw, shredded leaves, maize stalks, sugar cane bagasse, shredded bark, chipped tree trimmings, sawdust. These materials would be slow to break down on their own.

Soil with a good clay content should be 10% of the mix. Keep in mind that pure clay may not provide earthworms with the coarser soil particles needed for their gizzards.

Other ingredients may include:

- Rock dust up to 5% of the mix
- Gypsum for sulphur (up to 5% if needed where compost will go)
- Rock Phosphate for phosphorous (5% if needed where compost will go))
- Lime (lightly sprinkled like sugar on porridge)
- Wood Ashes (slightly heavier than lime)
- Coarse screenings from old compost
- Nettle tea, comfrey tea, etc.
- Restaurant or lunchroom food wastes

Care should be taken with alkaline materials such as lime and wood ashes to avoid raising the pH much above neutral (pH 7.0) as that will drive off ammonia.

A Word of Caution: Be sure the sources of your materials are not contaminated with such things as industrial heavy metal wastes, wood preservatives, paints and stains, animal drenches or pesticide baits, herbicides, etc. For example, municipal lawn trimmings may contain residues of clopyralid, an extremely long-lasting broadleaf herbicide used on lawns. Hospitals may use radioactive isotopes which could accumulate in sewage sludges. Be aware and be careful.

Other Notes: 'Hot' fertilisers like dried blood or blood-and-bone meal should be composted with carbon rich materials rather than spread directly on the soil. Depending on their breaking down into fine particles, rock dusts may add a welcome clay component to composts and would be particularly beneficial to sandy soils. Also seaweed meals, if available, are adequate at a low rate of 25 kg (55 lbs) per twenty cubic metres of compost. If more is available that is okay.

Blending

A thoroughly homogeneous mix of ingredients is desired. For operations with turning equipment that has spray nozzles for adding water—as in large scale commercial compost turners—mixing is generally not an issue. On the other hand, in static composting where turning is infrequent or does not occur until compost is spread, manures, green and brown wastes and soil or rock powders should all be layered as thinly as possible, watered well and compressed enough to ensure good contact between layers. A good percentage of animal manure might be 15 to 30% depending on the type of manure—chicken manure is hot, cow manure is mellow. Layers of plant materials, either 'green' or 'brown' should be no more than 10 cm (4 inches) thick if that, with animal manures half that and soil 2 cm (3/4 inch) or less.

Moisture

This should be even throughout and should start at 50% or more of the total so that water can just barely be squeezed out of the starting materials by hand. It may be a good idea to soak baled straw or hay in water prior to compost building.

Aeration

Air is essential to encourage healthy bacterial breakdown. Too compact a heap might fail to work properly, becoming putrid or sour like an anaerobic septic tank, while too loose a heap may work vigorously at first, emitting ammonia and then becoming dryer, more inactive and mouldy.

A bottom layer of brush or branches, or an inverted V-shaped tunnel made from biscuits of hay, or perhaps a length of corrugated plastic ag-pipe perforated with holes down the centre of long heaps will ensure aeration from the bottom up.

Warmth

Optimum temperatures are a result of a balance between water, air and green and brown materials. Heat is primarily produced by nitrogenous materials breaking down. Too much nitrogen rich material results in excessive warmth and nutrient loss to the air. If the temperature goes too high this may even halt the break down process. Not enough nitrogenous material makes for a cold heap.

Too much water leaches out nutrients while too dry a heap may work too fast at first and then cool off and go too slowly. Ideally the pile should heat rapidly the first two or three days and then cool gradually over the next several weeks. If the pile is too dry, too hot or working too fast or slow, turning and re-establishing good moisture levels may be required. Turning after six weeks may aerate and re-

stimulate the warmth process, though this will be cooler and more short-lived.

In large scale, high volume operations using turning equipment with water injecting capacity, windrows should be turned whenever temperature reaches 65 degrees Celsius (150 °F), or when moisture falls below 50% or when the carbon dioxide level at the base centre of the windrow goes over 15%.

Site Selection

Choice of composting sites will, among other things, be affected by the size of the planned heap and ease of access for accumulation of materials as well as access for working the compost. Obviously home gardens have different requirements from large dairies or municipal composting operations, but several features will be common in all cases.

- A well-drained soil pad above the flood plain. A concrete slab may be good for a silage stack or a feed pad, but compost needs a site where soil organisms, including earthworms, have direct contact with the compost.
- Opportunity for repeated use of the site. This allows build-up of beneficial organisms that are helpful for making quality compost.
- Beneficial shade. Shade slows evaporation and helps compost decompose more quickly. Beneficial trees may include casuarina, oaks, birch, elder or any leguminous trees (It may be good to avoid eucalypts, willows or walnuts.)
- Wind and rain protection. A covering, such as a plastic tarp, will provide a 'skin' or outer membrane for the heap. This helps maintain proper moisture and protects the biological activities in the pile so the heap composts fully all the way to its outer surface. Peter Bacchus of New Zealand suggests making a clay-rich paste and troweling it onto the finished heap like stucco before sprinkling the valerian on.

Note the small pile of finished compost in the front that filtered out of the coarser materials when the compost pile was turned.

Heap dimensions

Large windrows should have a base roughly twice as wide as their height. This could be 2.5 to 3 metres wide and 1.5 metres high. This should allow air to permeate the heap as well as providing enough critical mass to promote

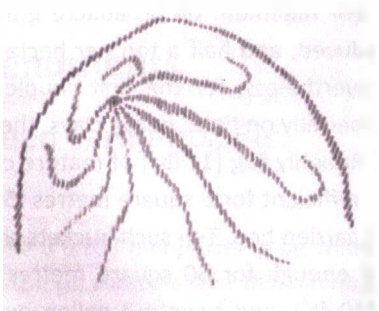
fermentation.

A home garden heap may be built as a near-vertical rectangle by building the corners up first and tying these together by filling in the sides and middle of the heap. Alternatively it may be contained by a circle of woven wire fencing or a slatted timber box that allows ample air circulation.

Building a Compost Heap

- Gather materials at the desired location. Large scale operations must allow for machinery access.
- Determine the necessary dimensions for heaps or windrows.
- For garden piles build a base of brush, or stack hay biscuits to form an air tunnel or lay down a piece of perforated drainage pipe at the base of the heap.
- Build alternate layers of brown materials, green materials, manure and soil. This might mean 10cm (4 inches) of shredded bark, chipped tree trimmings or 15cm (6 inches) coarse straw, covered with 3 to 4cm (0.75 - 1.25 inches) of lawn clippings or 7 to 8cm (3 inches) of green weeds and a centimetre or two (0.25 – 0.75 inches) of manure slurry covered with a thin layer of good soil, some siliceous rock powder, gypsum and/or rock phosphate and a fine dusting of seaweed, hydrated lime or wood ashes.
- Thoroughly water each sequence of layers, washing the upper layers down into the lower ones before building the next sequence.
- Kitchen scraps, dead road kill, older compost full of earthworms and turf with soil on the roots can be incorporated along the way.
- Build the corners, tie these together by then building the sides and fill in the middles last. In circular piles build the rims first and then fill in the middles. If digging new garden beds in mixed grass and clover sod, crumble the soil off the plant roots into the beds and use the plant materials to build up layers.
- Continue building sequence after sequence of layers—brown, green, manure slurry, soil, rock powders and a sprinkle of lime and—if available—seaweed.
- With a garden tool handle or crowbar make five holes at least 30cm [one foot] deep in the pile.
- With soil or manure, mould the five solid preparations into little balls and insert one into each hole. Stir the valerian tincture for 15 minutes in 4.5 litres (1.5 gallons) of water and spray this over the pile. Pour half down a sixth hole.
- When the holes are closed over, cover with a thin coating of soil or a layer of straw mulch, sprinkle the remaining valerian on and cover with a tarp.

Inserting Biodynamic Preparations



For a modest sized garden compost pile, use a small set of compost preparations, each weighing a 1 gram (level teaspoon) moulded into a ball with soil or manure. For a larger pile use 2 grams per preparation.

Although each preparation is placed at a single location, its radiations will thoroughly permeate the pile. See Steiner's drawing (right) from his agriculture course.

Turning

If, after six weeks, there are doubts about how the heap is composting, it can be turned and corrections made—such as adding water. Mixing the layers together helps integrate the pile. Turning should bring the outside into the centre and vice versa to ensure an even breakdown. At this point static piles should be covered and left for long term mycorrhizal fungal development and humification.

Static piles should develop beneficial fungal growth, while frequently turned piles favour actinomycetes. Not everyone needs to turn their heaps, but moisture should be checked and piles should be watered if needed.

Application Rates

Large scale, frequently turned commercial compost

For market gardens finished compost is generally used at 7 to 15 cubic metres or 2.5 to 5 tonnes per hectare per year. On tight, heavy clay soils in the first year or two the rate may be doubled, and probably some other amendments such as gypsum, elemental sulphur or high calcium lime will be needed. As the soil becomes active and alive and diversity improves this rate should be reduced.

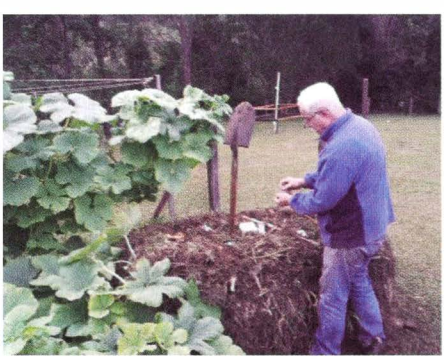
Put compost on the surface and let it work in via the animal activity of the soil rather than ploughing it into the soil. Once compost establishes the herbal

preparation processes, rates can be cut.

For minimum till broadacre grains and dairy pastures the rate can be further reduced, and half a ton per hectare (0.2 ton/acre) per year should be sufficient. Nevertheless, for the first couple years of conversion from chemical methods, especially on tight, heavy clays, these rates can be doubled or even quadrupled.

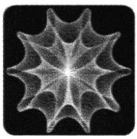
Roughly 5kg (11 lbs) of mature compost fits into a 10 litre (3 gallon) bucket and is sufficient for 5 square metres (54 ft^2) of garden bed. Ten such buckets should be enough for 50 square metres area (540 ft^2), and twenty 3 gallon buckets will cover 100 square metres (1076 ft^2).[33] If this amount is applied every other year the soil should be well-cared for. Keep in mind that trace mineral corrections based on soil tests should be blended into compost before spreading.

Finished commercial humified compost



Inserting Biodynamic Preparations into a newly made garden compost pile.

[33] *These figures are approximate.*



Liquid Amendments

Liquid Manures, Weed Ferments, Etc.

Observation is the key to knowing what to do. There is a LOT that passes us by. Nature sings to us in a chorus of many voices, were we to listen. Let concepts arise that inform us of what we hear—or smell or taste or feel. What we have at hand is sufficient to the moment were we to attend.

Nothing need be wasted. Liquid amendments, sometimes called liquid manures, are another useful option. A large number of watery ferments, extractions and concentrations can be made as plant tonics on the farm from locally available materials, weeds, rubbish, cow dung, seaweeds, fish scraps, road kill and other materials fermented and digested with the compost preparations 502-507. Simple herbal ferments may take from eight to twelve weeks, while fish ferments and road kill brews may take many months or more. This also applies to effluent ponds.

Plant materials such as nettles, inkweed (poke), comfrey, lucerne (alfalfa), seaweeds (kelp), lantana, tobacco bush and thistles rank high among the possibilities. Fermented cow manure makes a good tonic too.

Plant Ferments

Fill a 200 litre (55 gallon) drum a third to half way with the chosen material, fill it the rest of the way with water and add a 1-2 grams (1 – 2 level teaspoons) of each of the preparations tied in bits of cloth like tea bags. Simply stir up and add the valerian flower juice to the ferment once it gets going. Stir the ferment regularly and keep it covered. In some cases it is a good idea to add molasses to sweeten the ferment while feeding an EM type mix of anaerobes dominated by lactobacilli and yeasts. An effective microbe [EM] culture may help with brews that tend to go stinky, such as stinging nettle, fish ferments or road kill brews. Biodynamic preparations activate, balance and stabilize the brews. Know that stinky smells indicate volatile nitrogen compounds escaping into the atmosphere.

Application Rates

Apply plant ferments, seaweed ferments and other brews at 10 L/Ha (1 gallon/acre) and dilute one part in ten with water for use as a soil drench. Activate by hand stirring or use a flowform for an hour and apply as a soil drench with CPP,

horn manure [500] or soil activator. These application rates can also be used for fertigation (Fertigation is putting inputs out along with irrigation). Strong and stinky fish or road kill brews may require high dilution.[34]

Seaweed Ferments

There's plenty of use for seaweed composts and ferments made on the farm. These can be simple to mix, and seaweed contains all amino acids and minerals.[35]

Fresh kelp should be finely chopped and half fill a 200 litre (55 gallon) food grade barrel. If powdered or ground dried seaweed is purchased, ten kilos (22 pounds) is enough for a 200 litre (55 gallon) drum. For ease of mixing, fill the barrel two thirds full of water and stir in the seaweed, topping up with water.

Adding Preparations

One set of preparations is sufficient (1–2 level teaspoons of each preparation, tied in bits of cloth like tea bags) for a 200 litre (55 gallon) barrel. Place each preparation (bound up in cloth) on top of the kelp mix and cover with shade cloth or a loose lid. Stir once a week. Each preparation ball will sink and radiate its influence throughout the ferment. After a week, stir the valerian tincture in (first activate by stirring for 15 minutes in 4 or 5 litres (1.25 gallons of water). Stir every few days. When it stops bubbling, it is ready. This may take two to three months.

Stinging Nettle [24 hour extract]

Cover one kilo (2.2 lbs) of chopped fresh stinging nettle herb with 10 litres (10.55 quarts) lukewarm water in a suitable container for 24 hours. Strain the juice off as a light tea and use two or three times in as many days as a spray for insect larvae or caterpillars. This strengthens the nitrogen processes [astrality] of plants, reduces nitrates and improves sap flow, which will help counter aphids and fungal attacks while flavours and essential oils increase. In the same tea-like proportions this can be continued from a few days up to several weeks and can be applied as a soil drench to work from the soil up.

As a general tonic for plant growth nettle extract can be used as a soil drench

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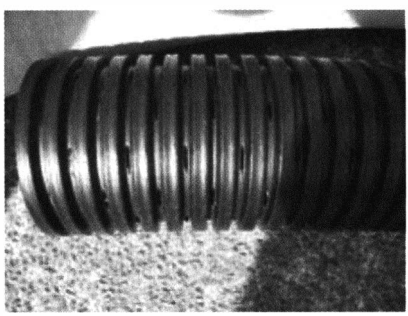
[34] *For ease and efficiency some farmers may combine liquid seaweed, soil activator and other materials in their soil drench/fertigation formulas for pasture, hayfield, grain, orchard, vineyard or vegetable production. Be observant and do what works.*

[35] *In Australia, those without ready access to the raw materials or the time to make ferments can order seaweed and fish fertilisers made with biodynamic preparations from Biodynamic Agriculture Australia in Bellingen, NSW.*

diluted at a rate of one part in forty with water and activated by stirring as above. A much thicker, stronger nettle ferment can be made (*see Plant Ferments)* for use on garden vegetables such as tomatoes, cucumbers, spinach or cabbage and it helps supply biological nitrogen as amino acids. If used as a foliar, dilute to one part in twenty. Stir and spray.

Liquid Fish

- Make this recipe well away from the house or away from public places. No one forgets twice.
- Use a 200--2000 litre (55–550 gallon) non-corrosive tank or drum to dissolve the fish—for example, a stainless steel vat, concrete tank or suitable plastic drum or rainwater tank.
- Before filling with fish, place a filter (e.g. a piece of nova-flow pipe) upright, inside the tank, connected to the outlet at the bottom of the tank. This is to sieve out scales and bones from the broken down liquid. Compost these filtrates.
- Fill with sliced or chopped fish. Shark or stingray are best, but fish-heads, frames and skins make a reasonable product.



Nova-Flow pipe

- Cover the fish with rainwater and add the compost preparations 502-507.
- Add the compost preparations [502-507] twice during the breakdown process, which takes several months. For 2000 litres use five sets (5 level teaspoons) at the beginning and five sets in approximately three months.

Liquid fish takes about seven months to ferment properly. It can be stirred well once or twice a month. After three months the liquid should be a thick cloudy grey. When ready to use it should turn a clear golden colour and lose some of its sulphurous smell.

Use at the rate of 2 to 3 litres per 100 litres of water per hectare (1 quart per 10 gallons of water per acre). This can be applied up to three times a year as a tonic for pasture, vegetables and fruit trees. It helps the trace elements and is an excellent way to get the compost preparations out over the land.

Fuzzy Brew

- 3 kg (6.6 lbs) fresh cow dung
- 1kg (2.2 lbs) molasses
- 1kg (2.2 lbs) Cow Pat Pit or Barrel Compost
- 1/2 litre (1.1 pint) cow urine (you may need a dairy to catch it!)
- 1 kg (2.2 lbs) yoghurt

Place ingredients in a 200 litre (55 gallon) drum, fill with water and allow to brew. Stir daily. Fuzzy brew should bubble as it ferments and be ready for use after 4–6 weeks. Dilute 1:10 and use as a soil drench for veggie and fruit crops. Fuzzy brew is also used for sugar cane, sorghum, or other grassy cover crops. Apply weekly or monthly.

Road Kill Brew

Fill a 200 litre drum with water, add road kill carcases such as possum, deer, kangaroos, wombats, groundhogs, feral pigs, armadillos, (may need cutting), etc.

Add 1-2 double sets of biodynamic compost preparations 502-507 at the rate of 1 double set per 200 litres (55 gallons) of water.

It may be necessary to hold down or puncture carcasses. Stir when possible to keep aerobic but submerged. Molasses and effective microbes may be added to scavenge escaping gasses. This is a high nitrogen (very smelly) brew that should never be applied while at its foul-smelling worst. It recycles such fractions as blood and bone, with additional glue and varnish characteristics that may be active but beneficial at high dilution.

Use 1 litre per hectare (1 pint/acre) diluted in forty parts water in an annual spray on pastures or cane fields. It could be combined with soil sprays. A rule of thumb is if it smells bad, don't use it or highly dilute it. It isn't fermenting properly until it smells like it is. If it's too wet, dry it out. If it's too dry, wet it.

Fermented Weed Teas

Weeds are often a sign of soil mineral imbalances. Each species is able to accumulate the minerals it needs even when these are not available to other species. Making a tea of them and spraying it back on the land usually makes these minerals available.

There are weeds, tall woody weeds in particular, that act to mop up and conserve loose nutrients, particularly nitrogen, phosphorous and potassium (N, P and K). Fermenting these weeds and using the finished ferment on cultivated soils usually suppresses the growth of these species.

Half fill a 200 litre (55 gallon) drum with weeds. Use whole plants and chop as needed. This may amount to 20 kg (40–50 lbs) of material. Fill with water and add one small set of compost preparations. Molasses and effective microbes may also be added. Stir weekly. Weed ferments are ready when active fermentation stops.

Dilute weed ferments 1:40 and apply as a soil drench. If needed and if feasible, apply three times, at least a week apart, to problem areas.

Effluent Pond Water

Many dairies and other high density animal farms have effluent ponds into which manure and urine are washed and collected to prevent them from getting into streams, rivers and aquifers. Properly fermented, such effluents can be recycled on pastures or crops. Dairies may pump their effluent water to irrigation pivots so that a small percentage—typically 5 or 10%—is added with every irrigation. Effluents tend to be rich in nitrates as well as sulphates, borates, silicates and various trace minerals including cobalt, selenium and molybdenum, which are too valuable to waste. In their raw condition most effluents are rich in potash and nitrate salts that would lead to undesirable lush, weedy growth. Insofar as possible these soluble salts should be stabilized and tied up with soluble humates and biodynamic preparations. It is advisable for the areas where manure and urine collect to be treated with a light spray of cow pat pit or soil activator and effective microbe culture (EM) along with a dusting of soluble humates before wash down. That way an appropriate microbial activity can go to work before these effluents are used. Once again, trial and observation will lead to the ideal way to do this for each farm.

Milk Feeding of Pastures and Soils

Sometimes dairy farmers have surplus milk that they cannot get a worthwhile price for. There is hardly anything more beneficial than milk for pastures and for the soil food web. Pastures may be able to absorb more milk than cultivated land because the soil food web is undisturbed and milk is a premium food for living organisms. For cultivated land, such as maize or broadacre crops, use 20 to 30 litres per hectare as a weekly or fortnightly soil drench. On pasture, as much as 3 or 4 times this amount might be used when available. Again, be observant. It might be a good idea to dig up a bit of pasture and examine the roots and the soil food web a day or two after a milk treatment to see how things are going.

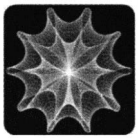
Consider what a stimulant effect this could have on the ecology and imagine how well the farm could produce if nature was stimulated by application of liquid

amendments. There is a bit of work involved, and some mechanical power, but this has better prospects than buying a lotto ticket. Those with radionic equipment can put the patterns of these recipes out over their whole property using a map.

Biodynamic Preparations, their functions and associations.

BD Prep	Horn Manure BD 500	Horn Silica BD 501	Horn Clay	Yarrow BD 502	Chamomile BD 503
Human Organ	Central Nervous System	Senses	Diaphragm, Epithelial tissues	Kidneys, Bladder	Intestines
Planetary Principle	Earth Vortex In	Earth Vortex Out	Earth's Surface	Venus	Mercury
Organic Process	Inhaling, taking things in	Exhaling, giving things off	Pulse	Refinement Purification	Digestion, Assimilation
Minerals	Lime/Humus	Silica	Clay/CEC	Sulphur, Potassium	Calcium, Amino Acids

BD Prep	Nettle BD 504	Oak Bark BD 505	Dandelion BD 506	Valerian BD 507	Horsetail BD 508
Human Organ	Heart, Blood	Skeleton	Liver	Lungs	Hair, Epidermis
Planetary Principle	Sun	Moon	Jupiter	Mars	Saturn
Organic Process	Circulation Distribution Vitality	Inner or Outer Structure	Regulation	Respiration	Boundaries
Minerals	All Minerals	Lime with Organic Nitrogen	Potassium, Silica	Phosphorous and its Co-factors	Organic Silica



Preparation Storage and Use

Aging and Enhancing the Remedies

Biodynamic preparations are living substances. Properly stored they should improve and get finer with age. They can be damaged by such things as exposure to electromagnetic fields—circuit breaker boxes or electric motors—but they are resilient and can recover from most damage. They may bear scars, but that doesn't mean they are useless.

We would do better to treat our preparations as if we were aging fine wine—prepare a clean, wholesome place for cellaring them that becomes thoroughly permeated with their essences.

Storage of the Biodynamic Preparations

To optimize the effectiveness of the biodynamic preparations it is important that they are stored in ways that protect and enhance their properties so they do not dissipate, become damaged or get contaminated. The shape of the storage container, the material it is made from and the environment it is placed in all have effects on the preparations being stored.

Horn Silica [501] and Summer Horn Clay

These are two very important preparations. Horn silica enhances warmth and light and horn clay enhances the way warmth and light inter-act with the biological activity in the soil. As such these should be stored in a warm, sunny location, such as a window sill where there is air movement and sunlight. These two preparations can be stored together or in separate containers. Clear glass, such as would be used for instant coffee or bath salts, might be a good choice. Let circumstances dictate whether the container is best kept outdoors or inside, and care should be taken to prevent harm, such as falling and shattering the jar. Air flow should be good, and the jars should be kept clean. For example a window box of portulacas or small succulents might be a good choice.

Soil Based Preparations

In contrast to the horn silica or summer horn clay, it is important to keep the

soil preparations moist. Ideally they should be kept away from sunlight. They have a strong connection with the tone and life ethers. As with horn silica and summer horn clay, winter horn clay may be stored along with horn manure. These preparations include horn manure [500], barrel compost [cow pat pit or CPP], soil activator [all the preps], winter horn clay and the yarrow [502], chamomile [503], stinging nettle [504], oak bark [505], dandelion [506] and horn clays. The valerian [507] extract is usually kept in a brown glass bottle.

Each preparation should be stored in its own vessel, well-marked and inside a larger containment packed with peat, coconut fibre, rice hulls or other relatively neutral organic packing materials. Generally the individual vessels should be glass, ceramic or pottery with lids that fit well enough to keep foreign material and bugs out, but aren't strictly air-tight.

Although most organisations that distribute preparations ship them in Ziploc bags, these are not recommended for long-term storage. In the construction of storage for preparations, plywood, treated woods and plastics tend to be avoided, though food grade plastics are often used. Metal containers should definitely be surrounded with organic materials. Growers tend to use what works and is available. Storage methods should take into account the preparations' need to breathe by allowing a bit of air circulation.

Horn Manure, Winter Horn Clay, CPP and Soil Activator

For storing large quantities of horn manure [500], winter horn clay, CPP or soil activator, bathtubs like the old cast iron variety, can be encased in a wooden box filled with peat or similar material.

Each tub should be surrounded by at least 5 or 10 cm [2 to 4 inches] of peat moss or comparable organic material. This not only insulates the preparations, it draws in organizational energy from the surroundings according to each preparation's needs. This helps them mature and contributes to their character as they age. Peat moss is ideal for this purpose as it provides a material that draws in etheric energy. The top of the bathtub can be covered with damp hessian bags and then covered with a timber lid packed with peat moss or a peat filled bag made from close weave fabric that won't leak dust. Some use an old door.

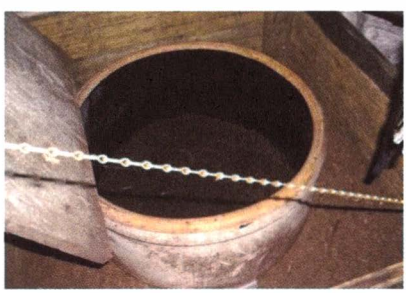
Larger containers for groups of preparations could include a variety of containers for storage or transport. Some examples are a wine barrel with an access hole cut in the side; a half wine barrel with a wooden lid; an old wooden tool box or even bee hive boxes sunk into the ground and used for storage.

Some may think it heretical to use plastic, but an ice chest filled with peat moss

or rice hulls is a cheap, durable, handy and functional container. Glass instant coffee jars labelled with red nail polish can nestle into the peat moss. The lid can be closed and locked and the cooler stored in a cellar. It is mouse proof, almost bug proof and can be chucked in a vehicle and bounced off across the, barnyard, compost site or pastures before being returned to storage. The preparations will be kept secure, uncontaminated and ready for use. Use is important. The preps don't work unless they are used.

At the other extreme, storage boxes for preps can be crafted from beautiful exotic hardwoods, such as Osage orange, lined with gold foil and covered with rabbit fur for maximum etheric accumulation. This preparation tabernacle could be housed in a marble pyramid at a crossing of earth vortex lines. Personal preference is the rule, though have a care about spending more effort storing the preparations than using them.

Compost Preparation Ice Chest



500 Storage Crock in Peat Lined Box

Valerian Tincture and Horsetail Decoction

Both of these two preparations will ferment in storage unless taken to a homeopathic potency and protected with ethanol or something of the sort. In many cases the fermentations, as with wine, have proven to be good and have stored well, so this may not be a worry. Just be observant.

In the case of the horsetail decoction, fermentation is desired for making a soil drench, while foliar applications are sprayed as soon as the decoction is made. Storage of these liquid preparations requires a cool dark place as with aging wines—well away from chemical or electrical contamination. This might be a cellar, a shaded farm outbuilding or even a wooden barrel in the ground. It may not be a good idea to keep preparations in a refrigerator. Again, be observant.

El Niño/La Niña Rhythm

The El Niño rhythm is based on the cycles of Mars, Jupiter, Saturn, Uranus, Neptune and Pluto. When these planets come together or conjunct there is an increased likelihood of an El Niño event occurring. The more of these together in a group the stronger the El Niño event is likely to be.

The strongest El Niño event was about 1983 when Pluto, Neptune and Uranus were as close together as they get in this cycle, so when Saturn and Jupiter caught up to them there was a close group of five planets. Every two and-a-bit years Mars catches up with the slower moving planets. This was the strongest El Niño event in the life time of any-one alive today.

As Uranus draws away from Pluto and Neptune in 2014, the next conjunction in the forty year cycle will occur in 2020 and will be weaker than in 1983. There will be a repeat in 2022 before we go back to a predominance of La Niña. What concerns many farmers today are El Niño events, such as the one in 2014-2015. This should be a relatively weak event lasting from October until March. Another of these lesser events should occur in 2016-2017 as Mars closes on Saturn, which will be starting to get within reasonably close proximity to Pluto.

So what can we do to manage such situations? One thing is to plant trees and shrubs that are edible by the animals that we keep. Another is to build as much humus as is possible each year. By humus I mean organic matter that has been digested by soil organisms. A third is to modify stock numbers to meet the expected climatic conditions for our locations. A forth is to nurture and modify the [etheric] atmospheric conditions. The more people working in this manner the better it will work for all. Bear in mind that in the act of farming we are already modifying the natural environment to a greater or lesser degree, so why not take the next step and responsibly manage the atmosphere in our localities?

The biggest challenge for us is to find ourselves unexpectedly in a situation where we are unable to manage the environment around us. Understanding the organisational [etheric] processes at work in our landscapes and using the biodynamic preparations to enhance them can help us get to the next level of responsible management.

Peter Bacchus, Coromandel N.Z. *(See also page198, El Niño/La Niña)*

Weeds, Insects and Pests

A Quantum Perspective

Observation is the basis of intelligence. There is a lot that passes us by. Nature bathes our senses in an ocean from which we merely sip. The teeming tapestry of form, colour and activity before us is an open book were we open to it.

Understanding nature allows us to increase and enhance life processes and nurture crops—which also implies we can impair or block the life processes in weeds or pests if we so choose. One of the things this may involve is making what is called a 'pepper' by burning the part of an organism that receives its life energies at a time when it most depends on them. Why this works is best explained by quantum physics and quantum biology.

However, before we get rid of something, we should try to understand why it shows up in the first place. Maybe it is useful, or maybe we are encouraging it by doing the wrong things, and were we to correct our behaviour the weeds or pests we have would disappear.

Converting to a New Paradigm

Weeds can be a big hurdle in converting to biological methods. Over the past 70 years the use of herbicides has changed farm management to the point the old ways of weed control are largely lost.

Weeds have increased in tandem with greater use of water soluble fertilisers and poisons. As soil life collapsed and healthy bacterial, fungal and protozoal activity was lost, soils became compacted, unhealthy and dead. Aeration, water circulation and tilth were lost, and anaerobic oxidation of organic residues followed. This favoured coarse weeds that thrive on loose nutrients such as N, P and K salts. In addition, these salts are usually applied at rates which impair fine root development and microbial partnerships. A few dominant weeds that thrive in these conditions have taken over many agricultural operations. Weed invasions in pastures have followed a somewhat similar pattern due to poor management and unwise fertility practices. Often weeds are nature's way of restoring balance.

Since 1945, pesticide use has risen 3,300%, but overall crop losses have not gone down proportionately. Rather, despite the use of 2.2 billion pounds of pesticides annually, crop losses to weeds, pests and diseases have increased. Do we really imagine this is working? We face a world crisis from toxic contamination of our food producing resources. Meanwhile, are there any growers who use

these warlike chemicals because they are enchanted with the aromas, or invigorated by a day's spraying? With pesticide applicator safety courses becoming mandatory, is there anyone left who truly believes these chemicals are safe? Is there any reason we can't approach nature in a new, cooperative way?

Suppose we look at weeds to see what they are doing to the soil. Maybe we have erred. We seem to be spending a lot of money, time and effort on doing something that isn't working while telling ourselves that herbicides are the 'easy' way. Here are some of the things that help weeds to thrive:

- Leaving the soil bare
- Fertilising with harsh salts
- Planting mono crops that impoverish the soil ecology
- Using toxic chemicals that disrupt natural balances
- Setting up erosive conditions
- Ignoring soil improvement in choosing crops
- Chasing high yields even when it's bad economy
- Using herbicides that result in more virulent weeds

When first introduced in agriculture after World War II herbicides were the brave new way of 'better living through chemistry.' Millions were spent on promoting their adoption and billions were made as profits. Now they are the old, familiar way. Now growers depend on these weapons and can't risk lower yields when they barely can service their debts as it is. The problem is venturing into the unfamiliar. It is risky, but it isn't as risky as the inevitable failure of battling nature.

Biological, organic and biodynamic growers look at weeds as messengers that tell us what we are overlooking or doing wrong. Weeds annoy us and insist we pay attention. Killing the messenger gives us momentary satisfaction—while prolonging the agony.

How hard is it to change the world compared to changing the way we look at the world? How hard is it to study a weed and see where it shows up, when and how it grows and what makes it really thrive? What if we tried finesse instead of force and denied weeds what they love? We could learn a lot. There is something very human, very futile and very tragic about imposing a solution that is itself a problem when we haven't understood what caused the problem originally. Fortunately, nature's patience and wisdom allows us to repeat those mistakes we fail to learn from. The more we poison weeds and pests the more they return. Surely this tells us we have a lot to learn.

A more effective approach would be to look back into the history of the area

and its soil and see how each weedy condition developed, step by step. For example, Patterson's Curse, which is similar to purple loosestrife, takes over fields with a history of cultivation in late summer or early autumn and fertilisation with single superphosphate, urea or di-ammonium phosphate [DAP] when planting winter cereals. The cultivation and fertilisation wipe out the soil mycorrhizae that solubilize and hold onto sulphur, boron, available phosphorous and its co-factors—copper, zinc and manganese. The first and easiest to leach are sulphur, boron and copper. Patterson's Curse and purple loosestrife are copper collecting plants that send down a tap root as soon as it sprouts and retrieves copper. Its tap root also gives it herbicide resistance. The curse occurs if it is the sole survivor and hungry livestock in desperation eat too much. They then salute the sky with legs as stiff as trees, victims of copper poisoning on copper deprived topsoil.

Each weed has its story—fireweed, capeweed, thornapple, thistle, wild radish, bindweed, rattlepod and willow. Many weeds are medicinal—stinging nettle, inkweed (poke), mullein, blackberry, elderberry, St. John's wort and milk thistle. Some weeds are simply beneficial—dandelion, yarrow, corn salad, pennywort, sorrel, chickweed and numerous medics. Some are highly nutritious for livestock—chicory, kudzu, and various vetches, glycines and stylos.

Most weeds follow successions and have a job to do, moving on once it is done. Many 'invasive' pasture species fall into this category—lovegrass, sedges, couch (Bermuda) grass, scotch broom, sensitive weed, dock, burdock, buttercup, thistles and paddymelons. They take over under poor pasture management and disappear in favour of better species when management improves. The lists are long and many weeds of potential importance are poorly understood and poorly utilized. For example, vigorous legumes such as kudzu and leucaena delve deeply into the soil, mining and unlocking its mineral stores and joining these up with atmospheric nitrogen to create proteins. This makes them rich fodder for livestock. Animals in a new pasture will graze these species first, and be back the next day and the next until they utterly ravage what they like most—if they are left on that area. Rotational grazing moves the livestock along and lets the best species recover. Leaving the animals on a section of pasture longer than a day or two hammers the best species, exhausts their roots and may kill them. Many legumes, which developed deep roots to penetrate hard soils, thrive in extremely tough conditions and improve the soil enormously, have developed thorns like thorny acacia or toxic alkaloids as with some lupines and vetches to protect themselves. Kudzu, a fire retardant leguminous vine which is amongst the fastest growing, most nutritious soil building plants, is easily killed by overgrazing. It must

be protected from continuous grazing in pastures, and it is difficult to establish from seed. Yet, once established it can grow up to 30 cm (1 foot) per day and is one of the plants most feared by weed police because, when not managed and controlled by grazing, it can smother tall trees, cross bridges and invade houses or barns. Properly managed it could reclaim gravelly deserts.

Weeds are only weeds when they show up where we don't want them, or like running bamboo, go where we wish they wouldn't go. We fear what we don't understand. Weeds are phenomenal resources that require artful management.

Weed Groups

Often weed problems show signs of environmental imbalances by the groups of weeds that appear. For example, dock, buttercup, sorrels and various sedges show up on compacted, poorly drained fields and pastures that remain waterlogged and anaerobic for extended periods. Under these conditions sulphur, boron, calcium and copper leach, eliminating clovers and shutting down phosphorous solubilisation and nitrogen fixation.

Blackberries, lantana, crofton weed, tobacco bush, privet, clematis, honeysuckle, and bindweeds can take over rough and tumble terrain that might be more productive if these weeds were trumped by high protein leguminous trees like gorse or wattles, or by vines like kudzu or glycine, or by shrubs like leucaena and some of the acacias which can be grazed to fatten stock. Kudzu in particular has trouble establishing on good country because livestock won't eat anything else until it is all gone. If kudzu is established and controlled by good grazing management, it is the best stockfeed of all.

Fire Management

There is a time and place for everything, and fire often makes way for broadleaf species. Quite a few of these, such as purslane, sow thistle, milk thistle and fat hen (lamb's quarters), are nutritious for livestock and the diversity they provide is important. However, repeated use of fire to 'clean up' pastures sends the sulphur, as well as the nitrogen, off into the atmosphere. This often is a first step in creating sulphur deficient, hard soils. Set stocking, where livestock stay on tight, sulphur-deficient pastures for many days or weeks at a time, perpetuates and worsens these conditions because the palatable species are grazed repeatedly at the first signs of growth while the less palatable species are ignored. This reduces diversity and all the herbicide and cultivation in the world won't fix this problem.

As an alternative to fire, slashing or flattening recycles nutrients and helps

defray costs. The residues become soil cover and make habitat and food for a wide range of soil animals and micro-organisms that open up the soil and conserve nutrients and moisture. But frequent slashing, not counting the expense, prevents plants, including weeds, from developing deep roots. If seed production is not desired, one can wait to slash until flowering begins when the plant is dying to produce seed. This will kill most weed species while getting maximum benefit for the least effort. Besides, deep roots are good.

Alternatives to slashing (mowing) include rolling down and crimping tall growth. Twice as wide a swath can be covered in a higher gear as compared to slashing. Some equipment, such as a 'crocodile', is built to chop out shallow divots and drop seed, to wait until rain comes.

A 'Crocodile' plants seed as it rolls down tall growth

To re-establish well-drained conditions that will support a mix of nutritious deep and shallow rooted grasses, legumes and broadleaf species a fast moving, high density, rotational 'mob grazing' program is advised. This mimics nature where dense herds migrated. This is management intensive and works best with the assistance of biodynamic soil activator supported by affordable applications of humic acids, sulphur, lime, boron, copper, etc. according to a comprehensive soil analysis. Where perimeter fencing is a long term investment, a well-thought out, well-timed, well-executed mob grazing soil improvement program using movable internal fences can help pay the costs. Depending on terrain and weather cycles, fertility gains may also be speeded up by direct drilling of annual summer/winter grazing mixes of grasses, legumes and broadleaf species such as sorghums, millets, cowpeas, lab lab, buckwheat, etc. in summer, alternating in winter with mixes of cereals, vetches, brassicas, corn salad, etc. As always, apply soil activator and maximize diversity by watching the changing succession of weeds instead of fighting them. If a weed volunteers, it's because the conditions are right for it. As the conditions change so will the succession of weeds. Working with nature is a win-win proposition.

Cultivated crops have their weed groups, though these tend to be more of the

annual or bi-annual sort, like thistles and rattlepod, that appear when the soil is bare. Weeds with deep tap roots like Patterson's curse, wild carrot and wild turnip suggest compacted soils that need opening up to let oxygen and water in.

Capeweed, farmer's friends, thorn apple, cockle burr, burdock, spiny amaranth and apple of Peru (also known as wild hops) are typical barnyard and fertiliser weeds that thrive on high nitrate and phosphate levels and may be problems around water troughs and gateways or in barnyards and cultivated fields where raw manure is spread. They indicate a need for biodynamic compost preparations along with better management of stockyards and manure accumulations. Stinging nettle, fat hen, purslanes, and some of the more robust wild amaranths may favour similar conditions, but these weeds usually are quite palatable for livestock.[36] Stinging nettle, the most valuable of this lot, is richer in nutrition than lucerne, but to be palatable it must be cut as hay or silage to neutralize its sting.

Lovegrass, is an extremely deep rooted perennial, adapted to low fertility and harsh conditions. Some varieties produce the staple grain of the Ethiopian highlands called *teff*. Teff flour makes a delicious, high silica, fermented flatbread called *Injera*, and farmers who find lovegrass taking over on their property should consider planting the best lovegrass varieties and growing Teff as a crop.

Weeds Are in Our Minds

The classification of plants as weeds is a matter of perspective. Stinging nettle, lovegrass and kudzu are amongst the world's most nutritious plants. Good sense, though it may be uncommon, suggests that where these plants thrive they should be used. Everyone has their problem weeds, and all plants can be controlled if we realize control and kill are not synonyms. Stopping your automobile does not mean you control it. Controlling weeds implies using them well or using them as desired. Until we can establish, use *and* eliminate a weed, it is not under control.

Best Weed Remedies

- Start with soil tests.
- Reduce soluble nutrients
- Build fertility with compost and natural minerals.
- Use field sprays such as soil activator to balance and enliven the soil.
- Rip lightly, increasing depth 6 or 8 cm (2-3") a season to open up compaction.
- Over-sow or re-plant with diverse mixtures. Re-forest with this in mind.

[36] During droughts some of these weeds can accumulate toxic levels of nitrates.

- Manage to maximize soil cover—leave no area bare.
- Use intensive rotational grazing to support diversity and ensure re-growth.

Some weeds and herbs are mineral accumulators

Often weeds are seen as a problem without considering their benefits. Many weeds and herbs are vigorous mineral accumulators and are important for conserving the health and balance of the soil. They often grow voluntarily where they contribute deficient nutrients to the topsoil in that area. Examples are tobacco bush for phosphorous and zinc, or ink weed for potassium. While laws concerning control of noxious weeds need to be observed, waging war on one or another weed seldom controls it. Harvesting weeds as valuable contributions to the ecosystem could be a better approach.

Suggestions

- Make weed remedies by fermenting weeds. Chop up 20 kg of weeds, put this in a 200 litre drum, fill with water, stir well and add a set of compost preparations. As the fermentation gets going, stir several times a week for 8 to 12 weeks or until stable. Molasses and effective microbes may help reduce odours and stabilize the brew. Once fermented use as a soil drench at a rate of 10 to 40 litres per hectare. This seems to do the job the weed was there for, and may result in the weed disappearing.
- Weeds also make good compost. They can be cut, baled and composted for their trace elements, as in the case of Patterson's Curse and Common Heliotrope—both copper collectors. This too may suppress their return.

Weeds that Cover Bare Land

If land is left bare due to clearing, cultivation, overgrazing or droughts followed by floods, certain weed species tend to rush in to cover the land. If it was recently cleared bush, the weeds will be those that solubilize phosphorous and other nutrients. If it was pasture denuded in drought, the weeds will be those that mop up loose nutrients and spread fast so as much soil as possible is covered.

Questions

- What will you cover the land with instead if you eliminate the weed?
- Is it possible to sow or re-sow pastures with a seed mix followed by mulching or mowing? Will this increase diversity?

- If weeds are bushy perennials on rough country—for example, blackberries, gorse, scotch broom, lantana or crofton weed on steep, rocky hillsides—are there taller succession species that can shade them out?
- Is clearing by ripping out plants and replanting along with peppering with the seeds of the unwanted species an option? Peppering may not kill woody plants outright, but it can ensure their seeds have little success.

Cropping Weeds

This is a big subject where little research has occurred. As mentioned earlier, baling or ensiling such weeds as fat hen (lambs quarters) or stinging nettle can provide highly nutritious fodder for livestock. Many weeds are highly nutritious when grazed or harvested under the right conditions. Some other possibilities are redroot pigweed (*Amaranthus retroflexus*), wild chicory (*Cichorium intybus*) dandelion (*Taraxacum officinale*), broadleaf plantain (*Plantago major*) and purslane (*Portulaca oleracea*). These and many others should be considered. Some weeds, such as Patterson's Curse (*Echium plantagineum*) , or purple loosestrife (*Lythrum salicaria*), are okay for grazing and haying as long as there are enough other species so that they are no more than 8 or 10% of the total.

Suggestions

- To suppress weeds, mulching may be an option. Also, turning in weeds as a green manure crop may use up some of the weed seed bank.
- Under the right conditions no-tilling into a green manure mix that includes tall forages such as rye and vetch or sorghum and cow peas. By rolling the cover crop flat while planting into it with a coulter that slices through the mat might allow planting crops like pumpkins and beans into the ground cover.
- Try Under sowing with a low growing ground cover such as clover, purslane and mung beans under potatoes or sweet corn to keep areas between crop plants covered. Under sowing may also refer to sowing pasture mixes that will come up during or after harvesting crops such as beans or pumpkins so the area returns as quickly as possible to pasture as a natural succession.
- Try double cropping such as lupines interplanted with oats, or soybeans inter planted with sorghum, millet or maize. Both lupines and oats may be harvested together and separated when cleaned while maize and soybeans can be sown with liquid inject directly into the stubble. In this case it may not be possible to harvest the beans, but the volume of sorghum or maize harvested may be higher due to the synergy of having a legume partner and

the microclimate it creates as an understory in the grain.

- And, lest we forget, we can use peppering. This involves collecting weed seeds, burning them to ash and applying this to the area where the next crop will be planted. This will shift the energy so the weed grows poorly.

Disease and Insect Management

Diseases and insect attacks on crops are signs of imbalances or deficiencies that make plants weak. These may be deficiencies of major or minor nutrients, or they may be excesses of soluble nutrients, particularly nitrates, which may go hand-in-hand with certain deficiencies such as boron, silicon, copper and manganese.

If excess is the case and plants look very robust and lush before they become diseased then excess nitrates are the probable cause. If plants look fairly lush but uncommonly glossy, then excess potassium is likely. In both these cases tall woody weeds are likely to grow very well.

If deficiency is the case, growth will be poor due to whatever the limiting deficiency or deficiencies are. Usually these limiting deficiencies lie toward the beginning of the biochemical sequence, with such elements as sulphur, boron, silicon and calcium. These elements tend to be overlooked in favour of nitrogen, phosphorous and potassium. Usually when nutrients such as calcium, magnesium or potassium show up in the soil test and yet are not released from the soil, sulphur is needed. Then plants will be pale and subject to diseases. If sulphur levels are good and the nutrients release but aren't taken up well, then boron and/or silicon are likely at fault. However, any deficient nutrient can make the plant subject to disease, and the nature of the disease will indicate the deficiency.

Horn silica [501] is excellent at bringing the atmospheric aspect into balance with the soil and keeping the plant's sugars up (high Brix). Fungal diseases often occur when the soil and atmosphere are moist and warm. Under these conditions the boundary between the soil and the air can move up into the plant as the soil becomes saturated with too much watery [lunar] activity. This is particularly apt to happen at full moon or at perigee when the moon is closest to the earth. When this occurs, the soil life can move up into the plant leading to mildew and fungal diseases. To remedy this, the horn silica needs the help of the horsetail decoction [508] as a foliar spray or soil drench.

Australia is noted for its abundance of warmth and light, as compared to Europe or North America. This has been cited as reason to avoid the use of horn silica [501]. However, this does not address the concern of organizing the warmth and light in equal measure to organizing the tone and life of the soil with horn manure

[500]. The fact that warmth and light are abundant in tropical Australia makes it more imperative to organize the atmosphere rather than less—the more warmth and light, the more it needs to be organized. That was this author's experience in five years of farming at 17°S latitude in Tolga, far north Queensland.

Fruit Fly Bait

John Priestley's Formula—for 100 fly traps

400 millilitres	cloudy ammonia	10 cups	sugar
20 millilitres	vanilla extract	20 litres	water

Use 2 litre plastic juice or milk bottles. Near the top, burn a hole on both sides about the size of a cigarette; make sure the edges are smooth. Fill with bait to just below the holes and hang the bottles in trees with the lid on. Renew the bait twice a year or as needed. This could be a source of fruit flies if one is making a fruit fly pepper.

Insect Attacks

These can occur for similar reasons to diseases—either imbalances, deficiencies or both. Phil Callahan, an entomologist working for the USDA, documented many cases where insects are attracted to plants that give off energy in the infrared under stress. He found that insect antennae picked up infrared emissions from plants and homed in on these plants from considerable distances.[37] Pesticides can kill the insects, but they don't address why the insects show up.

Usually insects attack plants that are low energy, lack complexity and are easy to eat. The plant sap will be low in dissolved solids and their cell walls will be weak and easy to chew. Their protoplasm will be low in complex polysaccharides and long chain amino acids, making them easy to digest. Rescuing such crops so people eat them is rather a pity because these crops are low energy and deficient in flavour and nutrition. Insects are warning us these crops are not fit for people to eat. Why shoot the messenger? Callahan's research showed the usual culprit in making plants glow in the infrared was soluble nitrogen, commonly nitrates.

In quantum agriculture the lime polarity horn manure [500] needs the silica polarity horn silica [501] to balance it and keep photosynthesis and energy high.

[37] *See* ***Tuning In To Nature*** ***by Phil Callahan,*** *revised edition 2001, ACRES, U.S.A.*

The herbal compost preparations [502-507 + 508] organize the nitrogen processes to reduce nitrates and keep nitrogen in its living, astral condition. Regular applications of all the preparations as a precaution in spring and early summer will help to reduce stress later on, while poorly composted manures or other sources of nitrates and soluble nutrients can produce insect plagues.

Horn silica [501] improves the efficiency of photosynthesis and increases the sugary root exudates that feed soil microbes which release minerals and fix nitrogen in the soil. This increases the amino acid and silicon uptake by plants. Biodynamic vine growers have noticed the skin on their grapes is stronger, the peduncle is thicker and stronger and the leaves are more robust because of using horn silica. The result is greater resistance to insect attacks and fungal problems, as well as reduced splitting of fruit. We also find that biodynamic soil drenches such as seaweed, fish emulsions and compost teas can keep beneficial microbes dominant so plants are better able to defend against diseases.

Brix, a Measure of Dissolved Solids

One of the best ways to check sugar levels in plant sap is taste. If pasture grasses taste sweet and complex, livestock will find them flavoursome. Nutritional density can also be tested using a refractometer which uses the brix scale. A brix reading of 12 or above is a sign all is well. High brix is a sign of an abundance of complex sugars and long chain proteins and optimum plant vitality. Wine growers usually look for a brix reading of over 25 in their grapes before picking. Wheat growers would love to see a brix of 18 or above in plant sap when grain is filling.

Biodiversity, Predator Crops and Natural Bush

A very experienced biodynamic farmer, John Priestley, recommends that every grower should have binoculars and a book on local birds. He has found specific birds will eat problem pests. For example, the Black Faced Cuckoo Shrikes (known in Australia as Blue Jays) devour the Bronze Citrus Bugs [*Musgraveia sulciventris*] in his citrus groves. Blue tonged lizards and goannas like to eat snails, which tend to hide along fence posts and in strips of agricultural tubing.

It is worth considering maintaining natural bush areas throughout the farm and timing border crops to fruit when fruit crops are bearing so birds have something to eat besides the crops. Every little bit helps to keep the ecology in balance.

Ensuring Overall Farm Health

As conversion to quantum agriculture proceeds, things that at first seemed a

great challenge will become easier. As farm health and vitality improve, weeds and pests will be reduced. Below are some ideas to ensure a healthy, vital farm.

- Practice and improve observational skills; get to know the local environment, vegetation and animal life and develop natural areas along the boundaries, fences, ditches and roads throughout the farm that maintain and improve natural diversity and balance. Manage rather than eliminate 'weeds'.
- Apply the biodynamic soil and atmosphere sprays at least twice per year—monthly if your soils are poor or a quick start is desired. This will rapidly improve balanced microbial activity and humus development.
- Make well-humified compost, whether in static piles or with mechanical turning machinery. Use the compost preparations in static piles or cow pat pit or soil activator when turning the windrows. Follow comprehensive testing to add deficient elements to composts. Include powdered rock minerals to humify these inputs too. Build organic matter and balance farm or garden energies.
- Use mixed grass, legume and broadleaf green manure/cover crops to build in more life, overcome weeds and help supply nutrients.
- Take comprehensive soil tests of different soil types so what is soluble and what is in reserves are known, inputs are accurate and waste is eliminated. Keep in mind that deficiencies must be addressed to ensure success. There is little point in adding phosphorous solubilizing microbes if phosphorous or its co-factors are deficient. Spraying valerian tincture [507] for phosphorous, does not add minerals that are missing in the total test.

Follow these points and get the best tasting, most nutritious food for your livestock as well as for yourself and others.

Peppering

Controlling Weeds, Insects and Pests

Can we imagine control as a synonym for kill? It is one thing to control a lawn mower, and another to kill it. When trying to control weeds we should find out what gets them going and how they change under various circumstances. This would help us understand what they do and why they are there. It would provide valuable clues about starting, using and stopping them. The chances are we cause our weed problems, and we should learn from that.

Nevertheless, methods for increasing and enhancing the growth and vitality of plants and animals also point the way to reining in plants or animals that are so dominant and aggressive they must be restrained. Peppering is a method used to clear an area of unwanted plants or animals that annoy us and are resistant to other control measures.

Understanding the forces that feed growth and reproduction for a species also shows us how to impair the connection between that species and what invigorates it. Making a pepper using the organism's seed, exoskeleton or skin shuts down or breaks its connection with the in-streaming energies that sustain it and give it vigour from its boundaries. In the case of plants they dry up and struggle to grow or reproduce. In the case of animals, they tend to move out and go elsewhere.

The promethean efforts of the chemical industry produce a couple billion tons of poisons annually. These are used on every sort of crop. Meanwhile weed and pest problems have become worse than ever while we have seriously compromised world food production in our most fertile environments. This approach has cost many lives and caused enormous suffering from its poisonous side effects. Residues are found in our food chain, even in our polar regions, and many of these chemicals contribute to loss of ozone in the upper atmosphere and toxic sediments in our lakes and oceans.

What really reins in out-of-control species is simple. By burning seeds, insects or animal skins, and using the pepper-like ashes we can keep unwanted species out of certain areas. Identifying the actual causes of what happens in nature shows us how to adjust these causes rather than lashing out in blind and indiscriminate warfare that ultimately fails while poisoning us and our environment.

For plants this means burning their seeds when the moon is in the constellation through which that variety of plant receives its energy. Different plants depend on different constellations. Some are aquatic weeds and some thrive in heat and drought.

For arthropods and insects, finding the right time means burning their exoskeletons when the sun is in a constellation that relates to their growth and reproductive cycle. Though that

may mean Sun in Taurus, it could be constellations to either side depending on the insects.

For vertebrate animals, burning their skins when Venus is in the constellation Scorpio is optimal. The ash left over need not be much even when applied to large areas if it is used to make homeopathic sprays. These can be used repeatedly as needed.

To truly control unwanted species we must not lose sight of diversity, balance and basic environmental health. It is not to our benefit to simply eliminate every species that we find costly or annoying. With that thought in mind, there is clearly a way to control species that have gotten out of hand and threaten our ecological diversity, balance and health.

Weed Peppers

For weeds, the basic method involves collecting seeds or other means of reproduction of the plant or plants we intend to pepper. Burn these, usually over a hot wood fire, so all that is left is ashes and perhaps a little charcoal. The key is in ashing the seeds, and it doesn't matter if a little of the wood used ends up in the ashes, though you might want to avoid using wood from what you wish to grow. In the case of plants that reproduce by bulbs or other root-like structures or from leaf clones, as with some succulents, it is those parts of the plant that have the power of reproduction that are important. This means wood that is without such power can be ignored.

Each species has its optimum timing or conditions for its reproduction, and that should be taken into consideration in making its pepper. For plants, the cycles of the moon are enormously important for growth and reproduction. The patterns of plants stream into the earth's environs from constellations in the heavens through the gateway of the moon, which works with the etheric (life giving) properties of water. Burning separates the hydrogen, nitrogen, sulphur and carbon from the seeds and drives these etheric components off into the atmosphere. Then by applying such an ash to an area we impart the patterns of seeds which have been severed from their connection with tonality, colour, warmth and structure. This severs the plant's connection to the etheric activities associated with hydrogen, nitrogen, sulphur and carbon. The ashing or 'peppering' process breaks these connections.

If we make a homeopathic remedy from an ash with the pattern of a particular seed, severed from the chemical, light, warmth and life ethers required for its growth, we can apply this pattern to a given area and impair the connection between the seeds of that plant and their interaction with water, air, fire and soil.

Here are some guidelines worked out for what signs the moon might best be in for burning various weeds.

Aries: canola, wild mustards and wild radishes.
Taurus: farmer's friends, wild carrot and Queen Anne's lace
Cancer: buttercups, convolvulus, creeping and climbing weeds
Leo: a great variety of weeds, especially dock
Virgo: thistles and morning glories.
Libra: daisy family and quick weed (aka *Galinsoga*).
Scorpio: solaniums, nightshades
Sagittarius: fat hen and couch (bermuda) grass
Aquarius: shepherd's purse
Pisces: grasses, wild oats, bent grass and chickweed.

Though it seems to make little difference when the seeds are collected, each weed has its optimum moon constellation to be burnt in. If this is not known, there are indications that burning in a fire constellation, particularly Leo or Sagittarius in a fourth quarter moon will do. It might help to consult a biodynamic calendar,[38] as burning while Mercury is retrograde may not be effective.

There are indications that peppering works better when the farm is already under biodynamic management and all the preparations are already at work. Also, for some reason if herbicides have been used recently, this method seems to stimulate rather than retard weeds, and success may not be immediate. A pepper may be used along with spray applications of other preparations and along with spreading fertilisers or seeds. Homeopathic potencies of 8x or higher, especially c potencies, may be applied by spraying, radionics or field broadcasting. The pepper may be applied as often as desired, but even so, to clear an area of well-established weeds may require up to four years.

Insect Peppers

Insects, with their exoskeletons, are related to the sun. The boundaries where their life forces arise and give them form is their exoskeleton. It would be difficult to peel this off, so burn the whole insect. This also applies for nematodes, molluscs like snails and slugs and arthropods such as spiders and mites.

Because the sun channels the life forces of these animals, the constellations of

[38] *The **Antipodean Calendar** is a sidereal calendar based on the actual constellations of the Zodiac. Unlike most astrological calendars which are based on the Tropical Zodiac which dates back to the time of Ptolemy, the actual positions of the stars today differs because of the precession of the equinoxes. Steiner points out in his first lecture on agriculture that plants are thoroughly reliant on the here and now, whereas human beings aren't.*

the sun are important for these invertebrates. They are best burned when the sun is passing through the constellations of Aquarius through Cancer. Instead of burning, it might also be effective to let the insects decay; and in some ways this could be better. It is a matter of collecting the results and experimenting.[39] From the winged stage through the larval stage, burn the insects in Aries or Taurus, particularly Taurus where the solar influences that vitalize insects are strongest.

Collect a quantity—perhaps 60 or more insects—sufficient to get enough ashes to work with. In the case of very small animals, these may be collected using something like a bottle trap or a sticky pheromone trap, as burning the paper and glue will not affect the ash. In the case of beetles and grubs or moths and caterpillars, collect specimens in a jar and burn both adults and larvae when the sun is in Taurus.

Homoeopathically potentize to D8 [8x] potency and spray this pepper on three consecutive nights when adults are flying to create mating disruption.

Burning ants with the Sun in Taurus and the Moon in Sagittarius is recommended. However, it has been reported that ants burnt with the Sun in Gemini and the pepper sprinkled over their trails kept them away for two years. For cockroaches burning with both Sun and Moon in Taurus is recommended. However, some growers have burned their insect pests with considerable success whenever they were active rather than looking for a perfect or 'correct' time.

Steiner suggested that the enthusiasm one has for making the remedy is a significant factor in its success—which makes sense considering the observer is a determining factor in the field of investigation. Looking for success makes finding it more likely. Mixing the various stages (eggs, larvae, pupa and adult) together seems to help, as the adult stage probably is not the most vulnerable. Burn, potentize and spray on the same day if possible. Keep records and share them with others to build a data base.

Making Peppers

One of the controversies concerning peppering is whether the material should be burned completely to ash or simply pyrolized so the water, nitrogen and sulphur are driven off but the carbon framework is still intact. Both methods have been known to work and work well on occasion. The history of making peppers successfully is spotty and sometimes a grower will make a pepper that seems to

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[39] ***Agriculture***, ***Rudolf Steiner***, *Copyright 1993, Bio-Dynamic Farming and Gardening Association, Inc. Kimberton, PA, Creeger-Gardner translation. Lecture Six, pp 124-125.*

work brilliantly wherever it is applied, while in other cases there is no observed effect. There have been cases where the weed, insect or animal pest seems to keep on thriving as before, and maybe something important was missed along the way. As there has been considerable success with this method, it would be wise to try again in such a case. Sometimes there has been too little follow-through on finding out why one pepper worked so well and another failed to work. We are working with a process of Goethean observation. Maybe the weed seeds were burned in the wrong Moon constellation for that weed, in which case they might be burned over a period of several days and the peppers combined.

The fact that some peppers work extremely well shows the method can and does work. The fact that some peppers have failed to yield clear-cut results indicates there needs to be further research. This should encourage experimentation, and everyone is free to have a go at making their own peppers. In fact, one of the debates is whether a weed or a pest from one location is a variant of what seems to be the same species in another location. It may be a good idea to make peppers locally to ensure the unique features of the local species are targeted.

Burning Methods

A fire outside, where the smoke can dissipate, is recommended, though a metal pot or canister in a wood heater has been known to make recovery of the ash from small samples easy. If burning the pepper outside, dig a hole in the ground for the fire and use a wok or inverted plough disc to contain the material being burned. A hibachi will also work. Depending on what is burnt, a cast iron frypan with a lid might be used, and a lid may be needed to contain seeds, such as thistles, which pop. A cooker designed for making bio-char might also be used. For small amounts of seeds or insects a small tin placed on hot coals in a wood heater may be best, as the container will catch the ashes and prevent mixing with other stuff. Larger amounts may require a wok and frequent stirring over an open fire. For really large amounts such as weed seeds collected after cleaning grain or insects collected in traps in orchards, a charcoal grill may be better. From there simply collect all the ashes and filter out any bits of remaining charcoal. If there are a number of sub-species in an area, it is probably a good idea to pepper representatives of each variety of each species.

For animals with an endoskeleton such as fish, amphibians, reptiles, birds and mammals the skins are the important part to burn. If the animal is difficult to skin, such as cane toads flattened on a roadway, the entire animal may be burned as

long as the skin is present. For vertebrates, the planetary principle that feeds their vitality is Venus, when Venus is in the constellation Scorpio. Venus has a 270 day revolution around the sun and a five year cycle of its position in Scorpio relative to the earth and the sun. The ideal time to make this kind of animal pepper is near superior conjunction where Venus is behind the sun in Scorpio. This occurs only one year out of five,[40] so it may not be good to wait for that. While other times may not be ideal, there are farmers who have made peppers with Venus anywhere from Libra to Capricorn, even at inferior conjunction, and these seem effective. Use the pepper you make and plan ahead to make a better pepper.[41]

Higher Animals

Unlike with insects where complex plant chemistry makes them ill, higher animals find complex, nutritionally dense food tasty. Although the animal in question may leave and go elsewhere, some may come back for tasty crops, even without vitality from the peppered area. The pepper may need to be applied regularly, and young animals looking for territory may brave peppered areas.

Keep in mind that life arises at boundaries. This makes the skin, scales, feathers, fins, claws or fur of higher animals the part to burn to break their connection to life. So snakes, cockatoos, deer, rabbits, wallabies, feral pigs, etc. should be skinned and their skins burned without burning the whole animal. Skins can be collected and kept until the time is right, and some prefer fresh hides when available. For a very large animal like a deer or kangaroo, put the whole skin on a hot fire and burn it to ash. Collect the ashes and grind these up even if some wood ashes are Included. Use wood with no bark and the wood ashes will be neutral. If burning road kill, use the species you require, and if there are several varieties, pepper them separately and mix their ashes together.

Application

Peppers can be mixed with sand and scattered along fences, roads and boundaries, along paths in gardens, orchards or vineyards and over broadacre or pasture areas. Insects and animals often penetrate the first few metres before leaving, so apply a buffer zone around gardens, vineyards and orchards.

Peppers can be stirred in water and sprinkled on neat or mixed with rock dusts

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[40] ***Agriculture of Tomorrow*, by Eugen and Lily Kolisko**; *Out of Print. See the Soil and Health Library or Amazon used books. This is a rare book.*

[41] *See the* ***Antipodean Calendar*** *for the best dates for peppering vertebrates in each year.*

or composts. Peppers can be added to fertigation tanks and irrigated onto fruit and vegetable areas. These should be homoeopathically potentized to 8x [D8] potency. The same potency can be sprayed lightly on equipment used for cultivation and seeds for planting (see following chapter). 8x peppers can be added to field sprays. Keep in mind that weeds, fleas, ticks, flies, poisonous snakes, obnoxious birds, etc. all have a place in the overall scheme of things. Everything contributes to biodiversity and balance on a global scale. Unless we understand a specie's role, we should only exclude them in well-defined areas.

Peppering seems to work for at least a couple weeks for most animals. Animals usually can avoid an area where they feel uncomfortable or weak, while plants don't have this option. When weeds are treated for several years running they will get smaller and weaker each year until they die out.

Using the Ash

Collect the grey/black ash from burning the specimens. Grind in a mortar and pestle for 10 minutes to pulverize any lumps and make a homogeneous mixture. This can be used by itself, mixed with sand or seeds or stirred with water and other preparations for spray application. Broadacre farmers may make up weed peppers to mix with their seeds at planting time. Driving around field borders spreading a blend of peppers mixed with sand has yielded considerable success. If the area to be covered is greater than the amount of pepper available, homoeopathically potentize the ashes to an 8x potency or higher to extend the pepper 100,000,000 fold or more. Lower potencies can be stabilized with ethyl alcohol and stored for making more D8 [8x] potency. Homeopathic potencies are easy to apply, seem to get better results and are a preferred method of application. It is believed they work best where biodynamic preparations are already established.

Making Homeopathic Potencies

Serial dilution and succussion of remedies separates the pattern of activity from the substances of the remedy. Succussion involves rhythmic pounding of a quantity of liquid in a jar or bottle by hitting the bottom of the jar on the palm of the hand or other resilient surface for a period of time—usually 3 minutes.[42] This leads to a thorough penetration of the water by the hydrogen bonding patterns

[42] *Trituration accomplishes much the same effect as succussion by using a powder such as lactose and grinding the remedy into it instead of succussing it to transfer the patterns.*

associated with the remedy. Dilution and succussion usually makes a remedy more effective, although Lily Kolisko's research (see ***Agriculture of Tomorrow***) suggests some potencies will be more effective than others. Fortunately homeopathic dilution and succussion makes a small quantity go a long way.

Some Testimonials

A biodynamic golf course manager used wood duck pepper on the greens and it worked beautifully—the ducks went everywhere else but stayed off the greens. Another grower reported that one sprinkling of blackbird pepper kept them off a display garden at a nursery. A New Zealand farmer peppered his farm for possums, which tend to be a big problem in New Zealand. Some years later only one immature male was found, while the farms next door had possums by the hundreds. This farmer felt the peppers affected the fertility of the males, and the females left the area to find fertile males.

Additional Tips

When peppering aquatic weeds, be sure to spray around the water's edge of the lake, pond, dam or wetland area.

Maria Thun suggests spraying three times in the same Moon constellation as the pepper was made in, which would mean monthly spraying in that constellation of the Moon.

It is a good idea to observe and think through the life cycle of the target organism so optimum timing for the reproductive part of the organism's cycle is used in making the pepper and spraying the homeopathic dilution. For example, in targeting intestinal worms in sheep it may be easier to spray paddocks to stop the larval cycle of the worms rather than drenching the sheep individually after they have already picked up the parasites. The pepper could be incorporated with field sprays, such as soil activator, so optimum health of the land will help break the parasite cycle.

Agricultural Homeopathy

Working with Smallest Entities

Homeopathy is a method of addressing conditions with remedies made from things that create similar conditions. The underlying principle is addressing like with like. For example, this means a remedy made from white arsenic (Latin: Arsenicum album) can be used to quell anaphylactic shock caused by ptomaine poisoning because the pattern of reaction to ptomaine poisoning is virtually identical to what happens if one is poisoned by white arsenic. The fact is a number of different causes can trigger anaphylactic shock, many of which have little to do with arsenic. But a dilute remedy of Arsenicum album can be used to counter them all because it sets up the same pattern of reaction counter to the condition. Theoretically, the remedy, by virtue of its matching pattern, can cancel out the condition it is applied to. What a compelling idea! If it didn't work it would have fallen by the wayside a long time ago. Perhaps because it offers enormous economy, those using more expensive therapies tend to view it as something they want to invalidate. This seems unfair since homeopathy requires far greater skill in diagnosis. Moreover it often deals with conditions that have no other remedy. The reasons why homeopathy, and many of the methods used in biodynamics and quantum agriculture, works lies in quantum physics.

Homeopathy traces its origins to German physician Samuel Hahnemann who found that he could make up very dilute remedies ranging from one part in a thousand [3x] to one part in 100 million [8x] or more, that were effective in remedying acute conditions as well as many chronic ones. Frequently the more dilute the remedy the better. According to accounts Hahnemann travelled to visit his clientele in a horse and buggy over somewhat bumpy roads. He began to notice that those remedies that had travelled with him and were shaken over many, many bumpy roads were his most effective remedies. Before long he began to succuss every step in his dilution process before going on to the next dilution step and the next. Thus a systematic procedure evolved of serial dilution and succussion of remedies, which began to be called homeopathic potencies. Clearly the pattern of the remedy, rather than the physical substance, affected the patient's conditions.

Over the years it has come to light that not only can an aberrant process be reversed or cancelled by application of homeopathic patterns, but missing processes can be supplied or strengthened in a similar fashion. This has led to applying the agricultural remedies introduced by Rudolf Steiner homeopathically.

At the time he delivered his Agriculture Course in Koberwitz, Poland, Steiner was already guiding the investigations of Drs. Eugen and Lily Kolisko into homeopathic remedies—which he called 'smallest entities'. Clearly it was his intention that homeopathic procedures would be used to apply his agricultural remedies to 'the largest possible areas of the entire earth', but as a scientist he wanted proof of the method's workability before he gave it his full endorsement. In the 21st century, Glen Atkinson with his BDMax formulas has continued this homeopathic tradition.

Homeopathy

Homeopathy traces its underlying traditions back through Paracelsus and even further back into ancient practices in India and Tibet. German medical doctors Eugen and Lily Kolisko performed exhaustive research into the homeopathic use of biodynamic preparations, as was published in Lily Kolisko's book, *Agriculture of Tomorrow, which* is available on the internet through the Soil and Health Library in Tasmania.[43] The Koliskos' research laid the groundwork for agricultural homeopathy. To enter into discussions about the use of homeopathy in biodynamic agriculture, visit Mark Moodie's website, www.considera.org

Making Homeopathic Potencies

Serial dilution and succussion [or potentization by trituration of powders] of remedies separates the pattern of activity from the substance of the remedy. Succussion involves rhythmic pounding of the liquid in the jar by hitting the bottom of the jar on the palm of the hand or other resilient surface for a period of time—usually 3 minutes. This creates chaos and laminar flow in the fluid which leads to a thorough penetration of the water by the hydrogen bonding patterns associated with the remedy. Usually this makes the remedy more effective, as the removal of the substance seems to leave a vacuum behind that pulls things into its pattern. This tends to get to the root causes of conditions and change their basic patterns

[43] http://www.soilandhealth.org/ *Also see* http://www.considera.org

so that no further measures need be taken. It also makes a small quantity of a remedy go a long, long way. If you find this works for you, maybe it will work for your local council or land management authority for weeds along highways and on public land.

From the commercial point of view homeopathic remedies that neutralize problems may be bad news for those who look to make money selling products that must be applied repeatedly. Change can't happen overnight, of course, but those whose depend on selling temporary fixes may want to find other employment. Stockholders in an herbicide or insecticide manufacturers might want to change their portfolio anyway. There is no long-term future in any industry that poisons the environment, as it poisons the people who live there.

Peppering

Since quantum agriculture provides an overview of how to make things grow, it also provides insights into how to stop things like weeds, insects and pests from adversely affecting crops. Often making peppers from weed seeds, insects or other pests results in rather small quantities of pepper while large areas must be covered. Making homeopathic potencies is an obvious option to be explored.

Homeopathic Potentization

1. Finely grind the ash or char in a mortar and pestle.
2. Use 10 gms [one tablespoon] of this pepper with 90 ml of water containing at least 10% grain [ethyl] alcohol in a clean 200 or 250 ml jar with a secure lid. Label the jar as D1 [1x]. Say aloud, "This is the first potency" and succuss for three minutes. *(If there is a lesser amount of ash, just use 9 parts water to one part ash for the first potency.)*
3. Take 10 mls. of this liquid and place it in the next jar. As with the first potency, add 90 mls. of the water/alcohol mixture, making another dilution of one part in ten. Label this jar as D2 [2x] and say aloud, "This is the second potency." Succuss as before.
4. Repeat this procedure for the third potency.
5. Repeat again for the fourth potency,
6. Repeat again for the fifth potency,
7. Repeat again with pure water without any alcohol for the sixth potency, as this will all be used for the next potency.
8. Using the entire 100 mls of the sixth potency and a 1.5 or 2 litre bottle add 900 mls of pure water and succuss the entire litre in the same fashion as the

previous potencies. This will make the seventh potency.

9. Suspend a sling from a hook and, using a bulk water bottle or 20 litre drum, add the litre of seventh potency to nine more litres of pure water. Succuss in the sling for 5 minutes. This will be enough D8 [8x] potency for garden work or spot spraying. For larger quantities used in field applications or aerial spraying, go back to the fifth potency or the fourth potency and use a flowform to potentize dilutions of 100 litres or 1000 litres of D8 [8x].

Some use dowsing or kinesiology to determine the optimum potencies for peppers of weeds, insects or higher animals on their land. D8 [8x] is a standard potency.[44] If D8 [8x] will be used, the quantity should be increased for the 7th and 8th potencies. If some other potency is desired, dilute and succuss accordingly.

C potencies are diluted and succussed as one part in a hundred instead of one part in ten. Dilute 1 millilitre of mother tincture with 99 millilitres of pure water and succuss before taking it to the next step. Label and date all potencies stored for future use. The only potencies not labelled would be the final multiplication steps. Without further dilution and succussion, the D8 [8x] potency can be added to larger spray tanks of water, as would be used for large scale compost turning, aerial foliar sprays, soil drenches or fertigations of large fruit and vegetable areas.

Hieronymus Homeopathic Rates

Aconite	7 - 87	Apis Mel.	36.25 - 59.25
Arnica	14.25 - 68.5	Arsenicum Alb.	14 - 34.5
Belladonna	34.5 - 42.25	Bryonia	30 - 60.5
Cal Phos	11.5 - 43	Carbo Veg.	12.5 - 76
Caulophyllum	31.5 - 50	Chelidonium	25.5 - 35.5
Conium	30.25 - 37.5	Ferrum Phos.	49 - 69
Gelsemium	70.5 - 42	Hepar. Sulf.	6 - 44.75
Hypericum	21.5 - 41.5	Ipecachuanha	45 - 16
Iodium	38.75 - 41.5	Ledum	25 - 40
Li/Be 13th cell salt	34 - 55	Lycopodium	66 - 29
Nux Vomica	33.25 - 88.75	Phosphorous	92 - 62
Phytolacca	4 - 48.75	Plumbum	45 - 42
Pulsatilla	14.5 - 43.5	Rhus Tox.	32 - 20.75
Ruta Graveolens	92 - 15	Sepia	18.5 - 11
Silicea	89.5 - 91.5	Urtica Urens	37.25 - 4.5

[44] *See **Agriculture of Tomorrow, E. & L. Kolisko** for research into the effects of various potencies.*

These methods are applications of quantum physics, quantum entanglement and quantum non-locality.[45] *Some consider these topics to be bunk, or perhaps, debunked. Others are sure they work but consider them forbidden or tainted as 'Ahrimanic' or 'Luciferic.'*

Goethe's theory of knowledge, which quantum physicists consider proven, has it that what the observer looks for is what the observer will find. Those who consider this bunk will find it is bunk, and those who consider it evil will find it is that too. There are no contradictions.

Radionics is based on copying and transferring patterns. Max Freedom Long defined the rules for this in his writings about the Hawaiian kahunas and Arthur Middleton Young described how this is consistent with quantum physics.[46] *The following methods are tools which are in use in quantum agriculture, and it is not the role of this book to pass judgement, only to pass on information.*

Radionics: The Term and Its Origins

The term 'radionics' comes from the work of San Francisco medical doctor and youth prodigy, Albert Abrams. Working with a medical diagnostic procedure based on percussing various regions of the abdomen, Abrams found an effect that varied according to whether the patient faced west as compared to other directions. Influenced by his friendship with the nineteenth century German physicist and medical doctor, Herman Helmholtz, who mentored Heinrich Hertz in his electricity and magnetism experiments, Abrams believed he had uncovered some sort of electromagnetic energy involved in human health. Initially he

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[45] *See* ***Dogs That Know When Their Owners are Coming Home*** *by Rupert Sheldrake; and* ***The Field: The Quest for the Secret Force of the Universe*** *by Lynne MacTaggert*

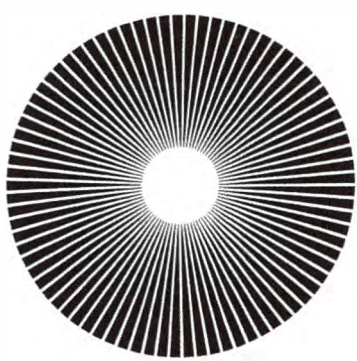
[46] *Google search* ***The Secret Science Behind the Miracles*** *by Max Freedom Long, and* ***The Reflexive Universe*** *by Arthur Middleton Young, the inventor of the Bell helicopter. Also see* ***Vibrations: Healing Through Color, Homeopathy and Radionics*** *by Virginia MacIvor and Sandra LaForest.*

experimented with various tuneable resistance devices. This led to his discovery that everything he experimented with radiated an emanation or frequency. Thus he coined the term 'radionics'.

While treating such diseases as malaria, he found he could favourably affect his patients' conditions by altering their resistance patterns with his radionic devices. Since from time to time he kept vials of his patients' blood, he soon discovered he need only connect his resistance boxes to a patient's blood specimen and alter the resistance patterns in the blood sample to get the same therapeutic effects as if the patient was physically connected to one of his devices.

Abrams communicated widely with others in the medical profession about his discovery—a promising new avenue of therapy that used frequencies and resistance patterns rather than drug and surgical techniques. Unfortunately this triggered opposition by the hugely profitable pharmaceutical and surgical industries and their investors. Before long the US Food and Drug Administration, acting on behalf of these industries, took aggressive measures to suppress radionics. Faced with legal accusations by cynical regulators, Abrams was unable to satisfactorily explain in laymen's terms how radionics worked. He himself was unable to explain how his methods worked in terms of electromagnetism. At that time the discoveries of quantum physics—to say nothing of what Rudolf Steiner and his team were doing—were yet to be published. Instead, Abrams was labelled a quack by the U.S. Food and Drug Administration (FDA) and persecuted as a charlatan, despite his inherited wealth, his prodigal studies as a physician, his world-wide reputation and his obvious lack of conflict of interest.

Scientific Background

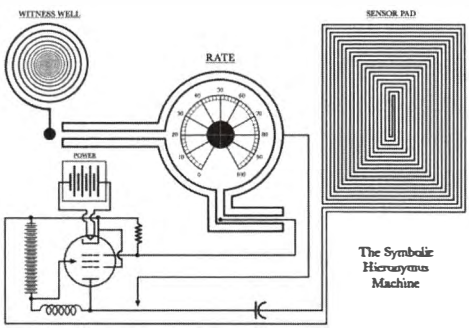


Paper Radionic Projection Wheel

Around the turn of the 20th century it began to dawn on western science that everything in the universe involved dynamic patterns of energy. Everything oscillates or vibrates constantly according to these patterns, which means that these oscillations are an integral part of everything. The patterns can be as simple as a single colour or the bright line spectrum of an atom. And they can be as complex as the patterns of a biodynamic preparation, a plant or animal, or the Milky Way Galaxy. This is not really a new idea as it dates back to the Vedas, ancient Egypt and the pursuit of knowledge of

other early cultures. Yet, this idea was not widespread in Abrams' time.

As quantum physics developed, it became clear that what we perceive as matter is infinitesimal bits of virtual nothingness that whirl around in almost no space, having nearly no mass, surrounded by near nothingness—and yet, we perceive the world around us as solid, stable and clearly defined owing to what might be described as the density of vibratory patterns. According to quantum theory, everything is in complete balance and unity. Taken as a whole, all is nothing. In sum there is no space, no time or any other dimension(s). In quantum theory this is called zero point, the zero point field or simply the field. Out of this some interesting rules develop, including quantum coherence, quantum non-locality, quantum entanglement and the capacity to transfer patterns—which can be thought of as mathematical designs—to whatever location we choose instantaneously with no loss. At the sending point a pattern is imparted to a 'witness' which is entangled with the receipt point. Just as with Abram's patients' blood specimens, an aerial photo of a farm, with its boundaries clearly marked, can be a witness for that farm. Changes applied to the aerial photo are instantaneously reflected on the farm itself, no matter how close or far away it is.



Symbolic Hieronymus Instrument Design

From this a few other rules emerge:

1. Since everything is essentially a fluid in flux—even crystals vibrate incessantly as they grow and unfold in patterns—the rule of fluid dynamics applies that a microscopic change at a point can effect large scale changes in the medium. This is known as the Butterfly Effect, as the flapping of a butterfly's wings is thought to be capable of changing weather patterns further downstream.

2. When patterns are compatible and re-enforce each other, working with more than one pattern or pattern layers at a time allows pattern density to produce stronger effects.

3. Life, thought and personality are patterns even though they are nearly intangible. This means intentions—such as prayers—can be transmitted by quantum entanglement. In fact, this is the only known means.

4. While duration and density of pattern transfer can more firmly establish effects, repetition of pattern transfer sets up multiple Butterfly Effects and increases pattern density. This repetition is called the 'hammer' effect, as in driving a nail with a succession of taps with a hammer.

5. The essence of control in achieving the desired effects depends on applying the precise changes needed, no more and no less.

Myths

Myths arise around things that are poorly or mistakenly understood. As with quantum physics, the science behind radionics deals with things that once were considered magical or religious. At one time science focused strictly on what was tangible and substantial. The subtle 'spiritual' activities behind physical occurrences were ignored. Such things as life, striving and values were considered imponderable.

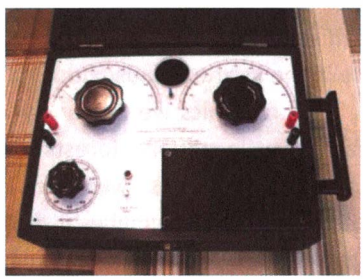
Although the history of religions is replete with lore about wise men and women who studied the stars and delved into the mysteries of nature—such as the Rishikas, Zarathustra, Moses, the Magi or Merlin—yet, for centuries western science held that non-sense phenomena, such as goodness and beauty, could not be examined. These were considered imponderable, metaphysical or paranormal and left to churches, shamans and—inevitably—charlatans.

Even in ancient Egypt and Chaldea, institutions of authority and wealth accused any competitors of selfishness, deception and outright evil. Whether rightly or wrongly, powerful leaders destroyed great libraries, murdered their opponents, burned 'witches', forbade astrology and divination, crusaded against 'infidels' and in general suppressed anything not approved by their own innermost circle.

Science survived and introduced an age of debate and enlightenment by avoiding controversy and sticking to what was easily measured and demonstrated. Goodness and beauty were left to the churches and science contented itself with the observation of measurable, sense-accessible facts and their explanations. Today the accomplishments of science and engineering have swept the world. Nearly everyone firmly believes in science. Moreover, tolerance of the beliefs and customs of others has grown in reaction to our long history of horrific and brutal intolerance such as racial and sexual discrimination, the Nazi Holocaust and on-going conflicts in today's Middle East, Africa and Asia. Religions of wide variety clearly need to learn to co-exist in relative peace and impartiality. After all, science, for the most part, has won peoples' hearts and minds with the beauty and goodness, to say nothing of the utility of its truths.

There is little debate about whether ugliness and evil exist, and there is general support for choosing beauty and goodness insofar as these can be agreed on. In science, many are understandably troubled by its potential for misuse. There is growing debate in scientific circles about the need for morality in science. What common factors of goodness and beauty can we agree on?

Biodynamics and Radionics



Hieronymus Analyser

Usually we think of science as the art of knowing. But Goethe and Steiner embraced the issues of goodness and beauty along with truth. If the truth about sensory phenomena can be good and beautiful, what is the truth about non-sensible things?

Steiner thought of evil as limitation, and defined the main inner hindrances to manifesting goodness, beauty and truth as personal ambition, illusions and petty jealousies. There needed to be a language for viewing aberrations or distortions, so he labelled the exercise of power for selfish ends as Ahrimanic after the Persian deity of evil reputation. As for flights of imagination that wander off into illusion and lose their grounding, he labelled these as Luciferic after the downfall of the angel of light. Petty jealousy he associated with the all too human failure to unite the highest expression of our

Hieronymus Biodynamic Preparation Rates

52-72	Horn Manure [500]—Earthly lime axis, nitrogen fixation
76.25-47	Fall to Spring Horn Clay—Strengthens ebb of sap in plant
50.5-91	Spring to Fall Horn Clay—Strengthens flow of sap in plant
58.5-89.5	Horn Silica [501]—Cosmic silica axis, nourishment
25-34	Yarrow [502]—Works with sulphur and potassium
37-33.5	Chamomile [503]—Works with sulphur and calcium
47-34.5	Nettle [504]—Works with haemoglobin and chlorophyll
43-38	Oak Bark [505]—Works with calcium and nitrate
52.5-41.5	Dandelion [506]—Silica and potassium, fruiting
48.5-38	Valerian [507]—Works with phosphorus and blossoming
32-86.5	Horsetail [508]—Works with silica and ripening

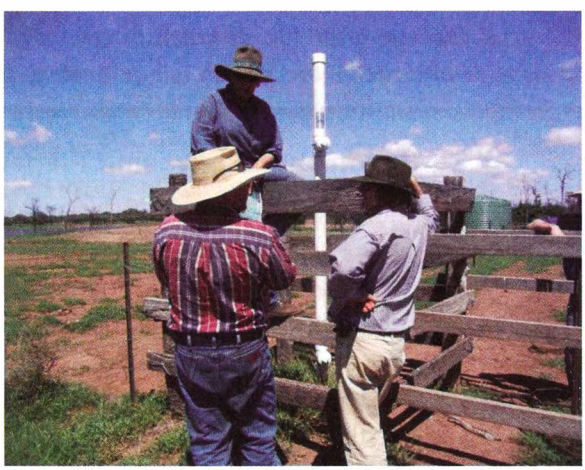
wills with our imaginations in our hearts—and thus we envy others. Biodynamic agriculture grew out of Steiner's last initiative to see that nutritional support provided the necessary inspiration or heart-felt enthusiasm to form a bridge between our wills and our imaginations and leave our pettiness behind.

Radionics, Field Broadcasting, dowsing and homeopathy are tools. Questions or accusations—which inevitably arise—about whether these tools are Ahrimanic or Luciferic, should be considered in the light of whether these tools are used in selfish or delusory ways. As for radionics being Ahrimanic or Luciferic, these issues lie in the hearts, minds and hands of doers, not in the tools they use.

With radionics we can apply biodynamic preparations as patterns to gardens, farms, cattle stations, forests or deserts of any size at any distance. Radionic gear is of three types: variable inductance, variable capacitance and variable resistance. The original gear of Abrams was variable resistance, while most of the gear made by Hieronymus, Kelley, Rogers, Mattioda, Malcolm Rae and others was variable capacitance or inductance. With radionics, the underlying pattern of each preparation or reagent—the essential quality of how it works—can be imparted as a pattern. Radionics makes it easy to apply these patterns in precise ways over large acreages. It is up to us to find out how to use this ability wisely.

Field Broadcasting

In the late 1980s, T. Galen Hieronymus (1895 – 1988) an early radio and radionic pioneer, put a radionic type product on the market that was very effective at broadcasting biodynamic preparations to large areas. This device worked like a crystal radio set with an induction coil powered by the energy differential between the soil and the air above it. He called this device a Cosmic Pipe, and it could pick up patterns as with a radionic instrument and send them out to the local environment as if they were a radio broadcast. I lived near Galen and trialled his Cosmic Pipe for 10 years on my



Quantum Agriculture Field Broadcaster protected by corral

Georgia farm. There were many indications that it worked quite well to broadcast to the lime activities of chemistry and life in the soil, but it was not designed to work with the silica activities of warmth and light above the soil. I re-designed Galen's instrument to broadcast to both the soil and the atmosphere. My design switched automatically from lime by night to silica by day. This enhanced the give and take between the below ground and above ground activities of lime and silica. I used my design to broadcast all the biodynamic preparations, and it became the basis for today's Quantum Agriculture Field Broadcasters. Over the years I improved on the quality and reliability of the instrument. See www.quantumagriculture.com

Dowsing

Dowsing has its roots in traditions as old as human culture. Scientific explanations of dowsing have led to investigations of the human brain as a biological quantum device—insofar as the brain can be called a device. For practical purposes dowsing is a way of tapping into vast information available to the human sub-conscious mind, and dowsing has been investigated in studies of brain wave patterns.[47]

2,500 years ago the Buddha Gautama taught that we experience 17 trillion thought events per second. Certainly it is impossible for most people to bring more than the merest fraction of this information into conscious focus. It would be like using google to answer questions at 17 gigabytes per second. Dowsing techniques can help to tune in more precisely to what we seek to know.

Although dowsing accuracy varies with the dowser and is not as accurate as in reading numbers out of a phone book, this is still a useful technique for finding underground streams, buried power lines or earth energy flows. It can also help in choosing appropriate applications of biodynamic preparations or homeopathic remedies. Theoretically it can be used to answer any question we might ask.

Much of the history and debate about dowsing can be found in Christopher Bird's book ***The Divining Hand***. For those who would like to become dowsers Joey Korn's book, ***Dowsing: A Path to Enlightenment,*** is recommended reading. A short course on dowsing by Walt Woods can be downloaded in a printable file from http://www.lettertorobin.org/

Walking the Talk

It may seem unusual to some growers to promote radionics, field broadcasting

[47] *More details can be found in Joey Korn's book,* ***Dowsing: A Path to Enlightenment****.*

or dowsing. However, this book aims to make all relevant knowledge available.

Every farmer should be able to make biodynamic preparations if they wish. However, making preparations and stirring and spraying the field sprays has made biodynamics seem a bit more difficult than other methods. Radionics, Field Broadcasting and Dowsing make biodynamics more do-able by providing easier and more economical ways to apply the preparations. This engages a wider public. Many who first bought Field Broadcasters have later invested in flowforms, and they stir and spray preparations where feasible.

Radionics, Field Broadcasting and dowsing simply are additional ways to apply biodynamic preparations and related remedies. In some cases they are the most feasible or the only feasible ways. Use of biodynamic preparations keeps increasing throughout the world, where homeopathic and radionic application has resulted in more widespread acceptance. Having additional ways of applying the preps has encouraged their wider use.[48]

A Universal Prayer of Intent

from Joey Korn's book ***Dowsing: A Path to Enlightenment***:*

If it be Thy will, let the powers of nature converge to increase and enhance beneficial energies, and transform any detrimental energies into beneficial ones, within the boundaries indicated, for now and in the future for as long as is appropriate, in deep gratitude. Amen.

**Available from Joey and Jill's website, www.dowsers.com*

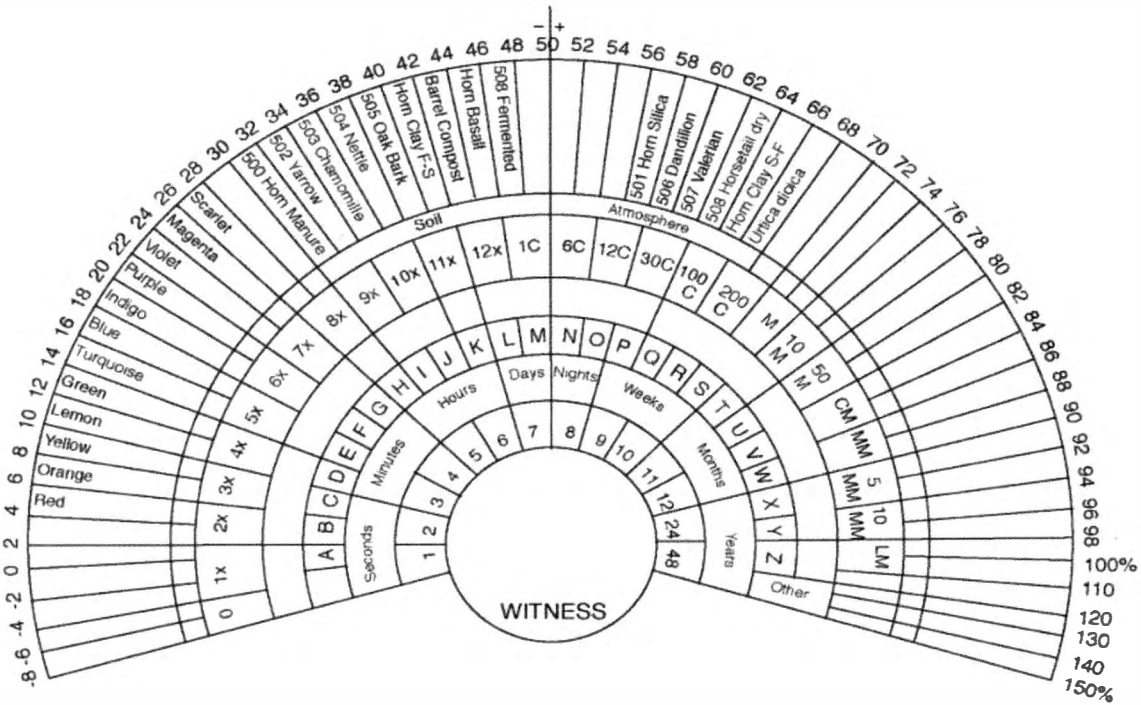
[48] A Few References:
http://www.duncanlaurie.com/writing/radionics/16_t_galen_hieronymus
http://quantumagriculture.com
http://radionicsinstitute.com/about_radionics.html
http://www.mail-archive.com/bdnow@envirolink.org/msg00499.html
http://www.dowsers.com/
http://www.dowsingaustralia.com/A_Health.htm

Hieronymus Left Dial/Right Dial Guide

Left Dial (Condition)		Right Dial (Location)	
1-	Building rate	-1	
2-	Viral Pneumonia, excess chlorine	-2	Hypothalamus
3-	Cold or Flu	-3	Frontal sinus
3.5-	Edema, Swelling		
4-	Pneumonia, Malaria	-4	Jaws, Parotid area
5-	Acidosis, Diphtheria	-5	Fore brain
5.5-	Sore throat, Flu		
6-	Flu, Catarrh	-6	Pacchionian bodies
6.5-	Building rate		
7-	Sarcoma, Lupus, Stones	-7	
7.5-	Carcinoma		
8-	Ulceration, Pus	-8	Ascending colon
8.5-	Mange, Fungi, Parathion	-8.5	Mesentery, Epithelium
9-	Athletes' foot, Fungus	-9	Turbinated bone, Ethmoid
9.5-	Fungus	-9.5	Bruise rate
10-	Undulant fever	-10	Mid brain
11-	Flu, spasm	-11	Nerves, Spinal cord, Eye lens, Nerve ending
12-	Tobacco poison, Radium burns	-12	Mucous membranes, Mouth, Rectum, Sigmoid colon
13-	Scar tissue	-13	Urinary bladder
13.5	Mexican flu		
14-	Meningococcus	-14	Hair, Scalp
14.5	Chronic TB, Mex. Flu		
15-	Streptococcus veridans	-15	Medulla oblongata
16-	Coryza, Aluminum poison	-16	Larynx, bronchial area
17-	Uric acid, allergy	-17	Lymphatics
18-	Brucellas abortus	-18	Eye ball
19-	Worms, Fungus, Hemolytic strep.	-19	Conjunctiva
19.5	Worms		
20-	Syphilis, Low grade staph.	-20	Parietal brain
20.5	Blood virus	-20.5	Outer ear passages
21-		-21	Bone, Bone marrow
21.5	Sprains and bruises	-21.5	Ligaments
22-	Hypertonicity, Stress	-22	Ovaries, testes
22.5		-22.5	Optic chiasma, subcutaneous tissues
23-	Cholesterol, Catalyst	-23	Kidneys
23.5		-23.5	Bile duct
24-	Skin allergy, Ulceration	-24	Mastoid area
24.5	Acidity, Excess chlorine	-24.5	
25-	Caries	-25	Teeth and Gums
25.5		-25.5	Teeth and Gums
26-	Acidity or Alkalinity	-26	Prostate, Cervix
27-		-27	Spinal cord, Pineal gland
27.5		-27.5	Vagus nerve
28-		-28	Pineal gland
29-	Mucosa, Catarrh, Mumps	-29	Liver
29.5	Clots, Emboli	-29.5	
30-	Carcinoma	-30	Temporal brain
30.5	Blood cancer, Leukemia	-30.5	
31-	Cold, Arthritis	-31	Connective tissue, Knee
31.2	Muscular weakness	-31.2	
32-	Cold, Watery discharge	-32	Stomach, Small intestine
32.5		-32.5	Laryngeal pharynx
33-	Undulant fever	-33	Maxillary sinuses
33.5	Cold and Flu	-33.5	Cornea
34-	Staphylococcus	-34	Pancreas
34.5	Kidney poison	-34.5	Nasal passage
35-	Pus, irritant	-35	Gall bladder
36-	Hiccups, Convulsions	-36	Nasal pharynx
37-	Excess chlorine	-37	Throat, Esophagus
37.5-		-37.5	Sphenoid sinus
38-	Flu, most common	-38	Pylorus
39-	Roundworms	-39	Parotid
39.5	Stomach cramps	-39.5	
40-	Congestion, Inflammation	-40	Occiput
41-	Nickel poisoning	-41	Muscles, Connective tissue
42-	Tuberculosis	-42	Derma, Muscle sheath

42.5	Fungus, Caustic Tumor
43-	Ulceration
44-	Toxin
45-	Fungus, Leprosy
45.5	
46-	European. equine encephalitis
51-	Undulant fever
51.5-	
52-	Arsenic poisoning
52.5	Ulceration
53-	Mononucleosis
53.5	
54-	Necrosis
55-	Insect stings
56-	Bovine virus
57-	Undulant, Poison
58-	Sarcoma, Tumor, In M. S.
58.5	Inflammation, (48-)
59-	Undulant fever
60-	Streptococcus
60.5	Cold
61-	Colds, Cyst
62-	Bacillus coli
62.5	Arthritis
63-	Albumen, Arthritis
63.5	Flu, Shakiness, in arthritis
64-	
65-	Undulant fever
66-	Found in muscle
67-	Causes burning
68-	Rheumatic fever, Flu
69-	Multiple sclerosis, Calcification
70-	Excess alcohol poisoning
71-	Burns, Excess HCl
72-	Hydrochloric acid
72.5	
73-	
73.5	
74-	Multiple sclerosis
75-	Diverticulitis
76-	Colds, Watery burning
77-	Hypotonicity, Exhaustion
78-	Flu, Pneumococcus
79-	Found in muscle
79.5	Pain
80-	Lead poisoning, Hives
81-	Fibrosis, Scar tissue
82-	Sodium, HCl, Fungus, Algae, Cancer
83-	Fungus, in Multiple Sclerosis.
84-	Flu, Sore throat
85-	Allergy, Fungus, In poison ivy
86-	Fungus, Trench mouth
87-	Fatty Tumor, Flu, Whooping Cough
88-	Nitrous oxide
89-	Worms, Pustules, Flu, Syphilis.
90-	Fibroid Tumor
91-	Virus, Cancer toxin
92-	Gastric ulcer
93-	Hardening of tissues
94-	
95-	Negative polarity, in high fever
96-	Coryza, Mucosa, Weeping
97-	Small pox vaccine
97.5	Albumen
98-	Building rate (DO NOT TREAT until all infections are out.)
99-	
100-	

-42.5	Rectal sphincter, trachea
-43	Esophagus, Vocal cords
-44	Lymph nodes
-45	Left lobe of liver
-45.5	Ligaments, tendons
-46	Adrenals
-51	Mucous membranes
-51.5	Hypothalamus
-52	Duodenum
-52.5	Omentum
-53	Thoracic area, Pleura
-53.5	Peritoneum, Uterus, Ovary coverings
-54	Digestive, general
-55	Spinal fluid
-56	Breasts, Mammary glands
-57	Glands, Involuntary muscles
-58	Uterus
-58.5	
-59	Salivary Glands
-60	Cecum, Transverse colon
-60.5	
-61	Connective tissue, Fatty tissue
-62	Descending colon
-62.5	
-63	Left kidney tubules
-63.5	
-64	Lachrymal ducts
-65	Anterior pituitary
-66	Appendix or cecum
-67	Ureteral duct
-68	Inner or middle ear
-69	Eustachian tubes, outer ear
-70	Heart
-71	Arteries
-72	Right kidney tubules
-72.5	Glottis or epiglottis
-73	Upper lungs
-73.5	Synovial membranes, joints
-74	Lower lungs
-75	Diverticula
-76	
-77	Thymus
-78	Hepatic flexure, transverse colon
-79	Eyelid lining, Sebaceous gland
-79.5	
-80	Splenic flexure, transverse colon
-81	Uterus, Vagina, Endometrium
-82	Intestines, associated w/Kidney
-83	Bronchi
-84	Part of stomach
-85	Epidermis, Hair follicles, Skin
-86	Urethra, Cervix Majora, Labia
-87	Posterior pituitary
-88	Urogenital tract
-89	
-90	Descending colon
-91	Nerve endings, Derma. Associated with burns
-92	Parathyroid
-93	Upper lungs
-94	Duodenum
-95	Spleen
-96	Coccyx, Rectum
-97	Veins
-97.5	
-98	Thyroid
-99	
-100	Positive polarity—found when conditions are widespread



Peter Ruehmkorff's Fan Chart for Pendulum Dowsing

Weather Moderation: Birth of Sequential Spraying

From Issue #6, *Applied Biodynamics*, Winter 1993 – By Hugh Courtney

First of all, the sequential spraying technique was developed by myself, almost accidentally, in the early summer of 1988 when it appeared that we were about to face a third year of blistering drought. Frustrated by that possibility, I reasoned that surely there had to be something in biodynamic agriculture that could relieve or at least ameliorate the damage to our pastures, hayfields and gardens, after all, had not Steiner himself in the *Agriculture* course, (see Lecture #5, especially page 89), suggested that the preparations could help the plant attract to itself from its environment what was needed for its best growth? I thought surely, if one knew precisely what preparations to use, then relief should be available somehow. That is if one assumes that biodynamics really is valid and truly works. In my case, however, I did not have the wisdom to know the precise preparation to use.

At this point in my work with the preparations, I was convinced that it would be fairly difficult to cause harm with them, even if one used them in a situation that did not seem appropriate.

The worst thing in such a case would be that their effects could be reduced or negligible. So, I chose to use all nine of them. The six compost preparations were applied in the form of Barrel Compost (Thun recipe) along with BD #500, BD #501, and BD #508. I reasoned that I should commence in the evening with Barrel Compost, since the generally accepted biodynamic practice is to begin with the compost preparations. I followed the next morning with BD #508, and since I had been very much impressed with the work of Lilly Kolisko, and since I already had some on hand, I chose to use the fermented version of BD #508 as detailed in her work, *Agriculture of Tomorrow.* In the evening of the second day I applied the BD #500. On the morning of the third day, I sprayed the BD #501(c) which is a crystal silica material found in a matrix of rectorite, a clay-like substance. I had been experimenting with this form of #501 and had been very pleased with the results to this point, so it was an obvious choice for me.

Since I was treating hayfields, and was very interested in the water element anyway, I chose to apply the sequence in a leaf period, which turned out to be just before the full moon, on the 26th, 27th and 28th of June 1988. Sometime within the following night, we received a nice, lengthy, soaking rain which totalled around 0.9 of an inch.

Energy Balancing

And Weather Moderation

In the late 80s Hugh Courtney experimented with applying all the biodynamic preparations in close conjunction with each other. He believed two days was enough time to spray them all. He tested this out on his farm in Woolwine, Virginia, and later introduced this method at various workshops.

The first afternoon he stirred and applied barrel compound [BC, aka CPP], which included all the biodynamic herbal preparations. The next morning he stirred and applied the biodynamic horsetail decoction [508] that works with silica and warmth. That afternoon he followed up with horn manure [500], and the next morning with horn silica [501]. The idea was that the downward activity of the barrel compound would be balanced by the upward activity of the 508; and the downward activity of the 500 would be balanced by the upward activity of the 501. This would restore the rhythmic daily atmospheric movements of moisture. He called this an energy balancing procedure.

At that time the southeastern U.S. was having stagnant atmospheric conditions and repeated summer droughts. Wherever this sequence was employed technical precipitation if not outright rain followed within 48 hours. Courtney figured the preparations had the power to attract whatever was needed for life to thrive. His experiments seemed to indicate that the best success in terms of rain occurred if the sequence was done near full moon when the watery forces were strongest.

This might be explained a little differently from the perspective of Wilhelm Reich's rainmaking work, but Reich's methods in no way contradict Courtney's. Reich observed that drought was always accompanied by stagnant, disorganized atmospheric conditions. He found that during times of drought the ether would become congested with what he termed DOR (deadly orgone energy). Under high DOR conditions, regardless of the humidity, clouds had trouble forming and rain would not fall. Much of Reich's research in the early 50s was devoted to discovering how to clear out toxic atmospheric conditions and restore healthy dynamics to the atmospheric ethers. If this was accomplished the result was regular rain cycles followed by clean skies and good cloud formation. Fluid dynamics tells us a microscopic change at a point can effect large scale changes in

the medium. Further experiments should be considered.

Following Hugh Courtney's lead, energy balancing procedure was used at Union Agricultural Institute near Blairsville, Georgia where there had been four weeks of stifling, hot weather in late June and early July of l990. The sky was brown and hazy, but despite humidity readings above 90%, there was no rain and not even any hopeful cloud formation. This was typical of what Reich called DOR. The Institute property was sequentially sprayed using energy balancing procedure followed by morning and evening radionic treatments of the same preparation sequence. On the second afternoon there was a light sprinkle. By the fourth evening the DOR cleared enough that there was a good shower. By the time the radionic treatments had gone a week there was abundant rain. Again in September the stagnant atmospheric conditions returned and again were resorted using the energy balancing procedure. There was a rapid return to healthy atmospheric conditions where the dew fell heavily at night and burned off quickly in the morning, and there was rain every fourth day. A few years followed during which Mt. Pinatubo erupted and there was plenty of sulphur settling from the upper atmosphere and ample rain. When summer droughts returned, morning and evening radionic applications were resumed and rain followed.

Except while Mercury was retrograde, energy balancing procedure was followed by rain in every case. However, on one occasion energy balancing procedure was begun the day after mercury went retrograde. Although the atmospheric congestion cleared somewhat and the sky became overcast, only a few spits of rain occurred. The sequence was repeated, again and again, and still only technical precipitation occurred. Finally mercury went direct. Within the hour a four inch deluge fell, cutting channels in the drive way and some of the fields. Characteristic of mercury retrograde no *apparent* progress was occurring, and the actual results did not become apparent until mercury went direct.

After that, a written intention from Joey Korn's book, ***Dowsing: A path to Enlightenment*** came into use as a way to avoid unwonted and detrimental effects.[49] Realistically, drought conditions may be much more entrenched in parts of the world where rain normally is scarce. It would hardly be beneficial to swing from one imbalance to its opposite and get heavy rain in Arizona or the Gobi Desert. Yet, in every case at Union Agricultural Institute the energy balancing

[49] *If it be Thy will, let the powers of nature converge, to bring in beneficial energies and transform any detrimental energies into beneficial ones, for now and in the future, for as long as is appropriate, In deep gratitude, Amen.*

procedure cleared up atmospheric stagnation and restored a healthy atmosphere. By the second day of spraying, haze would lessen and cloud formation would become more distinct. By the day after the sequence, weather fronts which skirted the region moved through it. Usually this brought rain followed by clear skies. Whenever the haze returned, energy balancing procedure was resumed.

Finally an experiment was begun at the Institute using a morning and evening radionic sequence of BC, 508, 500, 501, and back to BC again. This went on over winter and into the next summer. Rain began occurring every three days until in mid-August of 1996 there were floods and an area of a hundred mile radius was affected. We realized there was plenty of moisture in the atmosphere, but we didn't want to be the only place with a healthy enough atmosphere for it to fall.

Weather Theory

Weather is always changing, though it oscillates back and forth within limits. Whenever it gets too hot or too dry it self-corrects to become cooler or wetter or both. However, this oscillation has obscure trigger points. MIT mathematician Edward Lorenz made this discovery in the mid '50s, giving rise to Chaos Theory. Chaos is a fact, but theory seeks to explain how it gives rise to order, as with a self-correcting system like global weather. Water evaporates chaotically into the atmosphere. What makes it concentrate in clouds so dense they drop rain in certain places and at certain times—but not others?

Often there is plenty of moisture in the air but no rain. Particularly in the southeastern USA the humidity can be 95% along with 95°F without a cloud in the sky. This tends to be significantly worse in urban areas such as Atlanta, Georgia where summer thundershowers move across from western Douglas County, break up, go around urban Fulton and DeKalb counties, and resume their rain pattern in eastern Rockdale County. The traffic and industrial fumes that repel moisture and fuel urban haze only abate on the weekends where statistics show 20% greater chances of rain on the barbecue than on the weekday commute.

Global weather is a complicated self-correcting system. There is debate about global warming, but one thing seems certain—many glaciers world-wide are disappearing and new land temperature records keep being set. Both droughts and floods seem on the increase, since heat drives the world's weather and evaporation from the equatorial oceans puts the moisture into the atmosphere that fuels storms.

Roughly 89.5 billion acres of the earth's surface is covered by water, and an acre-inch of water is 193,460 gallons. This means if evaporation was constant at

merely an inch a year, rather than an inch or so a month, this would amount to 17.3 quadrillion gallons of water per year. That is 17.3 million billion gallons of water. Even a slight rise in the temperature of equatorial oceans means millions upon millions more gallons of water evaporate. No one is sure exactly how much, but it all has to fall somewhere. Wherever moderate rainfall becomes scarcer and scarcer because ground cover is lost or pollution increases, floods seem to become more common a few hundred miles away. Droughts in Chad, Sudan and Somalia correspond with floods in Mozambique and Tanzania. Droughts in Siberia are related to floods in Afghanistan and Pakistan. Alternatively, droughts in the Indus and Ganges coincide with floods along the Yellow and Yangtze Rivers. Drought in North America is matched by floods from the UK to Russia. If we reversed the conditions that lead to drought—such as bare soil and pollution—we would restore order to the atmosphere and normalize rainfall while preventing floods. It would be environmental responsibility to reduce bare soil and pollution.

Background

Since earth and sky interact, we cannot revitalize the atmosphere without revitalizing the soil—in which case we should consider how wrongly most soils are fertilized and cultivated. According to ***Webster's Collegiate Dictionary*** a fertilizer is any substance that when applied to the soil makes it more fertile. However, the Fertilizer Institute and the industries behind it have lobbied to pass laws requiring fertilizers to be soluble. Though the industry's agenda is transparent, good sense says we don't want our nutrients to be soluble. We must have them insoluble but available so they don't wash away. Insoluble but available only occurs when the nutrients are stored and retained by the life of the soil. The teeming symbiosis in healthy soil, delivers a steady availability of sufficient nutrients for robust crop production when the soil is truly fertile.

Under present laws lime and other rock dusts can only be advertised as soil amendments rather than fertilizers. Balanced, well-humified compost—which is even more crucial to building soil fertility—is also called an amendment instead of a fertilizer because its nutrients are insoluble though available.

On the other hand the massive use of nitrogen 'fertilizers' such as anhydrous ammonia, urea and nitrates is like living on amphetamines and ignoring balanced nutrition. Everything goes very strongly until it doesn't go very well at all. By resting, good soils may return to productivity, but eventually the collapse will be fatal if irresponsible practices don't change. Obviously building soil biology and eliminating reliance on poisons would help the atmosphere immeasurably. There

is a science to this and soil fertility can be achieved, but given the inertia of the present institutional arrangements it won't happen soon. It may take massive losses in the agricultural sector for change to occur. In the interim what can we—who want to protect ourselves and moderate the damage—do?

Re-enriching the Atmosphere

Restoring order to the atmosphere is a pre-requisite for rain to occur. This is an important part of returning agriculture to self-sufficiency. Sequential spraying, and/or radionic treatments with biodynamic reagents in combinations with colour, sound and intention—are within the ability of most farmers to accomplish. Only the know-how and confidence is lacking.

Homeopathic Milk and Honey

Hugh Courtney also suggested following up the balancing sequence with milk and honey. A land flowing with milk and honey implies a countryside rich in nourishment for the whole human being, both physically and spiritually. Since milk is related to lime, the milk potency should be sprayed in the evening on the soil. Honey is related to silica, and it should be sprayed in the air in the morning.

Not many farms flow with milk and honey, but it wouldn't be a bad idea. Milk supports growth and development of the whole human being), and honey supports maturity and refinement. After an infant reaches two mothers generally wean them and substitute milk from cows or goats. Milk processing, however, denatures milk and robs it of many of its benefits. If fresh raw milk is available it can be very nourishing for children throughout their formative years.

As people mature, honey comes to their aid. Maturation does not stop with physical growth, and people may eat honey to good effect into old age. Honey is a pre-digested form of the most refined plant juices. It has been concentrated and stored in hexagonal, crystal-like, honeycomb cells, and is at its peak of flavour and nutrition in the comb. It too is best extracted raw, and heating or other processing denatures honey as it does milk.

Honey strengthens the will and gives the ego a well-adjusted sense of security, especially when the etheric and astral bodies already have a good start.

Hugh Courtney suggested spraying homeopathic milk and honey to establish these patterns in the landscape as an adjunct to sequential spraying. If farming is to nourish the whole human being, it makes sense to experiment with this.

Since growth occurs in the evening and at night, and milk is associated with growth, the milk potency should be sprayed in the evening as with 500 and barrel

compound. For an acre, something like a pint of milk can be added to 3.5 gallons of water [1 litre milk/24 litres water/hectare], stirred for twenty minutes and sprayed in the late afternoon. Honey can be applied at a rate of 1 ounce to 3.5 gallons of water/acre [75 grams/24 litres/hectare], potentized for twenty minutes and sprayed in the morning. Multiply this as needed.

Radionic Experiments

Early on in the development of this procedure I started using radionics as an application of fluid dynamics that a microscopic change at a point can effect large scale changes in the medium. Using an aerial map with the Union Agricultural Institute farm boundaries marked as a witness, I used a double-dial Hieronymus instrument with vials of the various preparations for reagents along with the double-dial rates obtained by cold scanning. I alternated evening applications while fixing supper with morning applications when fixing breakfast. I dowsed for the duration of each application and programmed a timer to shut off the instrument while I went to work elsewhere. Union Agricultural Institute got timely rainfall even when the rest of Georgia was in drought. On challenging occasions I learned to use colour beamed from a lamp into the instrument's witness well. I also used various herbal and mineral reagents along with pictures and recordings of rain—whatever occurred at the time. Whale songs; were particularly exuberant, and an enthusiastic, playful feeling seemed particularly effective in obtaining desirable results. This generated such confidence of getting appropriate rainfall that I gave my pump and irrigation equipment to a farm enterprise east of Atlanta.

I also learned to use Malcolm Rae equipment with cards for the biodynamic preparation patterns along with an interrupter in the circuit that turned the instrument on and off hundreds of times a minute to create an effect of myriad butterflies flapping their wings in infinitesimal corrections rather than one single event. In 2005 I purchased a Power Radionic program for my computer from HSCTI products in Woodstock, Georgia.[50] With that I ran radionic programs based on sequential spraying—which opened up even further options.

In November, 2011 my wife, Shabari, and I flew in to the states from Australia for Sally Fallon Morell's Weston A. Price convention in Dallas, TX and we were shocked to see the devastation of the previous 10 months of drought. We organised a series of workshops in the Austin, TX area focusing on sequential

[50] *See* http://www.hscti.net/index.html

spraying and within the week most of the participants were rewarded by rain.

But knowing how much enthusiasm and diligence it takes to keep something like this going, and how easy it can be to lose confidence in the beginning it is easy to see how this might not catch on. The tricks of the trade are myriad, and many of these are shared in lecture form on a audio CD, available from our website at:

www.quantumagriculture.com

Sequential Spraying

Draw 3 gallons of water in a 5 gallon bucket. If it is chlorinated, leave overnight or stir for 30 minutes to outgas the chlorine. It should be warm, though no warmer than blood temperature. It may be warmed with sunlight, wood or gas. Electricity is not so ideal.

Stirring: With arm or stirring stick, stir round and round to create a vortex. The water becomes organized into laminar layers as the cooler, denser layers move to the middle and the warmer, lighter layers seek the edge. It will look like a spinning funnel. Reverse direction so the water froths in chaos until a new vortex is formed. As each new vortex matures, reverse direction again and again, back and forth. Stir 500 and 501 for an hour, and BC and 508 for 20 minutes. Every time a new vortex is formed a new organization is created. Organization is the basis of life, and creating successive generations results in an evolution of order. This charges the remedy with life force and imparts the stirrer's intentions to the water. Then what one thinks, one grows.

Sequential Spraying cont.

Spraying: This spray should soak into the soil like the dew, and should be sprinkled on in late afternoon in large droplets. Each drop radiates up to 6 feet, so there is no need for uniform coverage. Since life force flows from lower to higher concentration, spraying in this fashion builds life force [organization] from the surrounding cosmos. A pail and a wallpaper brush or whiskbroom are sufficient for applying these remedies

1st Evening: Barrel Compound [aka CPP]—The first afternoon, add a one acre unit of barrel compound (⅓ cup) to three gallons of water and stir and spray.

1st Morning: Horsetail Decoction (508)—Make a decoction by simmering 8 ounces of dried horsetail herb in ¾ gallon of water for 20 minutes. In the morning, dilute the decoction into 3 gallons of warm water and stir as above. Spray as a mist over the area.

2nd Evening: Horn Manure (500)—Add a one acre unit (¼ cup) of horn manure [500] to three gallons of warm water and stir for 1 hour. Spray on the soil in large droplets.

2nd Morning: Horn Silica (501)—Add a 1 acre unit of horn silica (1 gram) to three gallons of water and stir as above. In summer, spray this remedy as a mist into the lower atmosphere, perhaps chest or head height in the early morning. In winter, when warmth and light have receded into the earth, this can be sprayed directly on the soil.

3rd Evening: Milk—In the evening, dilute a pint of milk in 3 gallons of warm water and stir for 20 minutes. This spray should soak into the soil in large drops.

3rd Morning: Honey—In the early morning, dilute an ounce of honey in 3 gallons of water and stir for 20 minutes. Apply as a fine mist that evaporates upward.

True Excellence in Growing Food

Lessons in Agriculture and Life

Presumably organic certification avoids contamination from noxious chemical and environmental influences, but it is a concern that organic standards have little if anything to do with aroma, flavour and nutrition. Though there is a public expectation of quality when one buys an organically certified product, it is very much a 'buyer beware' experience. Synthetically produced ammonium sulphate is not allowed regardless of how biologically friendly low application rates are, while large quantities of raw chicken manure is allowed as an input with no regard to the havoc this wreaks on the soil biology or the nadir of quality its use achieves. There is need for an awakening to the quality of what we grow.

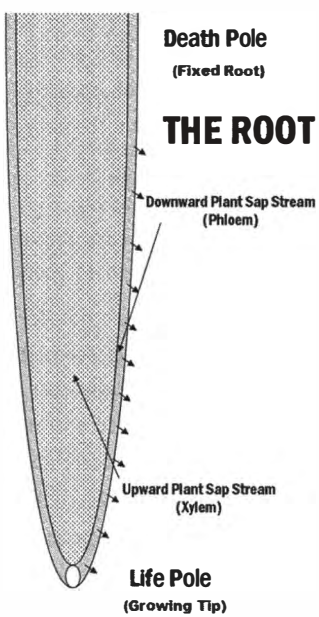
For the most part, true excellence in growing food has to do with the way nitrogen works within each farm. This can either be sophisticated or crude. Nitrogen is the essence of protein chemistry, which gives us the character and flavour of what we eat. Each farm has its unique protein signature, especially when it taps directly into the atmosphere for its nitrogen. The wine industry refers to this as *terroir*, which refers to the complete natural environment in which a wine is produced. Terroir is the key to the protoplasmic density and the nuances of character of a specific region and even a specific location. Yet, few farms today are consciously run with this in mind, and few people think about maximizing sophisticated nitrogen while minimizing the crude stuff. Nevertheless the benefits of robust nitrogen self-sufficiency—production cost, profitability, nutritional excellence, consumer preference, and social evolution—are enormous.

Kicking things off in any specific location may require outside inputs, but these should be thought of as medicine rather than fertiliser—especially the nitrogen inputs. There is nearly 0.7 tons of atmospheric nitrogen over every square foot of soil, and it makes no sense to ignore this abundance. Growers already addicted to nitrogen fertilisers need to tune in to this thinking and wean themselves from buying nitrogen. It must be done gradually, but who wants to pay for unnecessary inputs? The key to quality is getting the soil biology cooking and keeping it cooking with as little as possible of outside inputs.

Vibrant Personality

The chemistry of plants parallels the chemistry of our bodies. Both plants and people are carbon based life forms. While plants harvest energy and build carbon chemistry, animals digest and transform this harvest. In the process both depend on the nitrogen in DNA and RNA for memory and sensitivity. Maximum nitrogen fixation requires abundant energy, which plants supply. Nitrogen cycling also depends on animals, particularly protozoa, to digest nitrogen fixing microbes and provide plants with freshly digested amino acids to assemble their chlorophyll and other proteins. Animals depend on plants and plants depend on animals for a steady amino acid supply. This plant/animal symbiosis suffers when any of its components get short-circuited.

Consider how our amino acids are supplied by digestion—which depends on symbiotic microbes living synergistically within us. Vibrant health depends on generating blood in our own bone marrow. Blood transfusions are a stop-gap measure that we wouldn't want to have to rely on. Similarly, nitrogen in plants is provided at the cellular level by endophytes, which live in between plant cells, as well as microbes living in symbiosis with plant roots. For example, we may talk about plants fixing nitrogen, but the actual fixation and digestion comes from microbes that plants share their energy with. If we treat the farm—no matter how



How Plants Grow

- Roots take up nutrients via their woody interior, known as the *xylem*.

This feeds cell division, chlorophyll production and photosynthesis in the tips and leaves, building up sugars.

- Each type of plant sends a different mix of surplus sap from its leaves back to its root tips via the root layer just under the bark, known as the *phloem*.

- These root exudates act as a food source for various microbes and nutrient components from clay/humus complexes, soluble phosphorous, fixed nitrogen via the digestion and nutrient release occurring around its roots.

large or small—as its own entity within its boundaries it will accumulate life force or farm vitality.

How Plants Grow

Chemical agriculture tries to feed plants directly, while using the soil to hold them up. This amounts to hydroponics on a weekly or monthly schedule instead of a daily or hourly timetable, and it ignores the soil food web.

At first glance the chemical method seems simple and easy, but it is guaranteed to achieve less than optimum quality even when it delivers quantity. Soluble inputs damage the soil food web, burn up humus and nutrient reserves and take crops on a rollercoaster ride. Chemical fertilisers amount to large doses of the waste salts of microbial activities that should be going on in the vicinity of plant roots. High levels of these wastes shut down the microbial activities that otherwise would make nutrients available on an hourly and daily basis. The result is soil depletion instead of the optimum response we want to encourage. Our rule of thumb should be to feed the soil food web so it feeds the plant. The biological activity in the soil can far surpass anything we can do either chemically or mechanically, and it is unjustifiable not to maintain and improve this system.

The main building blocks of protoplasm are hydrogen, oxygen, carbon, nitrogen and sulphur. Minerals such as silicon and calcium are only a few per cent of the total. Carbon—which stores energy—enters into plants from the atmosphere. On the other hand, nitrogen—which provides memory, awareness and coherence—enters from the soil. This carbon/nitrogen duality means plants depend on a dynamic interplay between what goes on above in the air with what goes on below in the soil. Humus provides a reservoir that acts as a biological flywheel to store momentum for this dynamic interplay. The more we build humus, the more resilience the soil food web has for nourishing plants, and the more ably plants grow and feed the soil food web so it builds more humus. In this fashion diverse grassland ecologies have built the richest soils on earth.

Soil Biology and Vitality

Nitrogen is restless and elusive. It is content to share its beauty, cleverness and sensitivity embracing itself in the atmosphere. It takes a lot of energy to seduce nitrogen away from its narcissism and engage it with hydrogen, oxygen, carbon and sulphur to form proteins and mineral complexes. However, it is still restless. Unless it is in use or stored in clay/humus complexes it tends to volatilize or leach.

Growers who think they must apply nitrogen will find the more they use it, the

more they will have to use it. Nitrogen applied as urea, ammonium or nitrate suppresses nitrogen fixation. To some extent this can be avoided by feeding nitrogen to the soil food web along with humic acids or clay/humus complexes. These tend to tie nitrogen up as amino acids—which is the safest way to minimize any harmful effects. High production growers weaning themselves gradually from nitrogen inputs should watch closely as they use humates and cut back on nitrogen inputs. By leaf testing every three or four weeks, they can monitor nitrogen levels and add smaller and smaller amounts of nitrogen with humates as needed. This can gradually allow a grower to phase further nitrogen inputs out.

Compost teas can also be helpful. The goal is to encourage thriving nitrogen fixation and protozoal digestion so there are always sufficient freshly digested amino acids to bring out the farm's terroir. Since biological nitrogen fixation is a complex and delicate process, it takes experience to learn how to increase and enhance it. Probably the most important thing is understanding how life arises.

Boundaries, Synergy and Sulphur

Life arises at boundaries and at surfaces, both in plants and in soils. This is a syntropic process. Synergy is where two or more things working together produce a greater joint sum than if they work separately and their separate outcomes are added together. The greater the complexity of boundaries in a habitat—and the greater the diversity of living organisms in that habitat—the greater the synergy. With rich synergy, ten plus ten ends up closer to a hundred than to twenty.

Sulphur containing amino acids play a key role in this boundary process even though they are relatively scarce. Sulphur also has an intimate relationship with the transition metals essential for enzymes and hormones, which helps make it the premier catalyst of life chemistry. As the ignition key to growth, sulphur facilitates all other biological processes. Sulphur deficiency holds everything back.

Biochemical Sequence

Beyond sulphur, the minerals plants need from soils have a certain hierarchy of importance. One thing must work before anything that depends on it can. The earlier a deficiency occurs in this sequence, the more everything else is affected. For example, silicon provides the capillary action that allows plants to draw water and nutrients from the soil. All biological transport vessels—to say nothing of cell walls and connective tissues—require silicon. Silicon likes to form four chemical bonds. However, boron, which loves to react with silicon, can only form three bonds. It doesn't take much boron to make silicon look for a fourth electron

partnership. Boron makes silicon thirsty for water and electrolytes—which creates sap pressure. Without boron silicon doesn't take up water and nutrients very well.

This means both boron and silicon are essential for plants to take up other nutrients such as calcium and amino acids. Nitrogen depends on calcium and magnesium depends on nitrogen to catch energy from sunlight. Phosphorous depends on magnesium to transfer energy to it. Carbon depends on phosphorous for photosynthesis and for all the following energy transfers involving iron, copper, zinc, manganese, cobalt, molybdenum and traces of lesser significance. And even though in terms of energy photosynthesis comes first, phosphorous and the various trace elements play a huge role in the soil food web in releasing energy from carbon stores for microbial activity from emergence of roots onward.

Lastly, potassium is responsible for the communication and movement processes going on in plants, starting with nutrient flow and the opening and closing of cell walls.

Understandably any sort of fertilisation which breaks down organic matter and digests the soil food web, works rather well in the short term by releasing trace mineral reserves. In the long term, however, this peters out and loses effectiveness as reserves are depleted. NPK fertilisation ignores the soil food web and the biochemical sequence as well as how micronutrients work with sulphur and phosphorous. Truly NPK fertilisers harm soil biology, and N, P and K are not needed as much as they seem. Besides, most total tests show ample N, P and K.

Soil Biology

It shouldn't need emphasis, but nitrogen fixation depends on soil biology having abundant energy as well as the availability of calcium and various trace elements. Energy abundance is determined by the efficiency of photosynthesis and root exudation, which depends on sap pressure and amino acid uptake rather than nitrates. Sap pressure depends on microbial symbiosis to keep feeding the plant freshly digested boron, silicon, calcium and amino acid complexes at crop roots.

Probably the most important microbes in this regard are the *Actinomycetes [aka Actinobacteria]*, which are the source of many antibiotics and are responsible for the clean smell of healthy soil. By forming fine fuzz growing outward from young roots, they provide habitat for other microbes as well as releasing nutrients from clay/humus colloids. Often they live as endophytes within crop tissues and may be found in their seeds. Because they work at the beginning of the biochemical sequence to break down clay/humus structures and release boron, silica, lime and amino acids, the *Actinomycetes*, mycorrhizal fungi and other participants in the soil food web provide optimal plant nutrition. Nothing else can do this so well. In return this ensures efficient photosynthesis and plentiful root exudation in the active root zone. In turn, this ensures plenty of energy for nitrogen fixing microbes and the protozoa that feed off them. These then provide optimum plant nutrition.

Basically this activity can be seen as soil adhesion around plant roots with a delicate, dense, finely branched root development that never occurs with heavy applications of chemical fertilisers. As salts of hydrochloric, nitric, phosphoric and sulphuric acids, NPK fertilisers create salty conditions that inhibit *Actinomycetes*, mycorrhizae and fine root development.

More of the Story

Although the Biochemical Sequence can help determine which deficiencies are most urgent, in living soils everything happens in an integrated way. Above ground, phosphorous follows magnesium in photosynthesis, but in the soil food web phosphorous follows iron as the key to energy availability. Soil microbes need phosphorous to release energy from the carbohydrates crop seeds give off as they sprout. This is why most liquid inject formulas or seed coatings include phosphorous and its co-factor trace elements to get seeds and their microbial symbiotes off to a good start. However, if the soil reserves of phosphorous and its co-factors are depleted, the *Actinomycetes* and mycorrhizal fungi will struggle.

Compost

Lest we forget, the rule of thumb is to feed the soil food web and let it feed the plant. This is best done with humified compost, although the term 'humified' deserves explanation.

Many people imagine that composting is a process of breaking down organic materials until somehow they stabilize. This is over-simplified and poorly informed. If breakdown of organic materials was all that occurred the result

would be carbon dioxide, methane, ammonia and a residue of salts and oxides. Cellulose, for example, is a long chain polymer of glucose, a simple sugar. If all it did was break down it would be used up. However, beneficial fungi and Actinomycetes arrest this process and build the breakdown products back into large humic acid molecules much like bees storing nectar as honey in their comb. These organisms tie up all sorts of amino acids and minerals in humus formations. The resulting clay/humus complexes are so complex that bacteria cannot break them down. Protozoa and higher animals may release their nutrients, but in a healthy soil food web the mycorrhizae and *Actinomycetes* store and access these humic compounds. Soil tests do not reveal these insoluble but available reserves without performing a total acid [aqua regia] digest.

The microbes that build humic complexes grow particularly well on clay surfaces, so making humified compost requires some sort of clay or soil dispersed throughout the mix of materials being composted. The resulting clay/humus complexes are the perfect medium to restore key—often missing—micro-nutrients needed to rebuild the soil food web. Even at five hundred pounds (0.25 T/Ha) per acre, humified compost can act as a carrier for deficient elements. Depending on what is needed, five pounds of borax or solubor per ¼ ton of compost, ten pounds each of copper, zinc or manganese sulphates, one pound of cobalt sulphate or sodium molybdate or a gallon of sea minerals can be fed to senescent soils and restore their soil food webs to robust interaction with crops.

Incidentally, sea minerals are the dense, almost oily pot liquor left over after extracting sodium chloride from sea water by evaporation. This heavy pot liquor contains every element in sea water and can round out the picture with traces like selenium, molybdenum, fluorine and ORMEs (Orbitally Rearranged Monoatomic Elements). Composts of this sort can also be combined with gypsum, rock phosphate, lime, basalt or granite dusts. Without feeding these inputs to the soil biology via compost, soluble inputs tend to miss the mark and wash away.

The Keys to Success

Syntropy occurs where energy accumulates at boundaries. Infinitesimal changes on the borders of chaos result in big changes downstream. The richer a soil is in surface area and internal order, the more strongly it will draw in biological energy. Life arises on the surfaces and boundaries of soil particles. As islands of order amidst an ocean of chaos, living organisms depend on the syntropy found on surfaces to thrive. Carbon particles are particularly rich in internal order, so biochar, with its immense surface areas, helps life beget more life.

Nature shows us many master plants and animals. By growing them as monocrops modern agriculture has achieved certain efficiencies, especially in terms of harvesting and processing. Taken by themselves grains, fruits, vegetables, fibres, even bees, cows, and earthworms are impressive. Yet, we really don't know what is possible until we integrate these into the larger drama of life. What if these plants and animals worked together to achieve true excellence in growing food?

Diversity gives us synergy, and when we take syntropy and synergy seriously, robust nitrogen fixation is achievable—even though we should aim to harvest and export somewhat less than 10% of our total annual biomass production.

Food of true excellence and sophistication supports the development of human potential. This could mean art, music and poetry—works of incredible beauty and poignancy that seem miraculous. Achieving our potential wouldn't be so difficult if our food gave us the inspiration to develop our abilities more fully.

How We Get Our Nitrogen

From conception our unique nitrogen signature is stamped on our proteins and DNA. We break down what we eat into amino acids and re-assemble these according to our individuality. Everyone is a bit different, and our immune systems maintain this personal integrity.

We should think of a farm or garden in a similar light. It develops its own nitrogen character. Its microbes take in nitrogen from the atmosphere and build proteins according to its unique nature. The local mix of microbes, animals and plants recycle everything and build the local terroir. When we bring in artificial nitrogen fertilisers we water this system down and obliterate its individuality.

Manures, fossil humates and other biological fertilisers brought in from outside the farm or garden have to be integrated. Ideally nitrogen would be the one thing we would never import. We would produce crops within each farm or garden's nitrogen cycle. This would maximize biological enhancement. On any given property the more we build self-sufficiency, the more we ensure the property's strength of character. By keeping this in mind, we can achieve true excellence and yet export products to share with a wider world that appreciates excellence.

Homemade Fertilisers

Consciousness and Catching Carbon

Given that the nitrogen chemistry of our DNA and our nervous system is the physical basis for awareness, sensation and desire, the quality of our nitrogen diet influences the development of our consciousness. Engaging nitrogen requires abundant energy, and providing nitrogen that elevates our consciousness requires efficient photosynthesis. Thus raising consciousness depends on catching carbon.

High energy agricultural ecosystems give us a complex nitrogen diet that supports clarity, refinement and integrity as a natural result of good methods, while farming mono-crops with synthetic nitrogen fertilisers depletes soil carbon even as it feeds a crude, consumer consciousness that wastes resources and ignores the greater good. Establishing high energy ecosystems requires catching sufficient carbon for nitrogen fixation.

Nitrogen is responsible for taste and smell, our two best methods of chemical analysis. We can tell we are on the right track when our food is savoury and delicious.

Our present food distribution networks are not designed to supply this kind of food; and in an uncertain world where food distribution is increasingly subject to interruption and contamination, growing our own food or supporting those who do this in our local community is our best option.

To engage nitrogen in our home gardens and local farms we can start with Vermiwash and Potassium Silicate Watering Solution to strengthen the soil food web so it delivers intelligent nitrogen. The more we do this the better we will be able to understand how to grow food that wakes us up with its quality.

After 40 years of applying biochemistry to farming I am convinced that nitrogen is the carrier of intelligence, the basis of sensitivity and its vehicle in the chemistry of consciousness. Though I did not invent this hypothesis, I predict increasingly we will see it tested along with its corollary that the human brain functions as a quantum bio-energy device of enormous sophistication. A growing understanding of quantum physics is winding up our previous era of institutionalised denial of telepathy, clairvoyance, astral travel and prayer. We not only can explain how these things work, it is time we learned how best to use them.

At the bottom line is how we get nitrogen in our diet from infancy onward. This has an enormous influence on the psychic clarity and integrity of our

consciousness. The quality of nitrogen in the food we eat influences the development of our consciousness. This is a message to empower those who seek greater self-development.

Smart Nitrogen

While materialists believe we are our bodies, those who chose to explore a higher reality view their bodies as vehicles for spiritual development. In either case there has to be a physics and chemistry of consciousness, sensation and desire. Our daily lives depend on an extremely sensitive, fast reacting, versatile chemistry at the atomic level to access the memory of our cells so that millions upon billions of chemical reactions proceed again and again in exactly the same way. Here is the chemistry of nitrogen, the basis of our DNA and our protein chemistry. Nitrogen is so sensitive to sharing electrons that it easily is the cleverest, best informed and most memorable of all elements. And yet, on the dark side it is the ultimate narcissist, triple-bonding with itself as an inert gas.

Biological nitrogen fixation depends on seducing nitrogen away from its self-absorption. This requires nature to work coherently and intelligently in an extremely fine and energetic way.

Despite its seeming efficiency, natural nitrogen fixation requires abundant energy. This depends on photosynthesis, which depends on efficient carbon chemistry and so on. We live in an age where carbon dioxide is especially free and abundant. Now more than ever it should be easy to catch carbon.

Industrial Nitrogen

Industrial nitrogen fixation also relies on carbon. It uses methane as a source of hydrogen to produce ammonia, though this is neither efficient nor ecological. Most of this 'cheap' nitrogen is applied to farms as urea, and roughly half of that vaporizes as nitrous oxide.[51]

The real rub, however, is artificial nitrogen fertilisers consume many times their weight in soil carbon in order to become useful. Over the years this has resulted in the average carbon level in most farm soils falling from 4 – 10% organic matter and above to below 2%.[52] At this point we must get off the artificial nitrogen treadmill and restore the carbon—and thus the life—to our soils.

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[51] *Nitrous oxide (N_2O) is 300 times as potent a greenhouse gas as CO_2.*

[52] *Commonly soil tests report organic matter by multiplying 1.72 times the detected level of carbon.*

Building Soil Carbon

Forests have long proven their capacity for natural nitrogen fixation and carbon capture. Fortunately or unfortunately, forests build carbon on top of the soil rather than into it as do savannahs and prairies. When grasses photosynthesise they feed roughly a third of the carbon they take out of the atmosphere into the soil at their roots. Grass ecologies develop the sort of soil biology that builds deeply fertile soils with abundant carbon content.

Fire, arguably humanity's most formidable landscape management tool, can return the bulk of a forest's carbon to the atmosphere; while setting fire to grassland only burns off the surface carbon—what was built into the soil via root exudation, manuring and microbial activity remains. Hence the world's most fertile soils, such as the Serengeti Plains of Africa, the Steppes of Central Asia and the American Great Plains—were generated by grass and migratory herds. In their virgin state these soils attained a carbon to nitrogen ratio between 9 or 10 to 1.

Attaining Greater Clarity

While the above information may seem surprising, it shows the relationship between carbon and nitrogen. If we want to add nitrogen to our soils it is important to add it along with carbon. Where nitrogen provides the basis for awareness, carbon provides the living framework that supports the activities involved. In the past, the way we used nitrogen fertilisers has been unwise. We should continue to use nitrogen fertilisers as long as we do this wisely with a goal of restoring the soil food web and winding back nitrogen inputs to zero.

Otherwise what are the consequences? Along with widespread application of artificial nitrogen fertilisers, modern society bathes in a seething maelstrom of instant gratification seasoned with liberal doses of personal ambition, illusions and petty jealousies. With the rise of fast foods comes the loss of intellectual, political and economic integrity. Chronic diseases have increased while trauma is dealt with brilliantly. More and more is catalogued about things of less and less importance. We kid ourselves by thinking we are smarter even while we lose sight of long-term social goals. Money is confused with wealth and science is divorced from value. We race ahead at 200 km/hr [125 mph] with blinders in front of our eyes, catching mere glimpses of the wider reality from the fringes of our vision.

Mainstream Culture

There is no denying the power and immediacy of mainstream culture. It is running at full tilt, even while divorcing itself from nature. Our institutions of

higher learning emphasize teaching farmers how to kill things, and why worry about enlivening the soil when you can just buy fertiliser? The soil is there to hold the plant up so you can put the nutrients on that make things grow. Eliminate everything except what you grow to sell, as the extra vegetation robs your crops of nutrients and moisture. Go for the highest yields and use herbicides for early harvest. The aim is to sell perishable crops before they have a chance to rot. Don't worry about poison chemicals as long as you use them within 'safe' guidelines. Don't worry, we will grow the GDP by increasing medicine as a percentage of the national economy. Bottled water, waste management and privatized prisons are booming growth industries. Greetings, this is our brave new world.

Weather, Droughts and Floods

Clearly carbon attracts rainfall. When rain forests are cleared the loss of carbon coincides with lower rainfall, and the same is true for agricultural land which is left bare. Not too surprisingly, in the last 150 years somewhere around 70% of the world's topsoils have eroded away; and the abuse of artificial nitrogen fertilisers in most of what remains has depleted soil carbon, making rainfall increasingly problematic. Not only does rain become unreliable, but when it rains it floods.

About half of the CO_2 vented into the atmosphere since the industrial revolution has dissolved into the oceans and reacted with calcium or magnesium to form carbonates which settle into the deeps. The other half has added to an insulating blanket around the earth that seems to have raised global temperatures. Large expanses of permafrost in Russia and North America have thawed adding methane as well as CO_2 to the atmosphere, and portions of the ocean's frozen methane clathrates have also surfaced.[53] Consequently there's been more evaporation in the equatorial oceans, but the system is complex and in the final analysis it may all add up to global cooling.

Any increase of moisture in the atmosphere has to fall somewhere. By felling forests, ploughing surface vegetation over and burning up soil carbon with nitrogen fertilisers we ensure it rains more and more heavily in fewer and fewer places which absorb less and less. With deforestation, desertification, mining, urbanization and agricultural abuse we will see more droughts *and* more floods.

But if we want rain to fall frequently and stick around we need to re-build soil carbon. Soil life stores sunlight in carbon complexes. It opens up the soil to be more absorbent, and it slows down global warming and global cooling. Best of all,

[53] *Though shorter lived, methane is a 20-fold more potent greenhouse gas than CO_2.*

it fixes nitrogen.

Alternative Culture

All through the 20th century chemical fertilisers seemed cheap. Their stunning results masked their hidden costs, even while earthworms and the food chain that supported them disappeared. Soils got hard and sticky while nitrates leached away the available boron, silicon, calcium and traces. Soils fused when wet, then eroded, and we got less for more. The use of salt fertilisers on crop land scalded soil microbes, burnt up soil carbon and made crops thirsty, watery and weak—all of which invited weeds, pests and diseases while drawing us ever further into a dangerous dance with poisons. The progressive degradation of our best land along with rising degenerative diseases can no longer be ignored. If humanity survives, children will be asking grandparents, 'Why did people ever put poison on food?' Our only sensible choice is to learn to work wisely with nature's free gifts.

Pictured above is an analysis of a commercial source of sea minerals sold as a by-product of salt evaporation.

Consider the value of food whose protein chemistry derives from biological nitrogen fixation and digestion rather than mining and engineering. What happens when nitrogen's intelligence comes from the living, coherent web of nature that surrounds, sustains and shares its beauty and humour with us? There's good reason to prefer foods from ones garden, locality and region.

Getting Nitrogen Right

When plants take up soluble nitrogen (e.g. ammonium, urea or nitrate) their chlorophyll is watered down and photosynthesis is impaired, no matter that they

look lush and robust. But if they take up nitrogen as amino acids their chlorophyll is more easily assembled. Then their protoplasm becomes dense and photosynthesis is efficient. If we want to store surplus solar energy in the soil's biological flywheel then nitrogen fertilisers must be used sparingly and wisely to reverse soil carbon depletion and re-enliven the intelligence of the soil.

Though we cannot reverse the present situation overnight, we gradually and deliberately must give up nitrogen fertilisers and restore nitrogen fixation. This would put the current surplus of CO_2 to intelligent use, and at the same time build life and complexity[54] back into our soils and the food we eat. The fact that many environmentalists are obsessed with herbiciding plants that 'don't belong' shows how far out of focus social thinking has drifted. Nature votes for whatever flourishes wherever the possibility of something growing exists.

Building natural nitrogen fixation into the food chain might well be called 'getting nitrogen right'. When we get nitrogen right everything else tends to fall into place. Wherever we get nature to thrive coherently and self-sufficiently we engage nitrogen in the 'right' way.

One of the fundamental dictums of environmental self-sufficiency is the exports from a garden, farm or landscape should not exceed ten per cent[55] of that farm's total biomass production. The other 90% of what nature produces—for example, crop residues and manures—should recycle back into the soil to sustain and enhance its life. Getting nitrogen right requires working toward self-sufficiency.

Tasty Nitrogen

Taste a pellet of chemical nitrogen at the fertiliser store and you might be quick to spit it out. Its flavour is a clue to why it shuts down nitrogen fixation. Nitrogen is best when things are tasty. Digestion is an animal activity that takes place around plant roots and makes amino acids available to plants. From protozoa upward, intelligence is linked with smelling, travelling, tasting and digesting the most appealing proteins. Unused amino acids and minerals tend to turn bitter.

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[54] *Carbon provides the framework for life as we know it. Catching carbon is the principle necessity of all farmers.*

[55] *Farms seem to get in trouble when they export more than 8 to 10% of their annual biomass production. The internal farm economy must come first with export secondary in order for a farm to generate its own fertility. Many modern farms exporting hay, silage or sugar cane would not fulfil this requirement, while a dairy farm which composts and recycles its wasted feeds, manures and effluents while exporting milk is ideal for building self-sufficiency and engaging nitrogen.*

In order to really understand nitrogen we need to consider sensation and desire. Taste and smell are fundamental to the evolution of consciousness, which depends on nitrogen quality. It helps to use such savoury inputs as seaweeds and sea minerals if we want to get nitrogen right.

Some Misconceptions

Scientists of the past century thought of nitrogen fixation as something legumes did. This ignored the fact that legumes were merely hosts for nitrogen fixing microbes. Strangely, no one seemed to ask why legumes made such beloved hosts, and the fact that legumes draw oxygen into the soil in order to solubilize calcium and other minerals was ignored. Legumes release several times as much calcium to the soil biology as their microbial symbiotes use to fix nitrogen. This gives ample mineral supply for nitrogen fixation with following crops.

There was a tendency to assume the amount of nitrogen fixed could be measured by assaying a legume's nodules. This assumed that if no nodulation occurred no nitrogen was fixed. Since grasses did not nodulate they were treated as though they hosted no nitrogen fixation. However, via root exudation, grasses supply far more carbon energy to the soil food web. We should consider that nitrogen fixation requires abundant energy as well as calcium and other minerals. As long as the soil biology has sufficient lime, boron, silicon, phosphorous and trace minerals grasses can supply far more energy for nitrogen fixation than legumes—but this is harder to quantify with grasses because they don't nodulate. Yet, by 1970 soil microbiologists had catalogued upwards of a thousand different microbes that free fix nitrogen given sufficient mineral availability and energy.

Realistically, agricultural schools and researchers have been captive to the false doctrine that artificial nitrogen was the energy efficient way to feed the world. Since their jobs and research projects often depended on funding by industry, they taught that the form of nitrogen taken up by plants made no difference, and chemical nitrogen was equivalent to biological nitrogen. It was commonly asserted that plants could only take up nitrogen in salty forms such as nitrate.

The fact that nitrogen fertilisers poison nitrogen fixing microbes with what amounts to their own waste was ignored as inconsequential. Superficially the results were impressive in terms of lush growth and yield quantities. In the short term nitrogen fertilisers seemed a cheap way to grow bumper yields, and the consequences were easy to overlook. The idea that grasses and other plants might host nitrogen fixing microbes as endophytes living within their leaves and stems was not even on the horizon of agricultural microbiology. This was science

wearing blinders to serve industries with a narrow agenda. It sold a lot of nitrogen fertiliser. That alone illustrates the dangers of disguising self-interest as virtue.

Growing food that raises consciousness requires nurturing nature's delicate mechanisms for giving crops the natural nitrogen needed to make things tasty. This is a challenge, and learning how by doing is a good way to get started.

Alternatives to soil destructive methods—clean cultivation, mono-cropping, herbicides, pesticides and fungicides, etc.—needs experimentation. The true basis for growing good food is soil fertility. It is time to wake up. 'Fertilisers' which result in loss of fertility cannot be dignified by that name regardless of laws to the contrary.

Making Vermiwash and Vermicompost

As a start in the right direction, a home recipe for earthworm leachate or vermiwash makes a valuable food source for microbes in order to activate the soil biology and develop nutrient reserves.

- Collect old bathtubs or similar tanks. Caulk screens in the drains and plumb them on an overhang over a low wall or at a slight slant on blocks so buckets will fit beneath the drains.
- Fill the bathtubs with a balanced mix of manure, green/soft matter and brown/tough materials. Include 10% clay-rich soil, and gritty rock powders. After all, Earthworms have gizzards instead of teeth. They need grit to grind their food.
- Use materials from one's own property or locality to help nature work in a coherent, intelligent way in regard to the nitrogen in the environment. Home gardeners may shred their leaves and garden wastes along with lawn clippings and kitchen scraps. Judiciously season the mix with small amounts of gypsum, bone meal, wood ashes, kelp, sea minerals and small

Vermiwash made with loving attention in a biodynamic apple orchard in the Himalayan foothills of Uttaranchal in sight of Nanda Devi, India's highest mountain.

amounts of any trace minerals known to be in short supply.

- Use local weeds as mineral collectors to meet specific needs for nutrients such as sulphur, zinc, phosphorous, copper, etc.
- For microbes that make your local soil thrive, use healthy, local soil.
- To emphasize available nutrients use more manure and less clay or rock powder. This favours bacteria, protozoa and the small, red earthworms found in manure piles, making the vermiwash rich in small molecular compounds
- Conversely, to emphasize insoluble but more gradually available nutrients use more woody/siliceous material such as sugar cane bagasse, coconut fibre, shredded bark or wood chips for a humus-rich actinomycete/mycorrhizal leachate. Also increase the proportion of clay, rock phosphate and siliceous rock powders such as basalt or granite crusher dust.
- Always include biodynamic soil activator or a set of compost preparations.
- A wooden cover will attract life force and shed rain.
- Water the tank with a couple litres of water every other day for vermiwash.
- Finished material, including earthworms, can be used for such things as potting plants or kicking off new tanks.

Fulvic and Humic Acids

Fulvic and humic are names based on molecular size that are used to categorize complex organic acids. Usually these complex compounds are formed when organic materials like cellulose are broken down into simple sugars and built back up again by microbial activity. These terms are also applied to extracts made from organic deposits such as peat, leonardite or soft brown coal.

A Vermicompost shed on a self-sufficient Indian farm.

Fulvic acids are relatively small molecule carbon complexes that bacteria can absorb along with their amino acids and chelated minerals. Their larger humic cousins are higher molecular weight compounds that complex with clay and are more accessible to soil fungi. Symbiotic mycorrhizae

and actinomycetes store surplus amino acids and minerals in these stable, high molecular weight carbon compounds so they aren't available to most bacteria and don't reveal their contents on soluble tests. This shows nature's wisdom at work, as humic microbes store future food supplies in the soil like bees store honey in their hives.

Growers may have been taught that all nutrients must be soluble, but nature knows better. Ideally nutrients should be insoluble but available—otherwise they would be lost. The result would impair biological nitrogen fixation.

Potassium Silicate Watering Solution

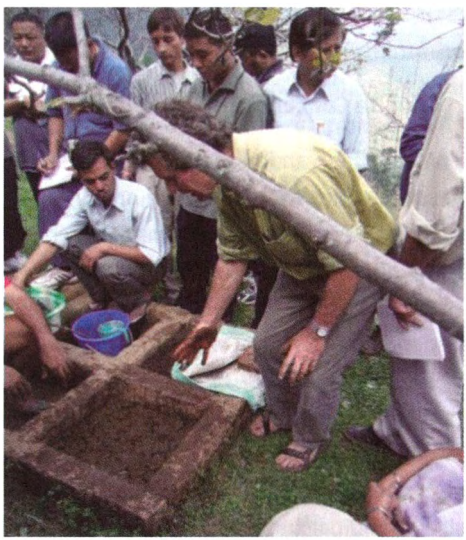
Here is another home remedy that addresses the most common deficiency seen in both agriculture and human nutrition—silicon. This deficiency often makes crops vulnerable to weeds, diseases and pests. It commonly is the result of soil mismanagement—particularly excessive cultivation and artificial nitrogen fertilisation. Here is a watering solution of near universal importance. It helps to make plants efficient and resilient, ensuring strong cell walls, transport vessels and connective tissues. It also improves photosynthesis, assuring protoplasmic density while making plants tastier. Taste, smell and related digestive and nutritive processes play a central role in engaging nitrogen—which means the more you use this formula on your crops and recycle their residues as compost or vermiwash the better you will engage nitrogen.

Used with vermiwash, potassium silicate can be a mainstay in most fertility programs whether for home gardens, market gardens, orchards, vineyards, flowers or herb production. It would even make lawns more resilient to weather extremes while making them smell cleaner and have more shine.

- Burn a large quantity of high silica plant matter and collect the ash. Any silica rich plant material will do. Rice hulls (not bran) are excellent, though hard to burn. Horsetail or dried casuarina herb is also excellent. Sugar cane bagasse or even bamboo ash will work. Mill ash from burnt bagasse is available at some sugar mills at cheap industrial prices and is rich in both potassium and silicon. If silica rich ash is hard to obtain it may help to include half a kilo or so of diatomaceous earth even though it will not contain much potassium.
- In a 20 litre pot simmer 2 - 3 kilos of high silica ash with half a cup of solubor or boric acid in 15 litres of water while stirring for 30 minutes. Measure boron with care as too much can burn seedlings and young plants.
- While still warm, add a heaping tablespoon of biodynamic horn clay and

potentize homoeopathically[56] for 20 minutes.

- Carefully cool, strain and filter the solution. *[hot, caustic]*
- Combine with vermiwash at a rate of 1 cup of potassium silicate per litre of vermiwash. Dilute this concentrate at least half and half with water and apply lightly with a watering can to the soil in the garden, orchard or vineyard.
- This formula can be overdone, so limit applications of combined solution to once a fortnight, or at most once a week, with cabbages, kale, broccoli, pumpkins, squash, sweet corn, cucumbers, capsicums, okra or anything with a tendency to get lush, weak, bug bitten or diseased. For tomatoes, which tend to easily get too lush, the proportion of potassium silicate to vermiwash can be doubled or even quadrupled.
- Residual ash should be recycled via compost or vermiwash production, incorporated into solid fertilisers such as humified compost or scattered on grain, pasture or hay land.



David Hogg leads a biodynamic Cow Pat Pit workshop in Uttaranchal, India. Cow Pat Pit compound is especially prepared to include the influences of the yarrow, chamomile, nettle, oak bark, dandelion and valerian preparations that work with various essential processes involving nitrogen biochemistry.

Application

Generally *Potassium Silicate Watering Solution* (with boron added) should be watered in. Keep in mind when using foliars that boron must be taken up by plant roots to produce sap pressure.

Boron has long been poorly understood while silicon has mostly been ignored despite it being the basis of nutrient transport. Use boron along with potassium silicate and vermiwash as a mainstay in almost any fertility program. Keep in mind these ingredients are all naturally occurring except solubor or boric acid, which are permissible in organic

[56] *This refers to rhythmic shaking (aka succussion) or stirring (potentization) where the creation of a series of alternating left and right vortexes are involved. (see Stirring and Spraying pp 43 - 45)*

certification programs where boron deficiency is documented.

Boron and silicon usually enter plants via actinomycetes and mycorrhizal fungi, which are delicate and easily damaged by the usual rates of salty NPK fertilisers. *Vermiwash* and *Potassium Silicate Watering Solution* feed these microbial symbiotes, increasing their nutrient uptake of calcium, amino acids and zinc.[57]

An industrial version made from potassium bicarbonate and sand was researched by the USDA and found to be the most effective preventative for fungal problems in both wheat and tomatoes.

Growing food should be one of life's most luxurious sensory experiences, brimming with wonderful aromas and flavours.

Why Be Concerned?

We all have an inner urge to realize our potential. Being self-aware, we strive to become more than what we are. Walking our talk takes a lot of energy and our force of personality or strength of character—which we could call guts—comes from how well we combine what we eat with our breath so that we release carbon dioxide (CO_2). Personal energy abundance for us and our offspring depends on how well we harvest carbon in agriculture.

Bounteous energy is required to assemble the complex amino acid chemistry that provides the basis not only for genetics, but also for sensation, desire and intelligence. Building a bridge from thought to action depends on nitrogen's versatile interactions with a wide array of elements between the chemical axes of silicon and calcium. While materialism sees only tangible substance as the source, those who acknowledge higher processes and spiritual impulses still must consider our need to optimize the physical world.

Bone Meal and Bone Ash

Here is where either bone meal or a soluble bone ash extract can provide a bit of phosphorous along with its co-factors to kick off the release of phosphorous from the soil reserve. Bone meal may be available from animal processors who steam clean bones and grind them up as a dry product. Otherwise fresh bones from local abattoirs, restaurants or the occasional road kill can be cleaned up by composting and then burned for bone ash. Bones should never be wasted, and

[57] *Caution: When using this formula in foliar applications, it may be appropriate to dilute the boron tenfold. Used sparingly in foliar and fertigation programs this combination considerably strengthens the silica containment and transport features of everything in the market garden, orchard, vineyard or nursery.*

regardless of how they are obtained it is best to clean any flesh off to avoid objectionable odours. Sometimes knackers process carcasses by cooking the meat off them and then processing the bones. On the other hand waste bones, including animal heads, may be available from abattoirs or processing facilities and they may be ground up with a stump grinder or wood chipper and incorporated into composts. If clean, or once clean, they may also be burnt. Small scale growers may render bones to ash using their wood heaters, or perhaps by open pit burning. Burnt bones may come from almost any source and some burn more easily than others. Once burnt, they can be crushed and phosphates extracted using vinegar and a bit of heat. If a little elemental sulphur is also needed, here is a good place to add it. To jump start the soil's phosphorous process, this crude phosphoric extract can be diluted and combined with vermiwash—ideally with a homeopathic dose of biodynamic valerian flower juice. Application rates will vary according to soils and their needs. Solid residues can be added to composts up to about 5% of the total raw materials, or they can be scattered thinly under fruit trees and flowering shrubs.

Liquid Fish and EM

If fish frames, scales and related wastes are available, grinding these up and fermenting them in water yields a product with a good balance between silicon, calcium and phosphorous along with enough nitrogen to jump start nitrogen fixation in the soil. Be forewarned, this tends to be quite smelly in the early stages and may need some Effective Microbe (EM) culture to stabilize its nitrogen chemistry. Nevertheless, well-digested fish waste can supply all the ingredients needed for nitrogen fixation and phosphorous release.[58]

Activated EM is a complex, synergistic microbe culture of phototrophs, yeasts and lactic acid bacteria. This can be home brewed from an EM Mother Culture using water, molasses and Mother Culture at rates of 20:1:1 up to 40:2:1 to produce a low surface tension, antioxidant microbial solution. On soil or foliage EM can be applied monthly at a rate of 5 L/Ha.

Buying local or regional sources of Mother Culture are advisable, as brewing it is a fairly technical process involving salt and other additives to make a low pH/lactic-acid-stabilized culture. Mother culture is not usually meant for field applications, but is used to on-brew activated EM which emphasizes phototrophs that conserve loose nitrogen and reduce odours as well as correcting various

[58] *See pp 112, 113, Liquid Fish.*

disease conditions.

Humified Compost and Compost Extract

Many imagine compost is simply broken down organic matter that is ready for consumption by plants. All too often compost makers break down wastes with little concern for the complexity and stability of the end product. They even may assume a high soluble analysis of N, P and K is desirable. Unfortunately such soluble products grow better weeds than crops, and they tend to promote leaching and pollute streams and groundwater. If soluble N is high these products often reek of ammonia or other volatile amines. Nature is far wiser. Much like bees, beneficial microbes such as actinomycetes and mycorrhizal fungi store loose nutrients in stable clay/humus complexes where they can be accessed by similar micro-organisms living in symbiosis with crops.

Composts and compost extracts that grow weeds are a worry because weeds are nature's way to sop up loose nutrients when humification has not occurred. Commonly nutrients become soluble during the first three weeks after ploughing down a green manure crop when bacterial breakdown of vegetation runs rampant and nutrients are released.

When we plant crops before the humus builders take over we will get a field of weeds that competes with crops. In composting, the initial 'hot' phase produces simple sugars, amino acids and soluble salts. Humus building organisms clean up this heady brew by tying up amino acids and minerals in large clay/humus complexes that are insoluble but available. Not only do clay/humus complexes conserve fertility, they provide the most beneficial forms of nitrogen. In most soils humus working microbes can be awakened using a humus rich food source such as humified compost. This feeds the right micro-organisms for further humus formation wherever root exudation feeds carbon into the soil food web. At some point re-enlivened soils become self-fertile and self-sustaining as occurs in nature.

Humic and Fulvic Extracts

Microbial activity can be boosted using humic and fulvic extracts from such materials as leonardite, peat or soft brown coal. These extracts can be applied in liquid inject formulas when planting seeds or in transplant drenches. They also may be applied with irrigation. Often in market gardening, as well as with broadacre grains and pastures, these extracts provide a way to feed soil microbes where they do the most good—on new roots. In garden and small farm applications such liquid formulas as vermiwash can be used at planting, but on

large areas such as pasture and field crops these extracts are more economical as soil drenches. While these inputs may be a compromise with self-sufficiency, such formulas can be useful for feeding nutrients such as boron, copper or zinc to the soil food web so that progress toward self-sufficiency can move more rapidly.

Sea Minerals and ORMEs

Unless one lives on or near the ocean, sea minerals—which once leached into the sea from the land—may have to be purchased. Sea minerals is a generic term for the residual liquid left after sodium chloride is extracted from sea water[59]. Most sea salt simply is refined sodium chloride. Only fully evaporated (aka macrobiotic) sea salt contains all the minerals in sea water. Since supermarket buyers overwhelmingly prefer free running salt, the 'sea salt' produced by sea water evaporation is removed after 90% evaporation, leaving behind a dense, oily pot liquor that usually can be obtained in bulk at reasonable prices. At rates from 1 to 5 litres per hectare per year, this bounty of the sea should never be wasted.

Orbitally Rearranged Mono-atomic Elements (ORMEs) occur when large numbers of atoms of an element align their electrons so they resonate as a single atom, becoming superconductors that are virtually weightless as well as difficult to detect. Nuclear physics has only begun to shed light on these elements, despite their seemingly magical properties tracing back to ancient Egypt and Suma.

Large living organisms behave with a coherence that once was thought possible only at the atomic level. ORMEs seem to account for many of these puzzling features of plants and animals which mimic quantum behaviour at the finest atomic level. For example, how can virtually ALL the photons striking chlorophyll molecules transfer their energy into sugar? To achieve such total efficiency they must act in complete unison as waves rather than particles. How can we detect a solution of zinc sulphate at the top of a very tall tree almost the instant it is poured on its roots? These phenomena are best explained by quantum physics.

If large collections of atoms resonate in perfect electronic alignment—as evidence suggests—then theoretically they *should* behave as one, exhibiting super conductivity and virtual weightlessness regardless of how many atoms are included. We see this sort of mono atomic behaviour when we chill helium until

[59] *At 90% evaporation most of the sodium chloride precipitates and the remaining pot liquor contains all the other elements in solution in the sea. Many of the functions of these elements are unknown, even though such elements as fluorine and caesium, which are abundant in sea water, are promising subjects for research. This pot liquor is referred to as sea minerals.*

all its electrons share the same base state and it becomes both a super conductor and weightless. Recent research indicates something similar can occur even with gold, platinum or iridium in living systems that show bio-quantum behaviour.

ORME rich sea water extracts can be obtained by raising the pH of sea water to 10.78 using sodium or potassium hydroxide.[60] This heavy, white precipitate can be separated from the original solution and used in agriculture with results—such as high yield and disease resistance—that often seem startling. Small quantities on the order of 2 or 3 L/ha, are recommended per application with the understanding that this experimental.

Calcium Nitrate and Molasses

Here is an input for where tall, woody annual weeds, such as thistles, amaranths, ambrosias, etc. grow prolifically. Such weeds indicate an imbalance of soluble potassium compared to available calcium. Tipping the balance from potassium back to calcium encourages clovers and other calcium loving plants such as daisies to take the place of thistles and tall woody weeds. This can be done when sowing—or even after weed emergence—by boom spraying 5 kg/ha (5 lbs/acre) of calcium nitrate along with 5-10 litres (2 – 3 gallons) of molasses dissolved in 400 litres (100 gallons) of water per hectare. This amounts to a 3x homeopathic dose. Yet it can shift soil dynamics to inhibit tall woody weeds.

Many organic certification programs prohibit calcium nitrate, and indeed at the conventional rates of 75 to 250 kg/ha this harsh fertiliser is far too salty. However, most organic programs allow trace minerals to be added at considerable dilution in their soluble salt forms as long as soil and leaf tests indicate they are deficient, and it could be argued that this gentle dilution falls within that range and simply adjusts the calcium/potassium balance to encourage beneficial species while discouraging undesirable ones.

Where We Stand

Modern society is fundamentally agrarian. Those things that are amiss—such as selfishness, crime, disease and environmental destruction—are rooted in agricultural practices based on conflict rather than cooperation. The notion that killing solves our problems goes back to the story of Cain and Abel, and murder is just as seductive and unwise today as ever—though hopefully we are more aware

[60] *A large amount of information on this subject can be found by googling ORMEs and Barry Carter.*

of murder's shortcomings today.

Age-old wisdom teaches understanding and forgiveness as the path to perfection. How can we put this into practice? Quantum agriculture comes to our aid. Even the tiniest of changes in dynamic systems can have profound consequences. We have free choice and our choices matter—which is something to keep in mind while growing what we grow and choosing what we eat.

Approximate US to Metric Conversion Table

1 inch	= 2.5 cm or 25 mm	Fahrenheit	Celsius
1 foot	= 30 cm or 300 mm	32°	0° freezing water
1 yard	= 90 cm or 900 mm	68°	20°
1 mile	= 1.6 kilometres	72°	22.2°
1 ounce	= 28 grams	98.6°	37° human blood
1 pound	= 0.45 kilograms	150°	65.5° plucking chicken
55 pounds	= 25 kilograms	165°	74° scalding pigs
1 ton US	= 0.9 metric tons	212°	100° boiling water
1 fluid ounce	= 30 mls		
1 pint	= 0.47 litres		
1 quart	= 0.95 litres	Area	(1 hectare = 2.5 acres)
1 gallon	= 3.8 litres	1 sq. inch	= 6.5 sq. cm.
5 gallons	= 19 litres	1 sq. foot	= 0.09 sq. metres
55 gallons	= 200 litres	1 acre	= 0.4 hectares
220 gallons	= 1000 litres	1 sq. mile	= 2.6 sq. kilometres

El Niño/La Niña

Scientists have long studied the Southern Oscillation—an irregular but periodic shift of warmth between the eastern and western Pacific Ocean. During an El Niño the eastern Pacific warms up off the coast of Colombia, Ecuador and Peru, generally around Christmas. Evaporation sails up the Andes into the high troposphere, shifting precipitation toward the poles. The result is droughts for large parts of world, until cold water replaces what evaporated and shuts the El Niño down. A La Niña occurs when the western Pacific overheats, loading moisture into the lower atmosphere, driving monsoons.

We are used to breaking things down into bits and studying the bits. Systems approaches with multiple variables were considered 'fringe' and ridiculed. Yet, studying weather using single factor analysis is absurd. Computers let us model complex systems with many variables, and things have changed.

Self-correcting weather cycles have kept our climate stable over the last several thousand years, though recent changes may be cause for alarm. From a longer perspective, the world has alternated between glacial and interglacial periods, and the tipping points are obscure. There also were periods where the poles melted and ocean levels were higher. Whether we are headed into an ice age or a warm cycle is uncertain. Chaos theorists use terms like 'strange attractor' and 'butterfly effect' to acknowledge the obscurity of the organizational factors involved, and those who believe everything lapses into chaos offer no help.

How does order arise? We know the atmosphere heats up and expands near the equator while it shrinks at the poles. Around the equator the troposphere is 10 miles deep, while near the poles this shrinks to 5 miles. This means warm air rises around the equator and slides down a sloping path towards the poles where it funnels down the polar vortexes and drives winter storms. Stronger equatorial evaporation means stronger winter storms. More powerful winter storms might make global warming look like global cooling.

Similarly the Gulf Stream and the Japan Current slide down thermoclines toward Norway and Alaska. What if warming of the North Pole shuts down the Gulf Stream? Would this trigger an ice age? Much is unknown, though the Southern Oscillation clearly affects evaporation and rainfall. Managing global weather would require understanding the organizational factors that drive it. Biodynamic preparations make a logical starting point for investigation.

The Paramagnetism Debate

How Can We Find Clarity?

The late Phil Callahan was an etymologist by training, though he was very well educated in a broad range of disciplines. He made some big contributions to eco-agriculture including the realization that insect antennas are tuned to infrared emissions given off by various plants and animals. One of his more controversial contributions was his theory that paramagnetism—weak magnetic force, as exemplified by oxygen—is of major importance to plants. I happen to agree. Unfortunately the pursuit of this theory has led to considerable confusion because ferromagnetism—strong magnetic force, as exemplified by iron—masks paramagnetism. What we can do to improve the detection and measurement of paramagnetism is open to debate. But, I think, for now confusion reigns.

The meaning of paramagnetism, as measured by a PSCM meter, is a matter of debate. Phil Callahan, who I knew and held in high respect, had a theory that highly paramagnetic soils gave very good responses to growth. This is an intriguing theory because oxygen, which is highly paramagnetic, was identified by Rudolf Steiner as the carrier of life force. When we analyse soils we tend to talk about the elements they contain—calcium, magnesium, phosphorous, potassium, nitrogen, etc.—as though they were pure. But insofar as they are any use in agriculture they are never pure and are always found in combination with oxygen as well as other elements. Over dinner at an ACRES convention Phil explained his theory to me along with explaining the difference between paramagnetism (weak magnetism), ferromagnetism (strong magnetism) and diamagnetism (anti-magnetism). This was before the development of the PSCM meter. I've always believed Phil was on to something, although for now I think things have gone somewhat off the rails.

Lee Leitner was an engineer from Atlanta, GA who helped Phil develop the PSCM meter that is in standard use today. Lee tried out the first prototype on my farm, and we tested all sorts of things from a nail, which we knew was ferromagnetic, to my soil, to my local granite quarry dust. The granite dust contained a variety of things including potassium, iron and aluminium, but it mostly was silica which is diamagnetic. We also tested my wood ashes, which we knew would be as high as possible in oxygen, and oxygen we knew was highly

paramagnetic. My soil tested about 130 units [centimetres grams per second or cgs]. The granite dust tested about 170 units, which we reckoned was due to the iron, etc. inclusions since it should have given negative values because of the silica. We tested my local lime, which was about 20 units. The wood ashes went off the scale, which at the time was 2000 units tops. Lee took the prototype back and re-designed it to have a top range of 10,000 units. When we tested the new meter, the nail still went off the scale; but the wood ashes, which were maxed out with oxygen, only tested 2300.

The thing that blew Phil's mind about the whole affair was my soil only tested around 130 pscm units and yet I was growing robust crops of maize with soybeans without any fertiliser. Phil said that was impossible. He reckoned my soil should have tested over 2000 pscm units to be able to do that because soils he had tested in the Amazon which gave similar responses HAD tested that high or higher. I reckoned that my soil was growing robust maize crops because of its high silica levels, which would have dampened the readings for paramagnetism because of silica's diamagnetic effects. Unfortunately the debate came to a halt there as Phil moved to New Mexico and soon thereafter fell into eclipse with Alzheimer's. Shucks. I really admired Phil.

I don't refute that he was on to something because I strongly believe oxygen, which is paramagnetic, is key to soil vitality. But I don't feel the PSCM meter was an adequate way of measuring this. Thus I do not give the paramagnetism readings taken by the PSCM meter any weight in my soil evaluations.

I feel this debate should be continued in the public and I don't think it should reflect adversely on Phil Callahan, who was an agricultural scientist of enormous stature who made huge contributions to understanding energy in agriculture. Phil has always been one of my heroes, and I bought my farm from a woman who raised corn ear worm moth larvae for his pheromone experiments at Abraham Baldwin Agricultural College (ABAC) at Tifton, Georgia. As I said, I feel Phil was onto something very key in paramagnetism because oxygen is such a paramagnetic element. I reckon oxygen is the element that carries organisation, the basis of life, into the chemistry of carbon. But the PSCM meter cannot distinguish between iron and silica to just measure *para*-magnetism. My soil in Tolga, Queensland, Australia, which was over 15% iron in the total test, measured 7850 pscm units. But it wasn't as fertile as my Georgia farm, which measured 130 pscm units. Until we can find a better method of testing, I reckon we should consider paramagnetic readings debateable.

Growing Ginger

Building the Soil Foodweb

Ginger roots normally contain endophytes, which are microbes living in between a plant's cells. This means there is no problem finding the appropriate symbiotic microbial cultures with ginger. The piece of ginger root you plant brings in many desirable species with it. This is also true for garlic, potatoes, turmeric and even seeds like peanuts, pumpkins and maize. These endophytes often involve yeasts and lactobacilli, but they may also include actinomycetes and nitrogen fixing species. Ginger is particularly good for hosting these last two. Virtually all of these endophytic microbes depend on the photosynthesis of the plant itself to provide their energy in the form of carbon rich plant sap.

This means that the surplus sugars produced by a plant and exuded around its roots are the food these beneficial microbes originated with. Ginger as a rainforest undergrowth plant, is very efficient at photosynthesis. In order to make the most of this ginger feature, I have found it best to space my root cuttings 6 to 8 inches (15 to 20 cm) apart in the row with three or four rows running parallel down a 40 inch wide (1 m), heavily mulched bed. I lay off shallow drills, press my root cuttings in, cover lightly with soil and lay on a thick layer of mulch—too easy. At that spacing I get enough root exudate overlap that the soil biology rivals the population density of a major metropolis and there is dense branching along the feeder roots. This close spacing also develops a canopy that—along with the mulch—excludes weeds and provides habitat for many soil animal species living, munching away and providing a continuous stream of freshly digested nutrients.

The Way It Works

The whole arrangement is powered by the fact plants photosynthesize and share a portion of their energy as complex carbohydrates seasoned by proteins, hormones and enzymes given off along the roots. This provides plenty of energy for the mycorrhizae and actinomycetes that solubilize silicon and release calcium, and for the bacteria that solubilize phosphorous and fix nitrogen.

Of course, these fungi and bacteria do not sacrifice themselves and release their nutrients directly to plants. Protozoa and other tiny soil animals eat and digest the silicon and nitrogen rich micro-organisms, releasing their nutrients as amino acids and mineral complexes. Mulching encourages this by providing habitat for the

animals that feed around the roots where water and nutrient uptake occur. Because this is an on-going process around active roots, such plants luxuriate in sucking up their nutrients as freshly digested amino acids and mineral complexes before these decay into nitrates and other salts.

Happily, when plants take up nitrogen as amino acids instead of nitrates their assembly of complex proteins is direct and efficient, and is not watered down by having to process nitrates. Then photosynthesis is more efficient, which makes root exudation richer, which makes microbial activity more robust, which makes silica uptake, calcium release, nitrogen fixation and phosphorous solubilisation more abundant, which ramps up the digestive activity around the roots and feeds plants a richer and richer stream of nutrition in a round robin the limit of which is unexplored. It is doubtful that any form of chemical fertilization can result in higher production, let alone attain the quality of this natural system. Between the plant giving sugars to soil microbes, and the soil food web feeding back complex minerals and amino acids, the plant is giving honey to the soil and the soil is giving back milk to the plant.

I particularly like ginger because it gives a high proportion of the carbon it catches back to the soil. It doesn't waste time growing massive tops, and it enjoys crowding—which results in an unusually high degree of root exudate overlap.

In the pictures that follow I mulched with my lawnmower clippings, which I used as thin applications, along with sugar cane mulch, round bales of grass hay or shredded tree bark. Since it was dry at planting, I irrigated, along with occasional doses of liquid humic acid in a watering solution as a mycorrhizal booster. And I applied all the biodynamic preparations including horn manure, horn silica, horn clay and cow pat pit (aka barrel compound). Not only did I stir and spray these, I also applied them 24/7/365 using a field broadcaster. After all, I was working with a nearly dead soil that had a long ways to go to come alive.

What Ginger Can Do

This first picture (above) shows some of my original planting material from a biodynamic farm (Aracaria Farm) in Mullumbimby, NSW. It had rich, fuzzy, actinomycetes growing out of its roots and extending through the soil. These

microbes are good at eating into the clay (aluminium silicate) in the soil to release silica, which is what makes their hairs such good transport vessels. They also have the virtue of unlocking calcium and other nutrients held on the colloidal clay/humus complexes in the soil, releasing a storehouse of minerals while growing a hairy forest teeming with bacteria and protozoa.

To my way of thinking, planting ginger seems like the simplest way of culturing the very microbes I want to see thriving abundantly in my soil—and I then can let the most vigorous strains for that soil and locality predominate.

Recipes and Pictures

Most of the pictures that follow show my crop at harvest—grown under mulch with occasional irrigation which included biodynamic preparations and a few applications of humates along with a bit of kelp and fish on a soil that simply wasn't cooking prior to this planting. See how dense the clusters of ginger corms are. The short distance between nodes indicates a rich silica content, which relates to both herbal potency and good keeping qualities. This is ginger of rare nip that makes quite a potent tea when boiled, or hot, spicy curries and stir fries.

I invested in a small deli slicer and pickled quite a bit as sushi ginger using a rice vinegar/apple cider vinegar, honey, salt, pickling spice and red shiso leaves. At the rate I've gone through it I wish I had put up three times as much—sushi ginger, spicy and delicious. The rest of the crop has kept for four months in my garage without refrigeration. At the time of writing I am replanting in a new bed.

While the ginger was excellent, the big deal is what it did for the soil. I like to farm to improve my soils rather than depleting them, and ginger surely does this.

In the tropics I followed the ginger harvest with maize, which isn't suited for winter. Yet the maize got off to a bang of a start, survived light frosts and made a modest crop--which can only happen when the roots are colonized by the best biology from emergence onward.

All garden work in this series of pictures was done with hand tools on odd weekends. The ginger harvest and subsequent cultivation of the bed was done with a pitchfork rather than a shovel—that's how workable this soil became.

The ginger, dug and laid out

View from the other end

A couple close ups showing the ginger clump density, a result of superb silica uptake

The soil afterward

Ginger roots with dense branching

Beyond Biodynamics

Agriculture As It Might Be Taught

Much that masquerades as understanding in biodynamic agriculture has been an overly simplistic interpretation of Rudolf Steiner's eight agriculture lectures. Little attention is paid to the fact that Steiner was in failing health and in a great hurry. Though he seems to have intended to give a second set of agriculture lectures, he was unable to. This left many seeming contradictions unresolved, and a great deal remained in the realm of mystery. For example, Steiner described the agricultural organism as analogous to a human being standing upside down and buried in the soil up to the diaphragm. He referred to cosmic substances and earthly forces as working in the above ground 'metabolic-limb' or belly region of the agricultural organism while earthly substances and cosmic forces worked in the below ground 'nerve sense' head region. But the Agriculture Course does not explain cosmic and earthly forces and substances. We should realize Steiner was speaking to an audience familiar with these concepts from his earlier medical lectures. Steiner's agricultural concepts are far better explained in the twenty nine lectures of his first and second medical courses delivered in 1920 and 1921.

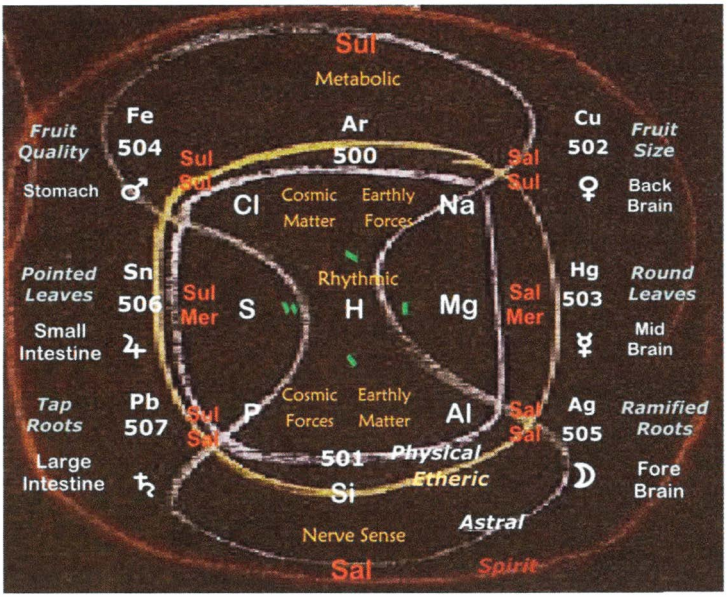
Glen Atkinson provides a clearer picture of Steiner's agricultural insights in his recent books, ***The Energetic Activities*** and ***Alchemical Chemistry***. These grew out of Atkinson's development of homeopathic biodynamic remedies that can simply be added to farmers' spray tanks and fertigation systems without the time consuming difficulties of conventional methods. Atkinson integrates Steiner's medical and agricultural lectures with astrology, alchemy and a new gyroscopic view of the periodic table of the elements with its levels of chemical, physical, etheric, astral and egoic substances and processes. Time after time my knowledge of biochemical reactions has confirmed that Glen's conclusions are spot on.

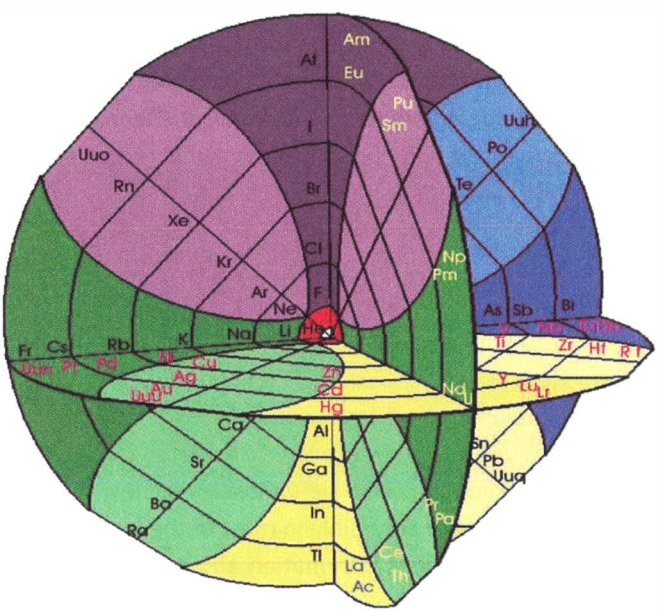
A more in-depth development of agricultural wisdom requires a book by itself. No doubt, someday we will have that. However, Atkinson's diagrams, reproduced on the following pages, should give some indication of how much more can be gained beyond what is presently accessible in most of the biodynamic literature.

Glen Atkinson's books, as well as information about BDmax homeopathics can be downloaded from his website:

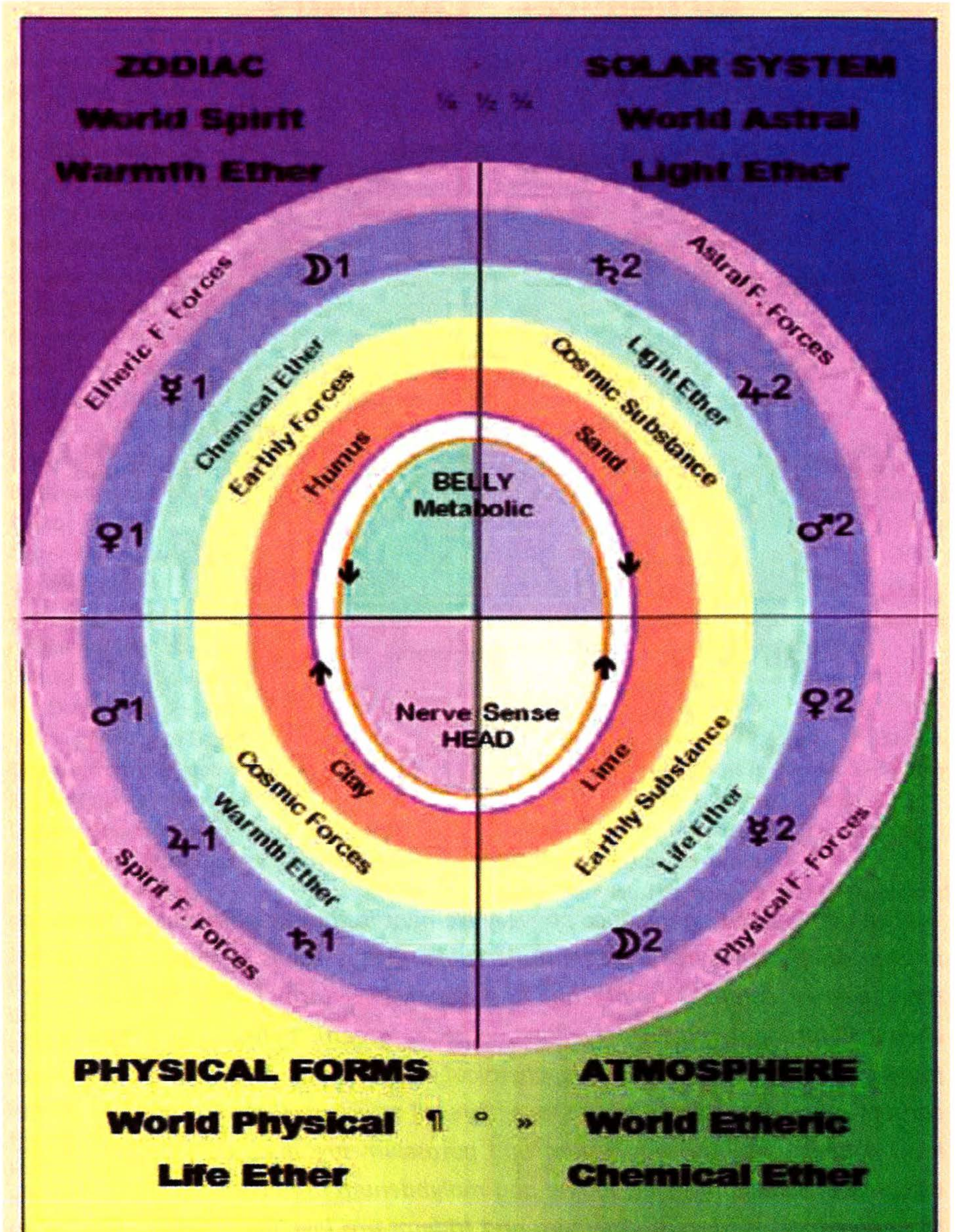
See: www.bdmax.co.nz/home/article/5 or www.garudabd.org/content/books

Alchemical Chemistry Summary

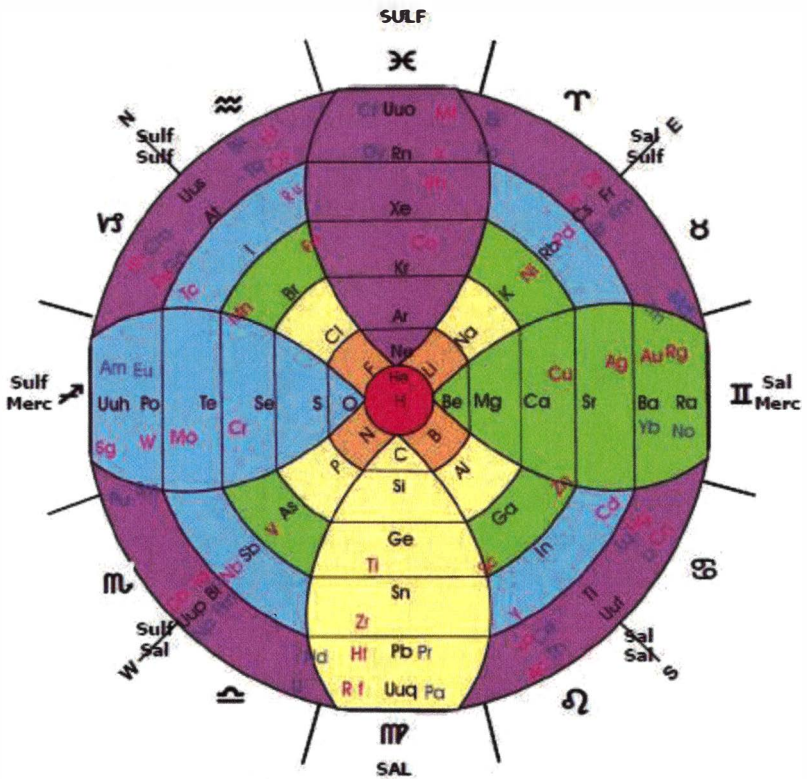




3D Gyroscopic Periodic Table



The Energetic Activities In Biodynamic Agriculture: Rudolf Steiner's Agriculture Course, edited by Glen Atkinson



The activity and significance of every element in the periodic table is revealed in Glen Atkinson's ***Gyroscopic Periodic Table****. Everything is arranged relative to the universal compass points and the dimensions (arms) into spiritual (red), chemical (orange), physical (yellow), etheric (green), astral (blue) and egoic (purple) dimensions. For example, chemically we are carbon based life forms. So carbon, allied with silicon, forms our physical structure (yellow). At the etheric level copper, calcium, magnesium and potassium are involved (green). At the astral level selenium, silver, iodine and molybdenum are involved (blue). And at the egoic level lead, gold, mercury and iridium are involved (purple). Opposite silicon on the vertical axis are the Nobel gasses, neon, argon, krypton xenon and radon. Opposite calcium on the horizontal axis are oxygen, sulphur, selenium, tellurium and polonium.*

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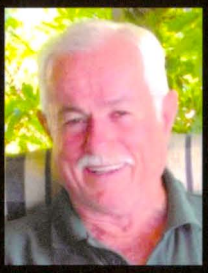
Quantum Agriculture

Biodynamics and Beyond

Joel Salatin says: Beware you faint hearted and conventional thinkers. Hugh Lovel brings biodynamics to a place of practical application, which challenges the very essence of status quo paradigms. Now I have a clear, practical guide to hand anyone who asks "What is Biodynamics". Thank you, Hugh.



Hugh Lovel is a farmer, multi-disciplinary scientist, and teacher of soil science, biodynamics and Quantum Agriculture. Author of *A Biodynamic Farm*, his articles appear in periodicals such as *ACRES USA*, *Acres Australia* and *Biodynamics*.

Hugh's first mentor, Peter Escher, was Ehrenfried Pfeiffer's farming partner. Hugh started the first CSA in Georgia and hosted a dozen Southeast Biodynamic Conferences. With over 30 years experience farming and biodynamic preparation making, he migrated to Australia in 2005 to teach, consult and write, and is committed to implementing Rudolf Steiner's imperative to " . . . impart the benefits of our agricultural preparations to the widest possible areas of the entire earth."

He aims to raise the level of scientific understanding in biology and agriculture where the intriguing rules of quantum physics are by far the best explanation of how living organisms interact with the soil as well as the wider universe. He and his wife, Shabari Bird, reside in the US and Australia.

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