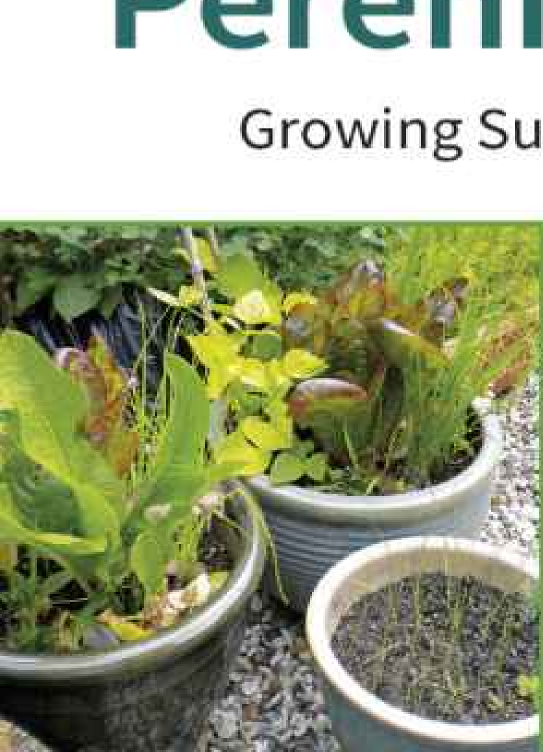
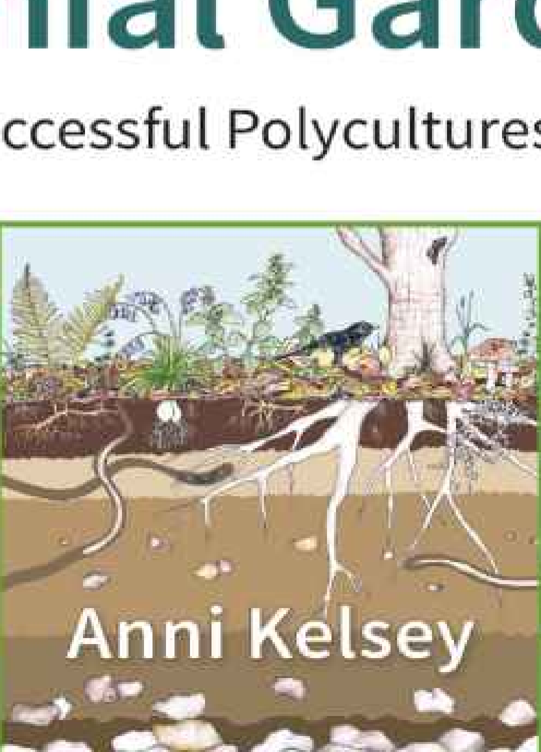
EDIBLE Perennial Gardening

Growing Successful Polycultures in Small Spaces





Anni Kelsey

EDIBLE PERENNIAL GARDENING

Growing Successful Polycultures in Small Spaces

ANNI KELSEY

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The Author

Anni Kelsey has been aware of environmental issues since finding a Greenpeace leaflet at school in 1972. She studied Geography and graduated from Aberystwyth University with a first class degree in 1990. This led to research and project management work in economic and community development and urban regeneration schemes. Looking for something more meaningful and life affirming she then trained in reflexology, Bowen technique, and nutritional medicine and says, “I have learned how to keep myself and my family very healthy!” Her passion lies with forest gardening, permaculture and The Transition Movement. Anni currently works as an administrator, has two grown up children, and spends her spare time outside in the garden or countryside, reading, researching and writing.

This book is dedicated to its readers

Acknowledgements

Many people have contributed to this book without being aware that they have done so. They are the writers and bloggers that I have been avidly reading. To undertake research and complete this project I have needed much more than mere technical details of rare and unusual plants and seeds, where to buy them and how to grow them; I have needed inspiration. In particular I have found it in the blogs of people who are looking into the future and working out in very practical ways how they can make their bit of difference. Whether by living closer to nature, growing their own food, helping their communities in Transition, living by the principles of permaculture – I have found masses of inspiration which has been invaluable to helping me focus on the task of working out how to grow an edible perennial garden in the context of a changing world.

A massive thank you must go to the team at Permanent Publications and in particular to Maddy and Tim Harland who live by the ethics of the permaculture message that they have done so much to spread. I am indebted to Maddy's recognition of the potential for a book about perennial vegetables and her continuing enthusiasm and support throughout, and particularly thank Tim for his meticulous approach and eye for detail.

I am indebted to Emma Lawrence who has produced the drawings contained in this book. Starting from my basic and scrappy sketches she has done her own research into the topics illustrated and with immense care and thoughtfulness turned them into lovely pictures that show exactly what I had hoped for.

It has also been good to have the support of friends and family who have taken such an interest over the past few years.

Most importantly there is my beloved partner Pat, who makes all the difference to everything. She has given me never ending support and encouragement. In the early days (when it was not at all clear that the project would be as successful as it has been) it must have been a trial to see her once respectable garden turned over to riotous polycultures which included dandelions and nettles. However she has just reminded me that it was her idea to extend the area under cultivation to give more space for my experiments! She has also helped to find imaginative ways to cook and eat the unusual foods that now grace our table.

FOREWORD

Learning to produce food from perennials is a matter of critical importance for the 21st century. Perennials sequester carbon and help slow climate change, and can prevent erosion, slow and infiltrate rainfall, and reduce labor and inputs. Growing those perennial crops in polycultures adds even more benefits, and can give birth to productive novel ecosystems in our farms and gardens.

For those of us in cold climates, however, there is much to learn before these systems are ready for scaling up. Few nurseries and seed companies stock perennial crops (Kelsey lists many such sources). Learning to grow and build polycultures around perennial food plants can be difficult. Perhaps the hardest thing is learning to incorporate these crops in our diets on a daily basis.

What our movement needs now is to hear the stories of the innovative growers who are learning what perennial crops grow well for them, how they are managing them, and how they are combining them in polycultures. Anni Kelsey's ***Edible Perennial Gardening: Growing Successful Polycultures*** is filling this important need.

Kelsey has almost a decade of experience growing perennial vegetables in polycultures. She reports on her experiences – what grows easily, what is killed by frost, what the slugs and cabbage moths go after. Permaculture is sometimes accused of oversimplifying and making it all sound too easy. Here Kelsey provides the antidote, sharing mistakes and failures in the context of her overall success in growing a diverse blend of long-lived vegetable crops and companion species.

Particularly of value are her thoughts on managing for balance in polycultures, and the importance of monitoring and guiding succession in the edible perennial garden. These observations come from real personal experience and are invaluable to all of us in this movement.

Even better, Kelsey has tracked labor by month and yields. To my knowledge this is the very first time anyone in the movement has been able to say how many kilograms of perennial food she produced with so many hours of labor. I'm most grateful to her for this contribution to our movement and hope she will inspire others to do the same.

Eric Toensmeier
Author of ***Paradise Lot and Perennial Vegetables***, co-author of ***Edible Forest Gardens***
Holyoke, Massachusetts, USA
October 2013

INTRODUCTION

Anticipation

Looking towards a sustainable future when a polyculture of perennial vegetables is as familiar a feature of our gardening landscape as the conventional vegetable patch.

I have always loved gardening. It is one of my very favourite things. However I used to feel that at best I was only just keeping on top of things, the garden always had more energy to put into growing than I did to put into its control, and it never took a day off. So it was in the summer of 2005 as I once again hacked back the excessive growth in the shrub borders that the thought struck me how good would it be if this exuberant greenery was all edible? Clearly the garden was capable of producing vast quantities of greenery, would it not be wonderful if I could eat it? What a lot of work it would save!

Allowing the whimsy to take flight I imagined a garden of plenty where the vegetables regrew each year and all I would have to do would be to go out and gather them. I am a bit prone to fanciful notions but thought I would check this out anyway and after a bit of internet searching I was reading about edible forest gardens. I was hooked.

What I read about that evening enchanted me. Imagine a forest of food, a place where food virtually grows itself with edible fruits, nuts and leaves growing all around. Who wouldn’t want one? A place of serenity, beauty and fertile bounty where balance is achieved and the plants are diverse and healthy. Well chosen and balanced plantings would reduce upkeep to a minimum and best of all many of the food plants in this magical place would be perennials returning year after year. Was this merely a utopian dream or a whimsy? No, this is real. Gardens like this, designed by people, but directed by nature are full of surprises.

Although forest gardening captivated me instantaneously I have been following the initial dream for nearly a decade now, chasing it down into a reality that I can see and eat. I have been on a journey of discovery and change in the course of which I have learned so much that is exciting, and experienced a revolution in my view and understanding of many things.

The one drawback that I could see initially in the concept of forest gardens was that without sufficient room to grow more than a few trees, there did not seem to be much choice of perennial foods. I was particularly interested in vegetables, but at that time the choice was rather limited and not that exciting. Thus began a quest to search out perennial vegetables — looking for any that would be useful, interesting and palatable. I hoped what I found might provide a viable alternative or addition to established vegetables and that they would come up year after year just for the picking, with minimal input from me.

This book is the result; it is the book I would have liked to have had in my hand the evening I first read of forest gardening. I wish I had known then what I know now — that perennial vegetables do exist and can be grown without difficulty. I believe that they are potentially so useful I wish I could transplant what I have learned into the heads of all gardeners.

On the journey I have also learned to garden in a way that is about collaborating (co-labouring) with nature and not in any way about control over her. I initially intended to write primarily about the perennial vegetables themselves, but as it has turned out they are perhaps best introduced and explained in context. Therefore I have begun with information about some of the pioneering approaches to collaborating with nature, about healthy soil and biodiversity. The perennial vegetables are introduced and explained in the context of my experiments and how I have learned to grow in polycultures. This is real life and of course things did not always go according to plan; I have not hidden my mistakes as each one teaches something.

Both perennial vegetables and growing in polycultures are likely to be unfamiliar to many people; but they are well worth trying out and integrating into your garden too. You don't need much space, or time, or any particular expertise. As with any new endeavour you do need some patience and ideally becoming more sensitive to how nature works will really help.

I am thrilled with the results of my experiments with both perennial vegetables and polycultures. There are other perennial vegetables that are not included here as I have focussed particularly on those that I have had the best results with. I think that once you have the concept established and have some experience of growing polycultures that they can come in an almost infinite variety. Mine now include other more conventional vegetables that can be grown as virtual perennials, as well as wild flowers, herbs and fruit bushes.

In one sense this will never be a finished work but it has reached a point where there is sufficient information of interest and significance to seek to share with a wider audience. The techniques proposed here are not set in stone and just as I have experimented to find what works for me I hope that other gardeners will experiment with perennial vegetables and polycultures.

I hope that I have produced an interesting introduction to an as yet unfamiliar topic. Perennial vegetables deserve much more attention. They can provide reliable harvests through much of the year for little work, and when grown in polycultures according to natural principles they help build fertility and enrich local ecosystems. My hope is that you will be inspired to start experimenting too.

chapter 1

SETTING AN OBJECTIVE

To find and grow as many perennial vegetables as possible

Despite initial disappointment, the idea of perennial vegetables had so possessed me that I could not give up without finding out if my dream was possible.

Starting points

It is becoming clearer daily that we live in uncertain times. One aspect of this uncertainty is increasing food prices and I am therefore sure that I am not alone in feeling an instinct to grow at least some of my own food. I have long harboured a secret envy of those gardeners who can bring forth a bountiful harvest from a beautiful plot but my previous attempts to grow vegetables have been short lived, somewhat half hearted and less than successful. Loving gardening does not make me anything other than a very average gardener, either before I began this project or now, therefore anything I can do, anyone else can also do. I was probably first attracted to growing perennial vegetables because they sounded easy and trouble free; and by then experience had taught me that this was likely to be the only kind of food growing I might succeed with – if I could find out what to grow and where to get it from.

Happily perennial vegetables are sufficiently robust to withstand my less than refined horticultural skills and also the vagaries of my garden, which is hardly ideal for ‘normal’ vegetables any way. Once I had understood the theory I began to search for and experiment with perennial vegetables and out in the garden the polyculture patches are burgeoning with life! I have spent long hours on the internet searching out information, tracking down perennials, many of which were not available in the UK seven or eight years ago. I have had to acquire at least a modicum of competence in raising plants from seed, although some have defeated me every time. However once the polyculture patches became established things began to fall into place and whilst there has been both triumph and disaster I have found it an easy, enjoyable and labour saving way of growing food.

Be realistic but push the boundaries of possibility

Although I would have dearly loved to grow a large scale forest garden, I was of necessity, limited to the plot round the house. Most of the garden is in front of the house being approximately eleven metres by thirteen at its widest points. Most of this was and remains conventional lawn with shrubby edges and a number of small trees. The ‘back’ garden is actually to the side of the house and is smaller than the front. Figures 1, 2 and 3 show the position of the early polyculture patches within the garden as of 2011.

The first polyculture patch was a small bed in the back garden which started out measuring about two metres by three. For years it had been home to a rampant hazel tree, an outsized conifer and a monster berberis. In an attempt to tame things the conifer and berberis had been removed, the hazel substantially reduced and the area replanted with shrubs and ornamentals beside a new timber deck just three months before I learned about forest gardens and began to hatch other plans.

This felt incredibly frustrating and I began to sneak vegetables in amongst the shrubs. Before I tracked down some perennial vegetables to begin experimenting with, these were annuals. The slugs won hands down eating everything in sight. The shrubs I had chosen did not like the site either and most of them withered away and died. Over the coming couple of years as I began to locate perennial vegetables this unpromising start metamorphosed into a delightful polyculture. I did not really know what I was doing to start with and gradually I ‘stole’ more bits of the garden for polyculture experiments. It therefore developed in a very piecemeal fashion with the initial patch creeping out by degrees and a couple more patches started.

The second polyculture bed is in a shady corner in the back corner of the front garden measuring approximately five metres by four. Until autumn 2010 it had a goat willow in the corner (which no doubt took up a lot of fertility and water), plus an existing small apple tree at the back. Although it had been ‘lawn’ it is naturally so damp that grass would not actually grow over most of it and there was some other ground cover that I have never identified masquerading as grass. Bounded on one side by a fence and the neighbouring property and on another by a wall separating front and back gardens, it is quite a shaded spot. Sunlight is mainly early in the morning or late evening during the summer and even then it is filtered through tall trees. It is not what would conventionally be thought of as a vegetable plot, but I was desperate!

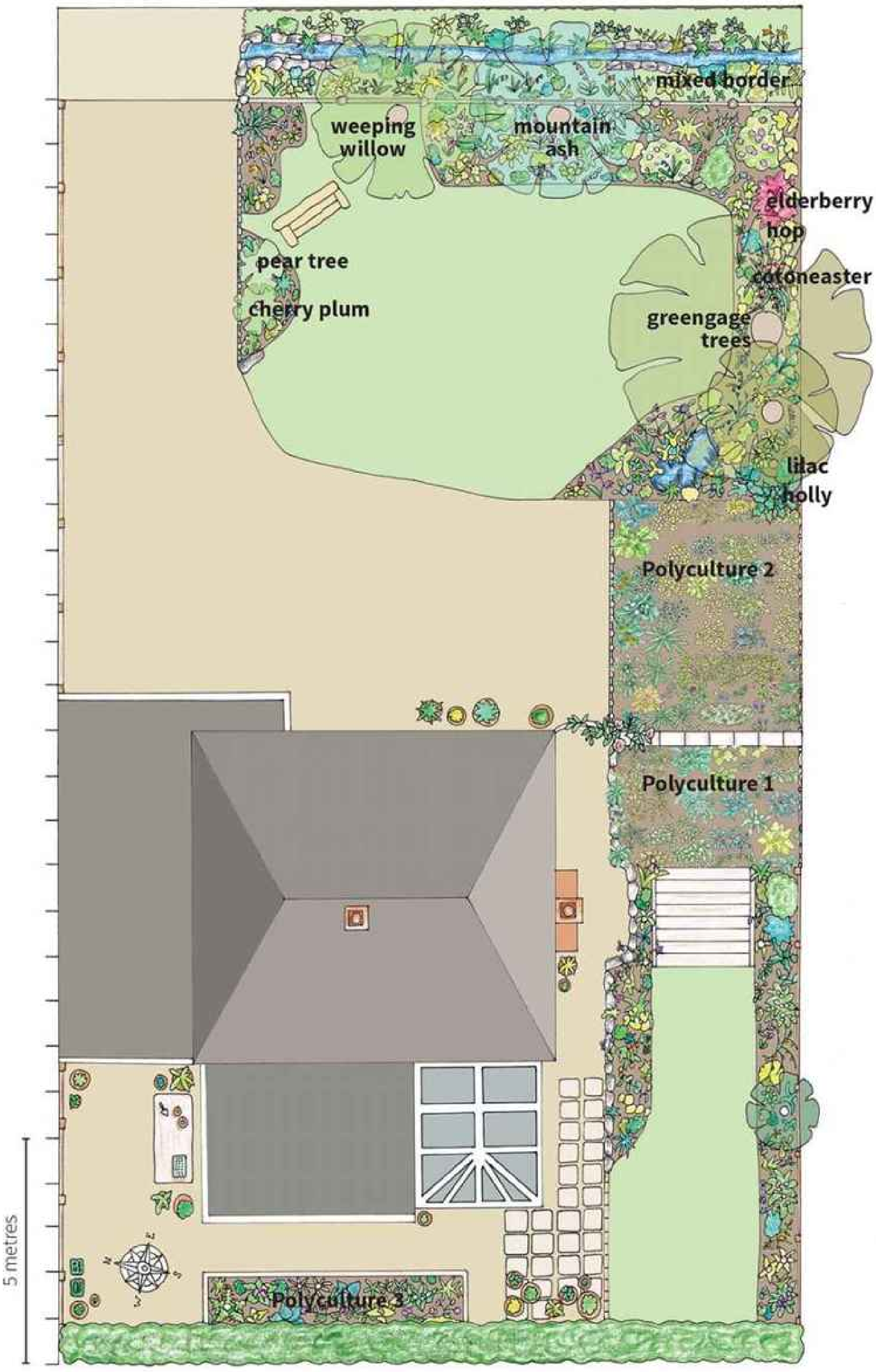

mixed border
weeping willow
mountain ash
elderberry
hop
cotoneaster
pear tree
cherry plum
greengage trees
lilac
holly
Polyculture 2
Polyculture 1
Polyculture 3
5 metres

Figure 1: The whole garden showing the polyculture patches situated either side of the wall dividing the front and back gardens.

Figure 2: The first polyculture patch situated in the back garden and home to a diverse polyculture of perennial vegetables.

KEY

Figure 2: Back Garden

1. Climbing rose
2. Walking stick kale
3. Grape, grown from pip
4. Nepalese raspberry
5. Raspberry
6. Blackberry
7. Cherry tree
8. Miscellaneous kales
9. Yams
10. Blackcurrant
11. Fennel
12. Asparagus
13. Variegated Daubenton's kale
14. Field beans / broad beans
15. Groundnut

16. Clover
17. Welsh onion
18. Yacon
19. Nine star perennial broccoli
20. Wild beet
21. Wild leek
22. Spinach mediana
23. Asturian kale
24. Green Daubenton’s kale
25. Hazel
26. Wild strawberry
27. Clove pink
28. Buckler leaf sorrel
29. Mixed onions, ground cover, rocky edge
30. Feverfew
31. Perennial leek
32. Chick pea
33. Sweet cicely
34. Tiger nut
35. Scorzonera
36. Oca
37. Buffalo currant

Figure 3: Front Garden

1. Field beans / broad beans
2. Oca
3. 1,000 headed kale
4. Bronze fennel
5. Maximillian sunflower
6. Pink clover
7. Asturian kale
8. Stinging nettles
9. Nine star perennial broccoli
10. Earth nut pea
11. Groundnut
12. Jerusalem artichoke
13. Miscellaneous kales
14. Holly
15. ***Ceanothus***
16. Mixed edge of ivy, wild strawberry, herb Robert, mints, honeysuckle, creeping Jenny, oxlip, ***euonymus***, wild raspberry, wild violet, ***vinca***, wild garlic, hairy bittercress, foxglove, three cornered leek
17. Purple sprouting broccoli
18. Wild rocket
19. Wild chicory
20. Land cress
21. Skirret

22. Yams
23. Chinese artichoke
24. Marjoram
25. Asphodel
26. Earth nut pea, French beans, shallots, Chinese artichoke
27. Spinach
28. Red veined sorrel
29. Blackcurrant
30. Apple tree
31. Raspberry
32. Leeks
33. ***Eleagnus***
34. Wild strawberry
35. Three cornered leek and wild garlic
36. Sweet cicely
37. ***Pyracantha***
38. Gooseberry Inbetween plants are: dandelion, dead nettles, sweet woodruff, cleavers, herb Robert, self heal, bluebell, crocus, daffodil

Figure 3: The second polyculture patch which is slightly larger but shadier and situated in the front garden.

The first polyculture patch is the area of green behind the decking (May 2011).

The second polyculture patch in the back corner of the front garden (May 2011).

A narrow strip at the back of the garden pressed into service as the third polyculture patch (May 2012).

The third bed is a short narrow strip no more than a metre wide behind the kitchen window bordered by an old established privet hedge. Other parts of the garden have also been pressed into service. Random vegetables have appeared in flower beds and in odd shady corners. Some have worked out others not, but often the outcome has been opposite to my initial expectations. I have found polycultures are quite addictive and in spring last year the back lawn was taken up to make more room for growing.

Clearly there is scope to plant polycultures almost anywhere – in a very small space or equally to expand to fill a very large space. Anyone sadly living without a garden or access to land can grow them in pots, though it is harder to meet their requirements for adequate nutrients and water in such confined spaces. Details of some ‘potted polycultures’ are given in Chapter Ten. I have also attempted to push the boundaries by experimenting by growing ‘normal’ annual vegetables as perennials (see Chapter Six).

Definitions

Most gardeners are familiar with the terms describing habits and life histories of plants but for anyone who is not here is a quick outline. Annual plants flower and set seed in their first season, then they die. Most food plants the world over are annuals, but this was not always the case. Biennial plants flower and set seed in their second season. Some food plants are biennials but are used in their first year. Carrots, beetroot, swede and parsnip fall into this category making them effectively annuals.

In contrast perennials live on for more than two years. Local conditions of climate, soil and seasons determine where specific perennials will grow well. Apart from fruit trees and bushes very few of our main food plants are perennial, asparagus and globe artichoke being perhaps two of the best known perennial vegetables.

What is special about perennial vegetables?

- Perennial vegetables are reliable performers and producers. Obviously they are not totally indestructible, but their proven durability is reassuring and once established they can last for years.
- Once established they need little care compared to annual vegetables.
- Very little (if any) physical labour is required to establish and maintain them in a polyculture, making them eminently suitable for anyone with little time or energy.
- Some perennial vegetables are wild vegetables or have not moved far from their wild origins. They are often resilient and adaptable plants and can be grown on land that annual vegetables would despise. Many of mine are, of necessity, growing in semi shade and some are in total shade. They have enabled me to make the best of the conditions I have and for that I am eternally grateful.
- I have had no need for any fancy gadgets and gizmos beloved of some gardening magazines and colour supplements.
- Perennial vegetables are mainly productive during the spring and autumn and to some extent the winter. There is something of a lull in the warmer summer months. This gap provides an opportunity for including any summer favourites amongst the perennials or tending to a conventional vegetable patch during that

time, or safely going on holiday without fearing the perennial vegetables are in mortal danger.

- Plants that remain in situ through the year contribute to soil fertility through the 'live food web' whereas the bare soil of an annual vegetable patch can lose fertility (see Chapter Three).
- A diversity of plant heights and shapes helps support increased biodiversity.
- During the course of experimenting with perennial vegetables and writing this book we seem to have experienced a series of extreme weather events – in Shropshire where I live we have had several extremely wet, cool, dull summers from 2007 to 2009; two very severe winters – 2009-2010 and 2010-2011; a very dry summer in 2011 followed by a very, very wet one in 2012 and then a record breaking period of snow and extreme cold in spring 2013. Such changeability makes any form of gardening challenging but overall the perennial vegetables have held on remarkably well. It would not be realistic to expect everything to cope with every extreme of weather and there have been some casualties such as the kale that not surprisingly froze to death nearly totally encased in frozen snow for weeks last winter.
- Nobody can predict with any certainty the precise way that climate change will impact on weather over the coming years, but if we are to experience increased diversity and extremes perhaps having an increased diversity of food plants growing in our gardens is one way to help mitigate the impact.
- Growing perennials in polycultures brings additional benefits which are described in later chapters.

I would never claim that perennial vegetables are a replacement for annual vegetables but I am sure they have a significant role to play in the food growing of the future. They are not show stopping celebrities but reliable performers that are immensely rewarding to grow and eat.

Are there any disadvantages?

- At present some perennial vegetable seeds are undoubtedly more expensive than those of their annual cousins. Sometimes seeds are a one-off expense as some species can be propagated from saved seed.
- Perennial vegetables are not often obtainable through the major seed and nursery suppliers. However even though some of my plants and seeds have been obtained from Europe this is not difficult to do and Appendix Two gives details of the suppliers I have used. I am quite pleased that perennial vegetables are a niche in the horticultural market not filled by big corporations and much prefer to buy from small, independent companies.
- Cool temperate climates (as in Britain) do not support perennial fruiting or podding vegetables. If you want to grow things like perennial beans or gourds and squashes you will need to move to somewhere suitable like California or Hawaii.

Find and grow as many perennial vegetables as possible

Selecting the best perennials for your own circumstances may take some trial and error. My initial experiments began with plants such as Good King Henry, lovage and salad burnet. I did not like any of these and nearly gave up at this point. I don’t want to malign them though, they have their place – as in a forest garden where there is plenty of room for them – and where they undoubtedly bring a host of benefits, and some people may well like them. Despite initial disappointment the idea of perennial vegetables had so possessed me that I could not give up without finding out if my dream was possible. I continued searching for perennials that would work for me and decided to track down seeds or plants of every variety I possibly could to see if they would grow in my garden and what they tasted like.

Eventually this ambition meant that I was almost overwhelmed with a host of different plants to experiment with. There were seedlings everywhere and young plants bursting out of pots with no designated place to live in the vegetable patch. I found out what I should have anticipated from the outset – that my lack of skills and experience caused a good deal of failures. Growing a lot of new plants, all of which were precious, in a very limited space and fitting this in between work and all the other demands on time has been challenging. Some plants inevitably did not get the care they needed and deserved; and I have not yet been able to try absolutely all the plants that I would have liked. But at least this is a reflection of real life and the really exciting thing is that despite these disadvantages it works!

Pots and seedlings galore in the spring sunshine (April 2011).

I am completely indebted to Ken Fern and his Plants for a Future database. * Without this monumental reference I would not have been able to even begin the background research (other books and websites that have useful information about perennial vegetables are listed in Appendix Three). At the latest count I have experimented with somewhere in the region of sixty perennial or potentially perennial vegetables. My experiments will no doubt continue but for the purposes of collecting things together for this book I have identified the perennial vegetables that I have found to be most useful.

Although many perennial vegetables are robust and reasonably easy to grow, some species require more care in the sowing and / or establishment and some have narrower tolerances for soil pH, light and water than others. The perennial vegetables I am recommending have been successfully and happily grown in my polycultures. I hope these conditions are sufficiently representative of conditions pertaining in many gardens in the UK and that therefore they might realistically be expected to thrive across most parts of the UK and also similar cool, temperate climates in other parts of the world. Those that I tried that did not produce good results are detailed in Chapter Six as they may well fare better in different soils and with drier and sunnier locations than I can provide.

Principles

I started with perennial vegetables simply hoping to find easy ways of growing food. Over time this aim has matured and ultimately evolved into an absorbing project and this book. It took time to fully unfold what was needed and could be achieved, but with some hindsight I can now define a set of core guiding principles and aims.

Conserve energy

It is estimated † that about 10 times more energy is needed to produce food in what has become the conventional fashion than is realised by eating it. Surely for any form of food growing or production to have a chance of being sustainable in the long term it must drastically improve on this horrifying statistic.

I have borne in mind the calorific value of the vegetables I grow, or more often the likely value, as many are not included in standard nutritional tables. Leafy green vegetables are low in calories therefore it makes no sense to me to spend physical effort producing them. Ideally they need to be available to just pick off the plant on a more or less permanent basis and perennial greens fit this very well. More calories are potentially derived from roots and tubers that are energy stores for the plant, although some like Jerusalem artichokes are stores of sugars that are not digestible and therefore their calories are not available. Either way, the less energy put in to the garden the better, you have more time, nature gets to do more of the work, energy is saved going shopping and less needs to be grown within a system that is frankly mad.

As a consequence my first aim is **to use as little energy as possible**. As an organic gardener anyway this clearly includes not using artificial inputs like fertilisers and pesticides, **but equally I wanted to put as little personal physical effort in as possible.**

Nurture and cherish a healthy and fertile soil

Soil is an immensely precious resource. I am in awe of this darkened realm which ultimately supports all life on the planet. This was not something I knew or understood to begin with; following natural principles for supporting soil health is fundamental to my gardening whether it be for vegetables or flowers and shrubs.

Conserve water and moisture

I water seedlings until they are planted out and established. Otherwise watering only happens under exceptional circumstances – after long periods without rain and when plants are starting to wilt. In practice it has only been during the unusually dry summer of 2011 that I have had to regularly water the polycultures and even then it was only the green vegetables in sunny places that needed it. High volumes of organic matter have built up in the soil helping to retain moisture, as does mulch on the soil surface and for the most part this keeps the polyculture beds sufficiently damp through normal dry spells.

Grow polycultures

The theory and practice of polycultures is covered in Chapters Four, Eight, Nine, Ten and Eleven. Environmentally and ecologically this way of growing is extraordinarily beneficial. It provides diverse habitat niches which nature fills with networks of life which in turn contributes to the overall health and fertility of the patch and the surrounding environment.

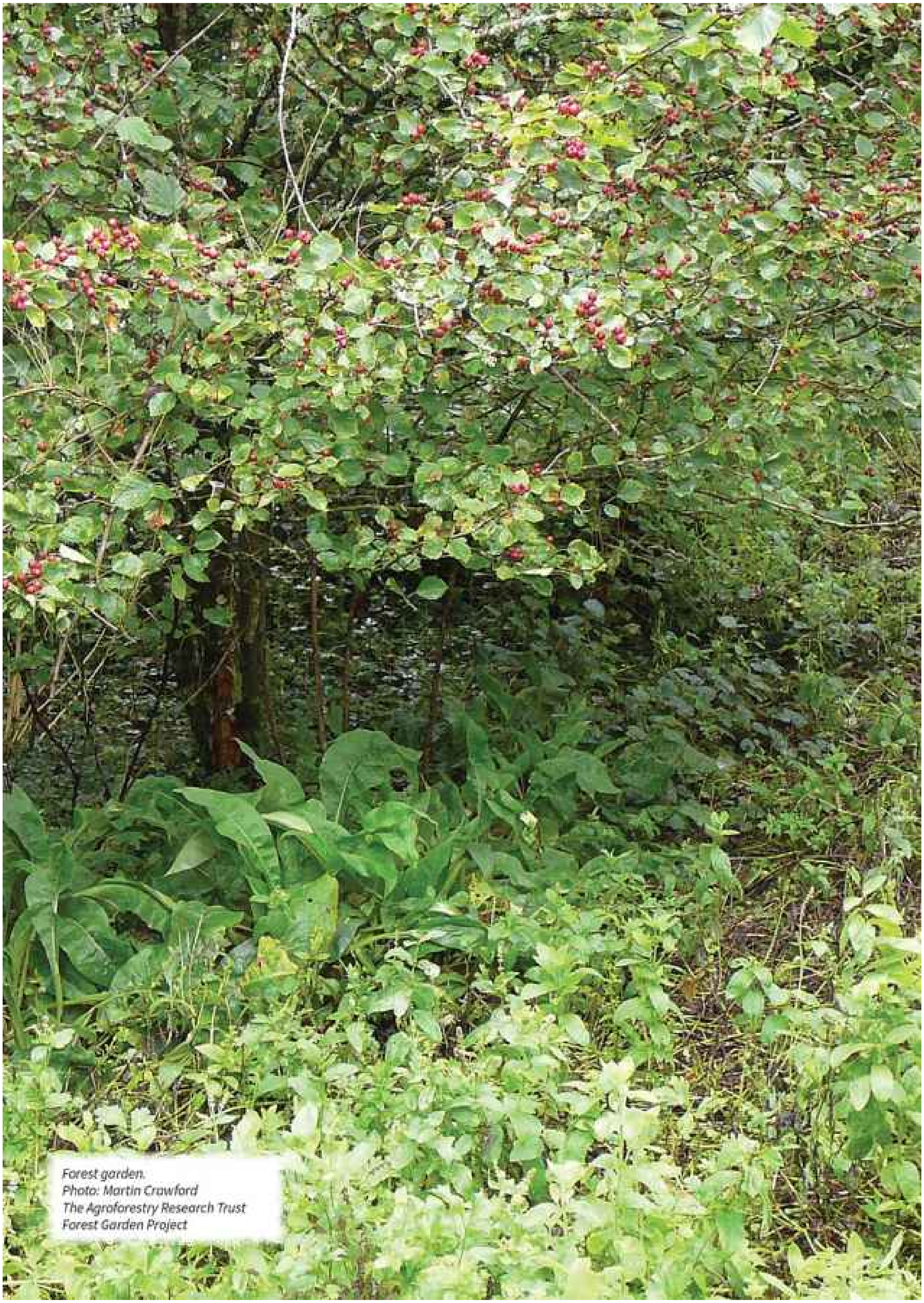
A polyculture can potentially be as orderly or as random as the individual gardener wants. As long as the plants are happy, the actual layout can be an approximation of something neat like a potager or much wilder and freer, either way can be very visually attractive.

Follow and celebrate nature

All the above principles can be summed up as following and celebrating nature. Nature is efficient; she conserves energy and produces no waste. She constructs complex webs of life that boost fertility and promote variety and diversity in unplanned but endlessly beautiful and productive ways. Much of what follows is about unwrapping and applying that principle.

* www.pfaf.org/user/default.aspx

† Soule and Piper 1992, quoted in ***Edible Forest Gardens – ecological vision and theory for temperate climate permaculture, Volume One: Vision and Theory***; David Jacke with Eric Toensmeier, Chelsea Green Publishing Company, Vermont, 2005 page 23



Forest garden.
Photo: Martin Crawford
The Agroforestry Research Trust
Forest Garden Project

chapter 2

FOUNDATIONS AND UNDERLYING THEMES

Permaculture, forest gardening and natural farming

Forest gardening, permaculture and natural farming are all ideas whose time has definitely come. They have been originated and developed by people of insight and foresight, who decades ago looked towards our current day and foresaw the need to do things differently. The rest of the world is beginning to catch on to this need, but there is a lot of catching up to do. It is not sufficient to leave this to politicians, policy makers, business or other people in general; we all need to be involved and we all can be! This exploration of these three fascinating topics is a tour of the work of some amazingly inspirational and dedicated pioneers.

Permaculture

In a drive for economic and material wealth and security, humanity has created global systems of waste and destruction with scant regard for the consequences. As a result spoiled landscapes, damaged ecosystems, extinct or endangered plants and animals, wasted resources, waste materials, holes in the ozone layer, melting polar ice caps, stockpiled weapons, unhealthy populations consuming food that has been stripped of its nutritional value, have all become commonplace in industrialised societies the world over. Faced with such overwhelming problems it is easy to feel powerless to make a difference. I am sure many people prefer to avoid dwelling on environmental and ecological problems because of the profound discomfort this can engender when faced with one’s own personally limited sphere of influence.

This is where permaculture fits in. It is modelled on the principles of nature and natural systems which do not waste and despoil and encompasses philosophy, values and practical strategies for action. Initially it focussed on land based activities (gardening and farming) but its principles of ‘Earth care’, ‘fair shares’ and ‘people care’ are clearly very widely applicable. Thus it also encompasses design of the wider built environment and elements within it. Its broad approach uses new methods and practices derived from many disciplines formulated to solve specific problems alongside older techniques that have been largely abandoned. It therefore provides a framework for addressing the basic human needs of food, energy, shelter and a whole host of 21st century dilemmas by adopting its principles for practical solutions that provide safeguards against unwise and damaging actions. There are many ingenious people out there doing all sorts of fascinating things the importance of which cannot be underestimated.

I am not trained in permaculture but have naturally absorbed the essence of it through the experience of growing in polycultures. Appendix Three gives details of interesting books, publications and web sites for further information.

Edible forest gardening

Edible forest gardening is one aspect of a permaculture approach to growing food. Variations on the forest gardening theme occur (or occurred) in traditional cultures around the globe. However ‘development’ and the importation of European / western agricultural practices have largely displaced the old ways. With its roots deep in ancient practices, forest gardening is being rediscovered by the ‘developed’ world as a remarkably useful and relevant approach to growing food.

On Wenlock Edge in Shropshire, a handful of miles from my home, the late Robert Hart created a prototype forest garden. He was a man of insight and also a practical man trying to work out how to grow food for himself and his brother in as easy and efficient way as he could. Instead of opting for intensive production techniques, he decided to model nature and this led him to the concept he articulated and wrote about as ‘forest gardening’.

The vegetation in a forest garden is usually described in terms of distinct layers. At the top the tallest trees form a canopy with smaller trees and shrubs beneath; still lower are the medium height herbaceous plants and low ground covers. A final ‘layer’ of climbers and vines mingle amongst all the layers from the ground upwards. The forest garden therefore has enormous variety in height and physical form. This in turn translates into ecological diversity by providing living quarters or niches for an extraordinarily wide range of animal and insect life. Nature has a marvellous ability to take a set of parts and knit them together into a system which is eventually capable of meeting its own needs.

One feature of such a system is that it is far less susceptible to pests and diseases. There is a long food chain within the system and natural predators abound. This helps to prevent pests from building up to threatening levels. It is also likely that individual trees and plants are healthy in themselves which either deters pests or enables diseases to be countered more effectively. By contrast a monoculture, whether it be forest or farm is readily susceptible to pests and diseases due to the high number of a single species in a small area and lack of diversity in natural predators.

Sunlight is the essential energy from which all other energy on the planet is ultimately derived. The layering of space in a forest garden enables it to capture the maximum amount of sunlight and convert this into plant biomass. Temperate forests are known to be ecosystems that generate a high level of plant biomass anyway and the really clever thing about forest gardens is that by using as many edible plants as possible a high proportion of this biomass is actually food. Additionally a well designed forest garden should continue to increase in productivity over time and needs less maintenance and work than a comparable area under conventional forestry or farming.

It is unlikely that any single variety grown in a forest garden will produce as much food as it might under more intensive systems. However the total output of all the edible species combined is greater than could be produced from the same plot of land under conventional cultivation. This is known as the principle of additional yields.

Forest gardens are shady places but they are in no way dull, gloomy or dark. Spacing trees more widely than in conventional woodlands leave openings in the tree canopy and the overall impression is light and airy rather than dark and dank. Plenty of trees, shrubs and herbaceous plants are well able to thrive whilst living in a degree of shade, and larger open spaces can be left for plants which really need full sun. The design can bring out wonderful contrasts between the different elements of the garden and it starts to feel a magical and beautiful place.

Other pioneers have now picked up where Robert Hart was obliged to leave this story. Martin Crawford is Director of the Agroforestry Research Trust based at Dartington in the beautiful South Hams area of south Devon. His experimental forest garden, created in the grounds of Dartington Hall is a wonder and Martin is a phenomenon. His attention to detail and the range of his experimentation and research has vastly increased the knowledge that is now available on forest gardening. Martin’s book on ***Creating A Forest Garden***[*] is certain to become a classic reference for UK forest gardeners and permaculturists. I attended an inspirational course with him in 2006 and am in awe of his lovely garden and extraordinary knowledge.

Meanwhile, across the Atlantic, Dave Jacke and Eric Toensmeier have written a two volume book on edible forest gardens. * The context is North American, although they feature the UK forest gardens created by Robert Hart and Martin Crawford, both of which they have visited. They too have brought an incredible wealth of knowledge together in their two volumes on how to make an edible forest garden. I have been reading and rereading these since they were published and will probably always mine them for deeper understanding and more ideas. If you have an appetite for further study and meticulous detail about the science of ecosystems, soil and many related topics then this must be on your reading and rereading list.

In addition to producing diverse edible crops, forest gardens can be planted with a range of trees, shrubs and herbaceous plants to fulfil other functions. Examples include bamboo which is edible but also used for garden canes, coppiced hazel for fuel, charcoal and a range of garden products, other plants for dyes, medicinal herbs and other uses.

Forest gardening sounds almost too good to be true, but there is no hidden catch to the theory or practice. Although I think that a thorough understanding of the principles and science behind it, and careful planning and preparation are essential keys to success. But forest gardening is truly amazing, and a potential answer to the problem of how to achieve high yields of food from small areas with minimal inputs. It is eminently suited to individuals raising food from their own plots, rather than the vast acreages of corporate agriculture and its potential significance cannot be overstated.

Masanobu Fukuoka and natural farming

Masanobu Fukuoka is another hero of mine and I cannot pay sufficient tribute to his life and work. He was truly inspired. His life, work and overall approach has been a significant influence and has helped me apply the practices and principles of permaculture and forest gardening to growing perennial vegetables in polycultures.

Masanobu Fukuoka lived and died in rural Japan between 1913 and 2008. Initially he studied plant pathology and worked as a produce inspector for the local customs office. Following a period of ill health and depression a profound experience brought him to a new way of perceiving and interacting with the world. He describes this life changing event and his feelings of elation:

“My spirit became light and clear. I was dancing wildly for joy. I could hear the small birds chirping in the trees, and see the distant waves glistening in the rising sun. The leaves danced clear and sparkling. I felt that this was truly heaven on earth. Everything that had possessed me, all the agonies, disappeared like dreams and illusions, and something one might call ‘true nature’ stood revealed.” *

This event marked a complete turning point in his life. He was convinced that he had gained an important insight which was potentially of great benefit to many people. Unsure at first about how to communicate it to other people he decided to return to the family farm and demonstrate his new perception in a highly practical and visible way by applying it to farming. It was this quest that eventually led him to the timeless principles of what he termed ‘natural farming’:

- No cultivation…
- No chemical fertiliser or prepared compost…
- No weeding by tillage or herbicides…
- No dependence on chemicals…” †

Natural farming is fundamentally about these core principles; it does not and never could provide a detailed method. Fukuoka recounts in his book ***The One-Straw Revolution*** how he came in time to develop a method of cultivating (or not cultivating), the local crops of rice and barley. He did this by what he called ‘do nothing’ farming which he describes thus:

“I was aiming at a pleasant, natural way of farming which results in making the work easier instead of harder. ‘How about not doing this? How about not doing that?’ – that was my way of thinking. I ultimately reached the conclusion that there was no need to plough, no need to apply fertiliser, no need to make compost, no need to use insecticide. When you get right down to it, there are few agricultural practices that are really necessary.” ‡

His conclusion was that interference with nature inevitably unbalances it and the ideal was to interfere as little as possible. However on the journey to that conclusion he made some truly disastrous mistakes. Leaving productive orchards unpruned the branches became tangled, the trees were savagely attacked by insects and died. As he sought the answer to the question, “what is the natural pattern?”, he killed hundreds more trees before finally understanding what a completely natural fruit tree was like. It is testament to the certainty of his commitment to natural principles that he was prepared to endure such losses and yet persist in the search.

Fukuoka persisted with his experiments for decades, using orchard fruit, rice, barley and vegetables. In time he was able to raise crops with yields equal to or exceeding the average for an industrialised farm in his region without any of the intrusive techniques and additional inputs. Word spread and many enthusiasts came to live a very simple life on the mountain above the farm and to learn by working on the farm how Fukuoka worked.

Despite Japanese government agriculture department officials being well aware of his success no attempt was ever made by officials to spread his methods amongst other farmers. His important work and contribution to understanding nature has become widely recognised, however, and ***The One-Straw Revolution*** is now widely regarded as a classic work.

Synthesis

Copying nature seems to me to be a very practical proposition - after all what might we know that she does not? The visionaries of permaculture, forest gardening and natural farming have all wisely and cleverly adopted and adapted natural principles and I have aimed to follow in their footsteps. Permaculture principles underpin my aims, forest gardening has provided essential techniques whilst natural farming inspires me to follow nature as closely as possible.

A wider context

Clearly the wider context of any action we take is significant. I have placed my experiments with perennial vegetables in the context of permaculture, forest gardening and natural farming because I could not have done it without them. However I think it is necessary to put all of these within a yet wider context – that of transition.

The Transition Movement was launched in 2006 in Totnes, Devon and rapidly spread round the world. The purpose in their own words is:

What are we ‘transitioning’ towards?

Whether we like it or not, over the next decade or two, we’ll be transitioning to a lower energy future - essential because of climate change and inevitable because of diminishing supplies of fossil fuels (particularly oil).

There are a variety of possible outcomes depending on whether we stick our heads in the sand or whether we start working for a future that we want.

Transition Initiatives, community by community, are actively and cooperatively creating happier, fairer and stronger communities, places that work for the people living in them and are far better suited to dealing with the shocks that’ll accompany our economic and energy challenges and a climate in chaos.

It begins when a small group comes together with a shared concern about shrinking supplies of cheap energy (peak oil), climate change and increasingly, economic downturn. This group recognises that:

- Climate change and peak oil require urgent action.
- Life with less energy is inevitable. It is better to plan for it than to be taken by surprise.
- Industrial society has lost the resilience to be able to cope with energy shocks.
- We have to act together, now.
- Infinite growth within a finite system (such as planet Earth) is impossible.
- We demonstrated great ingenuity and intelligence as we raced up the energy curve over the last 150 years. There's no reason why we can't use those qualities, and more, as we negotiate our way up from the depths back towards the sun and air.

If we plan and act early enough, and use our creativity and cooperation to unleash the genius within our local communities, we can build a future far more fulfilling and enriching, more connected to and more gentle on the Earth, than the life we have today. *

Transition was born out of permaculture design and encompasses every aspect of life, but one core theme, because it is utterly essential, is food production. The approach of many transitioners to food growing is rooted in natural principles. If you have not heard about transition please look at their website and follow links to the many incredibly positive and ingenious things that are happening. Local groups have projects such as garden share schemes, community gardens, forest gardens, foraging walks and workshops, community supported agriculture, all of which are positive moves to a more secure future.

* ***Creating a Forest Garden – working with nature to grow edible crops***; Martin Crawford; Green Books; Dartington, 2010

* ***Edible Forest Gardens – ecological vision and theory for temperate climate permaculture, Volume One: Vision and Theory; Volume Two: Design and Practice***; David Jacke with Eric Toensmeier; Chelsea Green Publishing Company, Vermont, 2005

† ***The One-Straw Revolution; Masanobu Fukuoka; New York, 2009; pp.8-9***

* ***The One-Straw Revolution; Masanobu Fukuoka; New York, 2009***

† ***The One-Straw Revolution; Masanobu Fukuoka; New York, 2009***

‡ www.transitionnetwork.org/support/what-transition-initiative, as of 26 November 2011

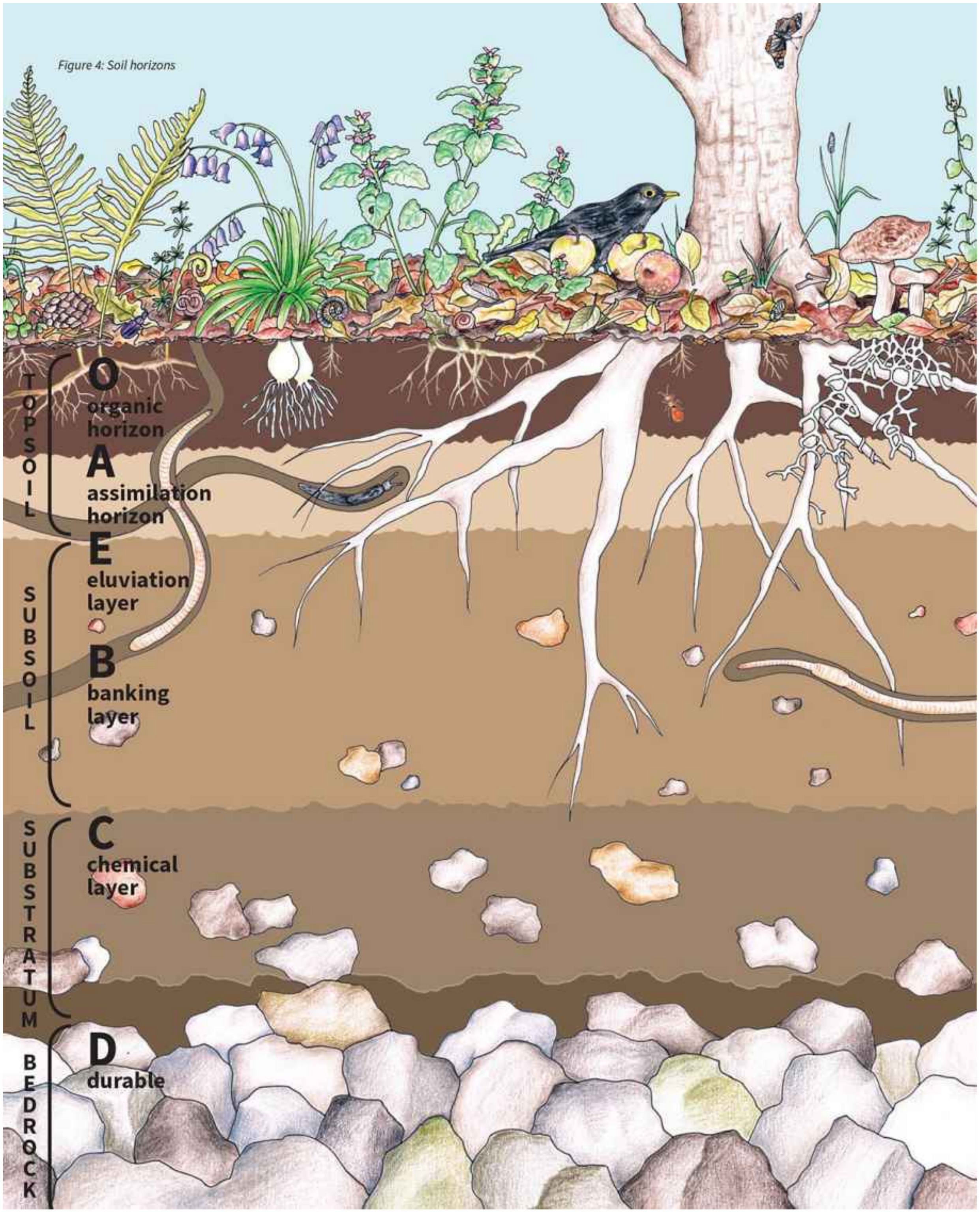


Figure 4: Soil horizons

chapter 3

LIVING SOIL AND PLANT NUTRITION

Soil is complex, fascinating and utterly fundamental to all life. It is therefore essential to have some understanding of how to support and maintain a vibrant, living soil.

When I was a child the word 'soil' was absent from my vocabulary. Instead I learned the words 'dirt' and 'earth' and as a child was frequently reminded that 'dirt' was to be avoided at all costs in order to keep myself and my clothes clean. But even then I must have had a fascination with soil and I enjoyed digging it up surreptitiously and making the outlawed 'mud pies' (muddy versions of sand castles) in a bucket behind the garden shed. When eventually I had my first garden I could not get out into it fast enough to plunge my hands into the soil. Now that I know a bit more about what soil is and how it functions I am in ever increasing awe of it.

To grow anything, I think it helps to understand something of how soil is structured and the soil life that brings with it health and fertility. To grow perennial polycultures I think it is even more useful as the very fact of their perennial nature means that life is persistently present and that brings its own benefits as described below.

The basics of soil structure

Soil structure is generally described in terms of horizontal layers or 'horizons' (***see Figure 4***). In a natural undisturbed soil the uppermost layer is composed of freshly deposited and partly decomposed vegetation and known as the 'organic horizon'. This is often removed by gardeners for the sake of neatness and presentation and also it is often believed to avoid plant disease. However if left in situ it will absorb rainfall and hold onto moisture, protect from erosion and compaction and make a cosy layer of insulation moderating the temperature beneath. It also provides a home for insects and removing it can favour unwanted fungi, bacteria and insects.

Below this is the 'assimilation horizon'. Hopefully, if it has had the benefit of organic matter added from above it will be rich in humus which is the end product of decayed organic matter. This is a stable form of organic matter, taken below ground level by the action of worms and other soil creatures. It holds nutrients but makes them available to plant roots, increases air and water retention and enables better aggregation of soil particles. Humus rich soil has a characteristic dark brown colour.

The next layer down is the 'eluviation layer', a relatively lifeless band with limited storage capacity for nutrients. Those nutrients not held in any form of living or dead organic matter are washed downwards through this layer by the movement of water.

The ‘banking layer’ beneath is where minerals are able to collect themselves together again by forming mineral clays. However for these to be available for plant growth a deep rooted plant or tree has to tap into them or alternatively worms can also retrieve nutrients and bring them up higher in the soil.

Deeper still are the realms of mineral particles and bed rock, but which are not home to any life.

I continuously add material to the top layer of my polyculture patches. I cut back or pull out plants (‘weeds’) which are getting a bit big and just drop them where I stand. I mulch round larger plants like oca with cut up material from shrubs, nettles, ferns, even twigs and small branches from elsewhere in the garden. The aim is everything being fed back to the soil with the absolute minimum of work. It is really quite surprising how much material the soil can take back, but I now confidently do this with everything that I would once have added to the compost heap.

Healthy soil is alive

Obviously I can’t see the microscopic creatures that live in the soil, but on my travels through the garden I do see lots of evidence of worms, spiders, beetles, ladybirds, wood lice, flying creatures of all types, scuttling millipedes or centipedes and the birds that come to feed here seem to agree there is plenty to eat. These represent some of the creatures at the top of a largely invisible food chain.

Vast numbers of microscopic forms of animal life, fungi and bacteria live in healthy soil. Many of these are decomposers which break down lifeless organic matter (of plant or animal origin) and which in turn at the end of their lives become either a meal for another creature or part of the matter to be decomposed (***see Figure 5***).

Each of the organisms below is a store for nutrients during their life; after their death the nutrients become available to other life forms. Hence there are plenty of opportunities to retain and recycle nutrients through ‘primary’, ‘secondary’ and ‘tertiary decomposers’ in soils with strong and diverse populations.

Bacteria tend to feed on fresh organic matter or the exudates squeezed from plant roots

- They mostly decompose fresh organic matter though some strains work on more resistant organic debris.
- Many can decompose toxic organic chemicals.
- By their combined activities they store, release and recycle nutrients and secrete glues that bind soil particles together.
- The majority are beneficial organisms.

Soil fungi are mostly microscopic threadlike organisms

- They improve nutrient retention and recycling, soil texture and promote soil health.
- They are adapted to many different conditions and can live in and around plant roots, the litter layer, spaces in the soil and on organic matter.
- They function as decomposers and can work in association with plants to their mutual benefit by taking nutrients and transporting them long distances to feed them to plant roots.
- Some kill nematodes (and vice versa), some feed on insects and some suppress their disease causing cousins.
- Many can digest toxic organic chemicals.
- Decomposer fungi can digest woody substances and some attack sick or dying trees but do not touch healthy plants.
- Fungi store and transport both water and calcium.

Protozoa

- Are the simplest form of single celled soil animal life.
- They eat bacteria (good and bad) and some eat other protozoa.

Nematodes

- Eat fungi, bacteria, roots and other organisms.
- Some nematodes have earned the rest a bad name as causes of disease. Approximately 90% are beneficial and some species predate on the malign 10%.

Arthropods are the real creepy crawlies and include insects, spiders, mites, bugs, millipedes, centipedes living in tiny spaces between soil particles or in the litter layer

- Mites eat bacteria and fungi, shred organic matter and a few attack plants.
- Bugs, millipedes, beetles, ants, earwigs and insect larvae shred and start the decomposition of organic matter.
- Beetles, centipedes and spiders are predators controlling populations of other organisms.

Earthworms shred and eat organic matter, deriving much of their nourishment from the organisms that live on these materials

- Their smaller cousins, potworms, are general decomposers and grazers.

- All worms bury and shred plant residues, stimulate microbial activity, mix and aggregate soil, increase water holding capacity and provide channels for root growth.

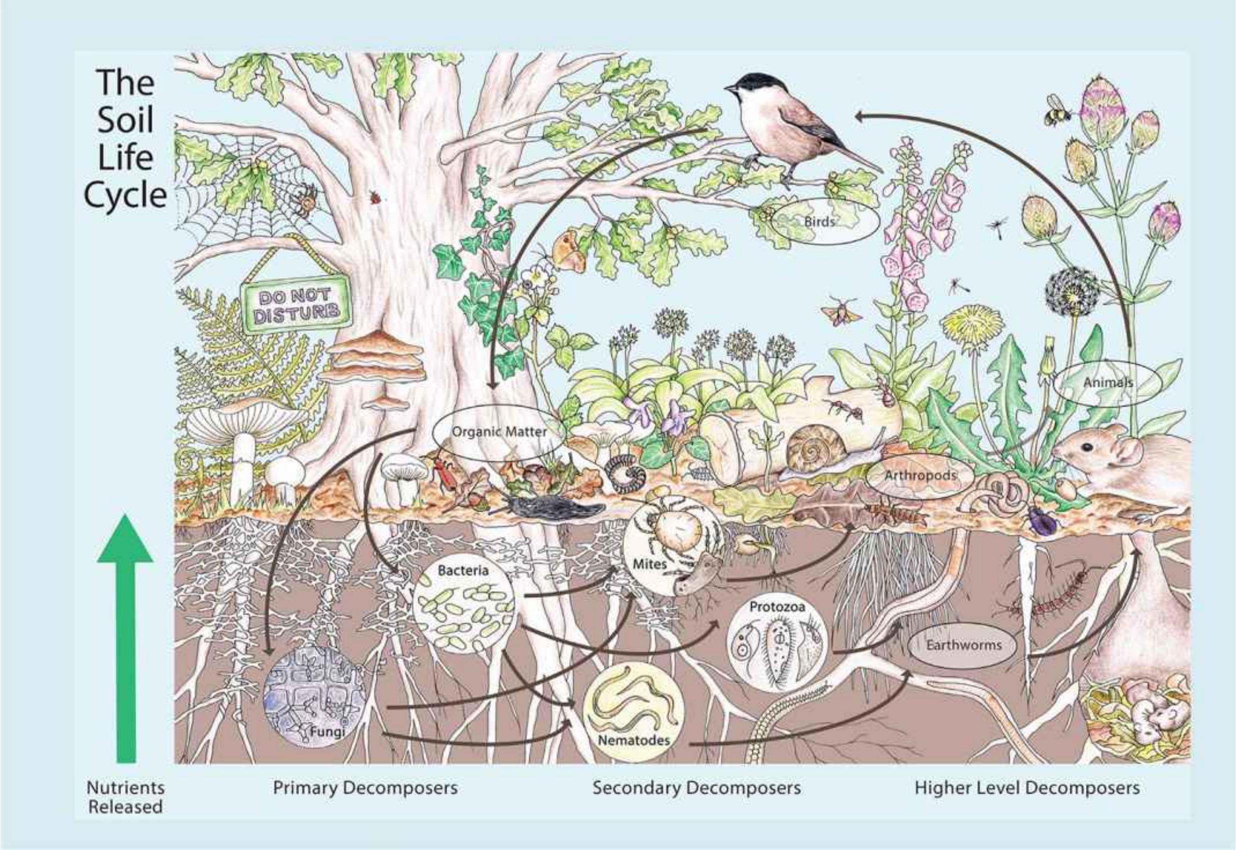


Figure 5: The interdependence of life above and below ground as nutrients cycle continuously through the ecosystem.

Soil food webs

It is the concept of a web of life in the soil that has stuck firmly in my mind and imagination and has helped me understand how to help the soil become and remain healthy and fertile. It has become a very important consideration that guides everything I do (and don't do) in the garden. It also helps to integrate understanding of soil structure and soil life as twin aspects of the same system. I first learned about this concept from Jacke and Toensmeier. * To fully appreciate the complexity of these living systems please read their full account in their book, ***Edible Forest Gardens***.

At any one time the nutrients used by plants may be stored in a variety of places – in bedrock, soil mineral particles, soil water, dead soil organic matter, soil organisms, live plants and the atmosphere. There are a variety of mechanisms by which nutrients are conserved and cycled within the soil or unfortunately lost.

A lifeless soil comprises only mineral particles, water and air. Nutrients can only be acquired from bedrock (very, very slowly), mineral particles or from the atmosphere.

When it rains many of the available nutrients are quickly leached down to the sub soil and lost. There is no food for any soil organisms and the soil is essentially dead.

Dead food web

If anything that once lived is added to the soil the process of decomposition begins and a niche is created for a range of decomposer organisms. The life, work and interactions of these organisms can be thought of as the ‘dead food web’. However eventually the process will be complete and if no further dead matter is added those organisms die. Humus has been added and temporarily provides a source of additional nutrients but eventually these will be leached out by rainfall.

Living food web

Part of the magic of plants is that when they are introduced to a dead system they initiate a range of functions and interactions that transform it into a living and life giving system.

In a soil bursting with plants:

- They garner the sun’s energy to grow and in effect they store embodied sunshine in their tissues. This is the starting point and channel for the energy that powers the ‘system’; energy that is transferred to all the other life forms that feed on plants or on those animals which initially fed on plants and so on.
- They also hold nutrients in their tissues. Eventually dead plant tissue feeds the soil based decomposer organisms and breaks down into humus.
- Their roots extract nutrients from soil water preventing them being leached and lost.
- Secretions from plant roots feed soil microbes encouraging the growth of bacterial and fungal populations in the root zone.
- In return soil organisms facilitate the direct uptake of nutrients from organic and mineral matter.

This is a lively dynamic system – a live food web which will not come to an end while the sun still shines and the plants remain in situ. However if plants are removed, as for example in an annual vegetable patch, the life giving processes are interrupted and the health of the whole system begins to be affected.

Plants need the right nutrients

Most plant tissue is built from commonly occurring elements – hydrogen, oxygen and carbon. In addition they also require nitrogen, phosphorus and sulphur and a range of minerals. * Limitation or deficiency of any of these can hamper growth and make plants more susceptible to disease. Nitrogen, phosphorus and sulphur tend to occur in old, decomposed organic matter whilst minerals can be held in the topsoil in association with humus.

The gardener’s part

My aim is to grow perennial vegetables and polycultures in a way that is as far towards the natural end of the spectrum as possible and to shun taking control. Perennial plantings inherently provide stability and support increasing diversity and numbers of soil organisms which in turn ultimately improves soil health and fertility. The aim is that this fertility and diversity continues to build over time and my experience is that the polycultures have exhibited ever more vigorous and healthy plants year after year.

I try to keep my interventions to a minimum as they generally tend to damage and destroy the soil food web. Therefore:

- Retain a permanently planted layer at all times, using ground covers between larger plants. I would rather allow a few uninvited guests (weeds) to live a while (in effect acting as a green manure) than leave exposed soil.
- Allow plant material to accumulate on the soil to maintain a permanent litter layer covering the soil surface.
- To seek and absorb vital minerals from the soil and subsoil and concentrate these in plant tissues use deep rooted mineral accumulator plants such as comfrey, dandelion (yes I did say that), and wild chicory.
- To absorb atmospheric nitrogen (for use by bacteria living symbiotically on the root system) plant leguminous plants such as clover and alfalfa, or use annual beans – broad ***runner*** French or wild plants such as vetches.
- Apart from gently planting new plants and equally gently removing root vegetables do not dig – it kills soil organisms.
- Do not add chemical fertilisers – they kill soil organisms.
- Do not walk on the soil, keep to pathways – compaction drives air out.
- Build up the depth of soil over time – as more mulch material is added to the top this will naturally happen. My observation is that plants are increasingly productive as the soil becomes deeper.

Even though I realise that I have always loved soil, I now understand much more about it. That understanding plus experience of its bounty leads naturally to treating it with even greater care and respect. More about how this manifests in practical terms is discussed in Chapter Eleven on how I manage a polyculture.

It also seems important to note that I hope to avoid a utilitarian attitude that sees looking after the soil purely as a means to looking after our own best interests. It is surely indicative of the intrinsic wisdom of ancient traditions such as Traditional Chinese Medicine and Ayurveda that they recognise Earth as an element * which must be kept in vital balance with all other elements. Imbalance ultimately leads to dysfunction and disease; perhaps gaining a similar perspective will enable us all to have a deeper reverence for the ground from which we all ultimately spring.

* ***Edible Forest Gardens – ecological vision and theory for temperate climate permaculture, Volume One: Vision and Theory***; David Jacke with Eric Toensmeier; Chelsea Green Publishing Company, Vermont, 2005

* The main minerals essential for plants are magnesium, potassium and calcium; whilst very small quantities of iron, boron, zinc, copper, selenium, manganese, silicon and molybdenum are also needed. These same nutrients are also vital to human health and nutrition and some examples of how they are used are given in Appendix 5.

* Traditional Chinese Medicine recognises the five fundamental elements of fire, earth, metal, water and wood; Ayurvedic Medicine recognises space, air, fire, water and earth

Wild chicory pointing skywards (June).

Field beans (April).

appendix 2

SUPPLIERS OF SEEDS AND PERENNIAL VEGETABLE PLANTS

Agroforestry Research Trust / Martin Crawford
Agroforestry Research Trust, 46 Hunters Moon, Dartington, Totnes TQ9 6JT
www.agroforestry.co.uk
Supplies a very wide range of trees, bushes, perennial vegetables and seeds from the demonstration forest garden **Backyard Larder**
http://backyardlarder.com/index.html
Sells small quantities of perennial vegetables raised at home and on allotment **B and T World Seeds**
Paguignan, 34210 Aigues-Vives, France
+33 (0)4 68 91 29 63
http://b-and-t-world-seeds.com
A vast resource of seeds

Chiltern Seeds
Crowmarsh Battle Barns, 114 Preston Crowmarsh, Wallingford, OX10 6SL
01491 824 675
www.chilternseeds.co.uk
Fresh seeds of almost 4,000 items, many rare and unusual **Edulis**
The Walled Garden, Tidmarsh Lane, Pangbourne RG8 8HT
01635 578 113 / 07802 812 781
www.edulis.co.uk
Growers of rare plants and suppliers of some perennial vegetables **Edwin Tucker**
Tuckers Country Store, Brewery Meadow, Stonepark, Ashburton TQ13 7DG
01364 652 403
www.edwintucker.com
Established for 175 years and has some heirloom varieties **Eric Deloulay**
Pepiniere Eric Deloulay, 1261 Rue de Cornay 45590, Saint-Cyr-En-Val, France
www.aromatiques.fr
Daubenton's kales and perpetual leek

Kings Seeds
Monks Farm, Coggeshall Road, Kelvedon, Colchester, Essex CO5 9PG
01376 570 000
www.kingsseeds.com

A wide variety of vegetable, herb and flower seeds **Magic Garden Seeds**
www.magicgardenseeds.com
Supply heritage varieties

Pennard Plants
Pennard Plants, The Walled Gardens, East Pennard, Somerset BA4 6TP
01749 860 039
www.pennardplants.com
Seeds of heritage vegetables and wild and unusual plants **Plantes et Jardins**
www.plantes-et-jardins.com
Daubenton's kale, perpetual leek and other perennial vegetables **Poyntzfield Herb Nursery**
Poyntzfield Herb Nursery, Black Isle, By Dingwall, Ross & Cromarty IV7 8LX, Scotland
www.poyntzfieldherbs.co.uk
Mainly herbs, but have some perennial alliums **The Real Seed Company**
PO Box 18, Newport, near Fishguard, Pembrokeshire SA65 0AA 01239 821 107
www.realseeds.co.uk
Heirloom and heritage vegetable seeds

Scottish Forest Garden
http://scottishforestgarden.wordpress.com/shop
Sells small quantities of seed raised on allotment **Shipton Bulbs**
Y Felin, Henllan Amgoed, Whitland SA34 0SL
01994 240 125
https://shiptonbulbs.co.uk/frontpage
For wood sorrel, wild strawberry and interesting native (UK) plants **Suffolk Herbs**
Suffolk Herbs, Monks Farm, Coggeshall Road, Kelvedon, Essex CO5 9PG
01376 572 456
www.suffolkherbs.com
Seeds of herbs, vegetables and wild flowers

Thomas Etty Esq
Heritage Seedsman and Bulb Merchant
Seedsman's Cottage, Puddlebridge, Horton, Ilminster, Dorset TA19 9RL
01460 298 249
www.thomasetty.co.uk
Heirloom and heritage vegetable seeds and bulbs **Victoriana Nursery**
Buck Street, Challock, Ashford, Kent TN25 4DG
01233 740 529
www.victoriananursery.co.uk
Large range of vegetable seeds and plants including some perennials

appendix 3

BOOKS, WEBSITES AND BLOGS

Books

Permaculture, forest gardens, natural farming

Creating a Forest Garden – Working with Nature to Grow Edible Crops
Martin Crawford; Green Books, Dartington, 2010

Gaia's Garden, a Guide to Home-Scale Permaculture
Toby Hemenway; Chelsea Green Publishing Company, Vermont, 2000

The Earth Care Manual – A Permaculture Handbook for Britain and Other Temperate Climates
Patrick Whitefield; Permanent Publications, Hampshire, 2004

Edible Forest Gardens – Ecological Vision and Theory for Temperate Climate Permaculture, Volume One: Vision and Theory David Jacke with Eric Toensmeier; Chelsea Green Publishing Company, Vermont, 2005

Edible Forest Gardens – Ecological Vision and Theory for Temperate Climate Permaculture, Volume Two: Design and Practice David Jacke with Eric Toensmeier, Chelsea Green Publishing Company, Vermont, 2005

The Edible Garden – How to Have Your Garden and Eat It
Alys Fowler, BBC Books Gardeners' World 2010

Designing and Maintaining Your Edible Landscape Naturally
Robert Kourik; Permanent Publications, Hampshire, 2004

Food From Your Forest Garden – How to Harvest, Cook and Preserve Your Forest Garden Produce
Martin Crawford and Caroline Aitken; Green Books, Dartington, 2013

How to Grow Perennial Vegetables – Low-maintenance, Low-impact Vegetable Gardening
Martin Crawford; Green Books, Dartington, 2012

How to Make a Forest Garden
Patrick Whitefield; Permanent Publications, Hampshire, 2002

The One-Straw Revolution
Masanobu Fukuoka; New York Review Books, New York, 1978; reprinted 2009 with updated preface **_Paradise Lot – Two Plant Geeks, One-Tenth of an Acre, and the_**

Making of an Edible Garden Oasis in the City

Eric Toensmeier and Jonathan Bates; Chelsea Green Publishing Company, Vermont, 2013

Perennial Vegetables

Eric Toensmeier, Chelsea Green Publishing Company, Vermont, 2007

Plants for a Future

Ken Fern; Permanent Publications, Hampshire, 1997

Sepp Holzer's Permaculture – A Practical Guide for Farmers, Smallholders and Gardeners

Sepp Holzer; Permanent Publications, Hampshire, 2010

Other interesting and informative titles

Eat Your Veg

Arthur Potts Dawson; Mitchell Beazley, London 2012

A lovely recipe book brimming with ideas. Mostly for traditional vegetables but as it is helpfully divided into sections for roots and tubers, bulbs and stems, leaves and flowers, perennial vegetables can readily be substituted into the recipes.

Lean Logic – A Dictionary for the Future and How to Survive It

David Fleming, 2011

The Power of Just Doing Stuff – How Local Action Can Change the World

Rob Hopkins; Green Books, Dartington, 2013

The Tao of Pooh and the Te of Piglet

Benjamin Hoff; Egmont Books, London, 2002

The Transition Companion – Making Your Community More Resilient in Uncertain Times

Rob Hopkins, Green Books, Dartington, 2011

The Transition Handbook – From Oil Dependency to Local Resilience

Rob Hopkins, Green Books, Dartington, 2008

Uncommon Fruits for Every Garden

Lee Reich, Timber Press, Portland, Cambridge 2004

Wild Fermentation – The Flavor, Nutrition and Craft of Live-culture Foods

Sandor Ellix Katz; Chelsea Green Publishing Company, Vermont, 2003

Another possibility for dealing with perennial kale is to ferment it in a sauerkraut or kimchi and this book shows you how. It also describes many more fascinating ferments and mouth-watering recipes.

Wild Garlic and Gooseberries … and Me – A Chef's Stories and Recipes from the Land

Denis Cotter; Collins, London, 2007

This is much more than a recipe book. Denis Cotter enthuses about the little known vegetables he is passionate about. He has devised mouth-watering recipes for perennials such as wild garlic, nettles, dandelion as well as oca, Jerusalem artichoke, sea kale, asparagus, black and red kales and scorzonera. If you need some inspiration for cooking your perennials – this is it!

Websites and blogs

My blog is kept up to date with what I am working on at present:
http://annisveggies.wordpress.com

Adaptive Seeds
www.adaptiveseeds.com/content/about-adaptive-seeds
They steward and disseminate rare, diverse and resilient seed varieties for ecologically-minded farmers, gardeners and seed savers.

Agroforestry Research Trust
www.agroforestry.co.uk
The Agroforestry Research Trust is a non-profit making charity which researches into temperate agroforestry and into all aspects of plant cropping and uses, with a focus on tree, shrub and perennial crops. The website has a massive plant and seed catalogue plus details of how to join the Forest Garden Network.

Backyard Larder Blog
http://backyardlarder.blogspot.co.uk
Exploring the possibilities of the perennial vegetable garden.

Blogger Seed Network
http://bifurcatedcarrots.eu/seed-exchange
Blog with links to an international seed saving and exchange network.

Emma Lawrence
www.emmalawrence.com
Emma drew the illustrations in this book.

Growing Oca
http://oca-testbed.blogspot.co.uk
This is a blog about just that, but also other roots such as mashua. It contains an amazing amount of detail.

Landed
http://landed.weebly.com/forestgardening-for-the-future.html
A detailed web site / blog about a forest garden in an average sized back garden with lots of background information and details of how the garden has developed over time. The aim of the blog and website is to make forest gardening, particularly at this scale, better known and more accessible. Reading this blog is a must for anyone contemplating guiding their back garden in this direction.

Of Plums and Pignuts

http://scottishforestgarden.wordpress.com
Another interesting and informative blog about a forest garden in Scotland.

Permaculture Magazine
www.permaculture.co.uk
Practical features, solutions, news and all things permaculture to inspire self-reliance.

Permaculture Association
www.permaculture.org.uk

Radix for Roots
http://radix4roots.blogspot.com
A super blog about every kind of root vegetable imaginable. This wonderful array of possibilities includes many of my favourite perennials, some I am keen to try and lots that are currently off my radar entirely. It is full of scientific exploration and thoughtful discussion.

Seed Ambassadors Project
http://seedambassadors.org
A sister project to Adaptive Seeds above.

Sustainable Smallholding
http://sustainablesmallholding.org
The sustainable smallholding is based on permaculture principles and is a demonstration site for the UK Permaculture Association through the LAND project. The blog is thoughtful and informative with an aim of passing on tried and tested sustainable practices.

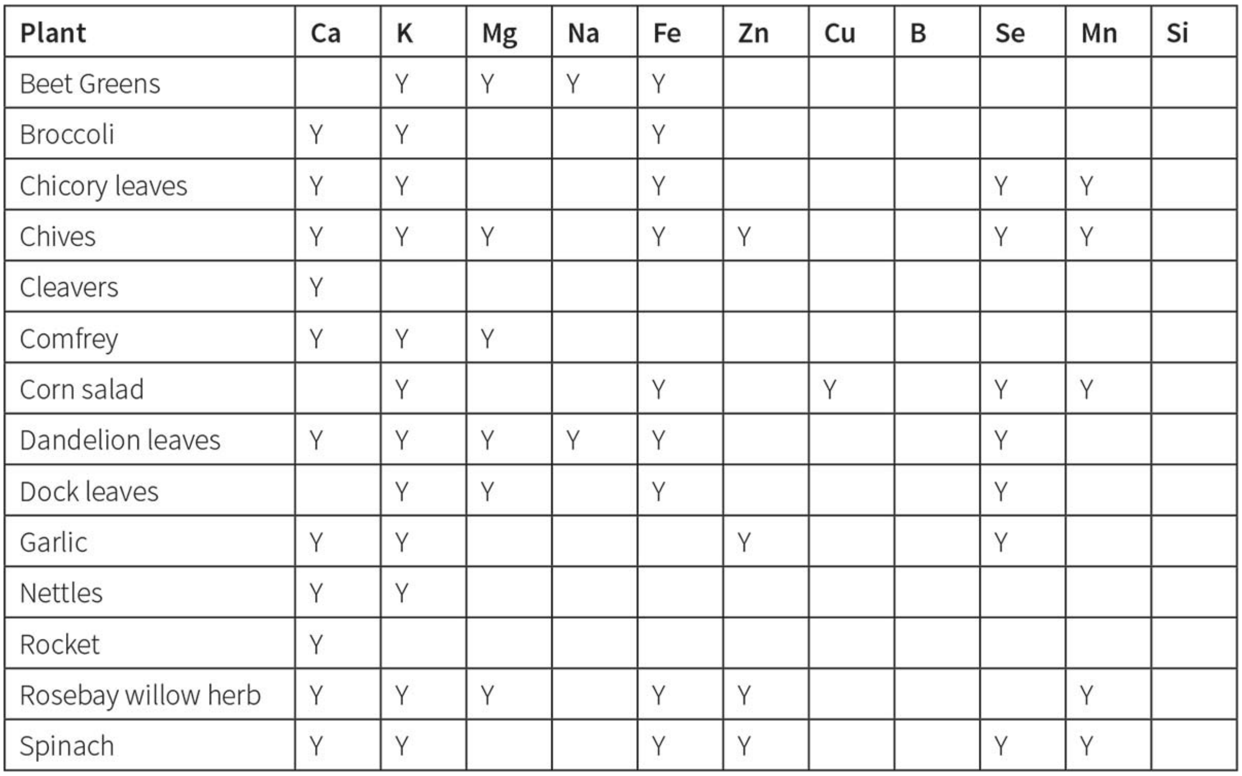
Transition Culture
http://transitionnetwork.org/blogs/rob-hopkins
Rob Hopkins’ blog.

Transition Network
www.transitionnetwork.org
The hub of the transition network with links to local initiatives round the world. Packed full of interest and inspiration.

appendix 4

DYNAMIC ACCUMULATOR PLANTS

This table relates to perennial vegetables and other plants I have in polycultures supporting them. Data is derived from the USDA database of nutrients.



Plant	**Ca**	**K**	**Mg**	**Na**	**Fe**	**Zn**	**Cu**	**B**	**Se**	**Mn**	**Si**
Beet Greens		Y	Y	Y	Y						
Broccoli	Y	Y			Y						
Chicory leaves	Y	Y			Y				Y	Y	
Chives	Y	Y	Y		Y	Y			Y	Y	
Cleavers	Y										
Comfrey	Y	Y	Y								
Corn salad		Y			Y		Y		Y	Y	
Dandelion leaves	Y	Y	Y	Y	Y				Y		
Dock leaves		Y	Y		Y				Y		
Garlic	Y	Y				Y			Y		
Nettles	Y	Y									
Rocket	Y										
Rosebay willow herb	Y	Y	Y		Y	Y				Y	
Spinach	Y	Y			Y	Y			Y	Y	

Source: U.S. Department of Agriculture, Agricultural Research Service. 2011. USDA National Nutrient Database for Standard Reference, Release 24. Nutrient Data Laboratory Home Page, www.ars.usda.gov/ba/bhnrc/ndl

appendix 5

ENZYME CO-FACTORS IN PHYSIOLOGICAL PROCESSES

Minerals are a vital part of our diet and they are well supplied in plant foods. One vital way in which the body uses them is to form enzymes that are essential to health. A few examples of enzymes that require micro minerals are listed below to give an indication of the pivotal roles they play. All of these micro minerals are to be found in kale, onions, leeks and garlic (McCance and Widdowson, ***The Composition of Foods*** 2002). Data is not currently available about perennial members of the kale and onion families, but they are likely to have similar constituents to their annual counterparts.

Copper

- Cupric cytochrome oxidase – this is used in the oxidation of food to produce energy.
- DNA polymerase – this is used in the process of DNA replication which is a fundamental process underpinning body repair, the generation of immune system cells, reproduction.

Iron

- Ferrous / ferric cytochrome – this is used to transfer electrons within the cells and is an integral part of energy generation.

Magnesium

- Glucose 6-phosphatase – this enzyme hydrolyses glucose-6-phosphate, which is the final step in gluconeogenesis (generating glucose from non carbohydrates) and glycogenolysis (the conversion of glycogen to glucose). These reactions raise blood sugar when required to do so.

Manganese

- Arginase – a stage in urea cycle which is for the processing and disposal of harmful ammonia.

Selenium

- Glutathione peroxidase – This is a whole family of enzymes which protect the body from oxidative damage.

Zinc

- Alcohol dehydrogenase – this is a group of enzymes which act to break down alcohol which is toxic to the body, into aldehyde, ketone and alcohol groups (a single oxygen and single hydrogen molecule linked together, not the whole compound) which are useful intermediates in a host of biochemical reactions.
- Carbonic anhydrase – this enzyme helps in the interconversion of carbon dioxide and bicarbonates, assisting carbon dioxide out of the body and helping to maintain the correct acid / base balance in the body.
- DNA polymerase – see above for magnesium.

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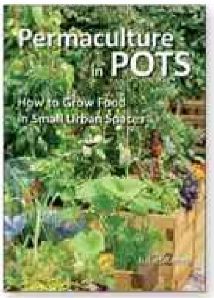
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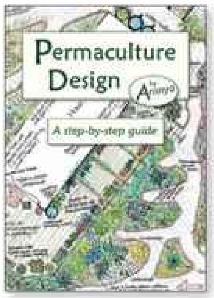
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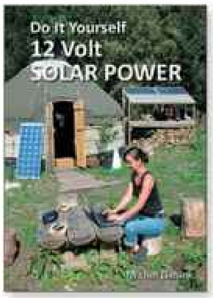
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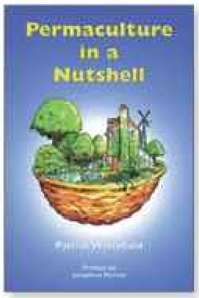
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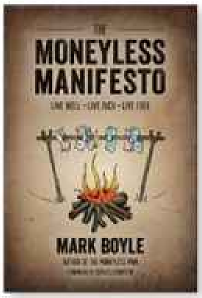
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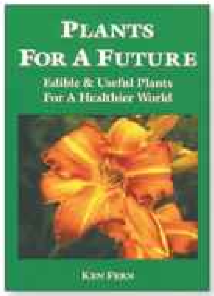
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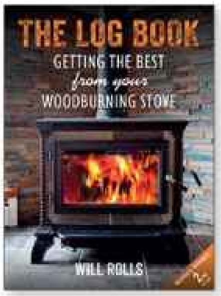
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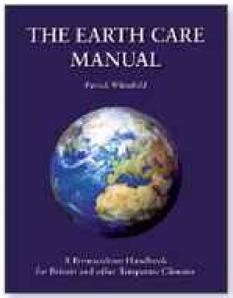
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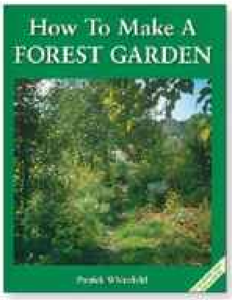
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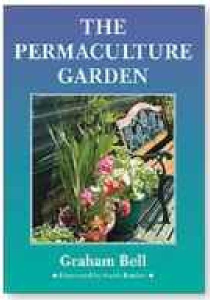
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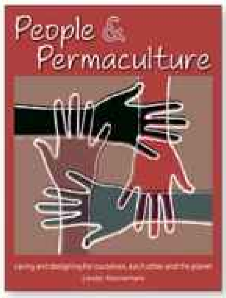
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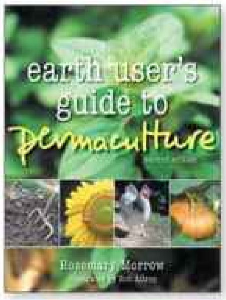
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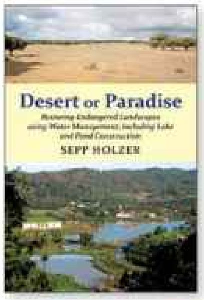
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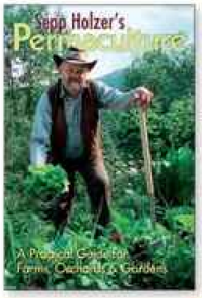
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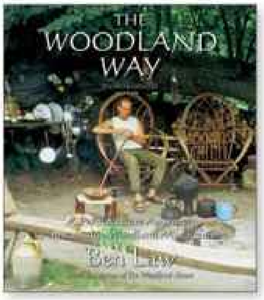
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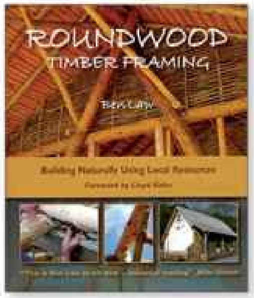
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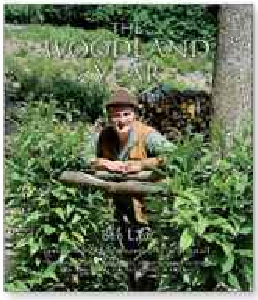
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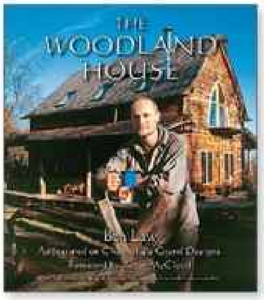
THE WOODLAND HOUSE
Ben Law

This is THE guide to growing edible perennial vegetables in low maintenance polycultures – an ideal way of growing food in small urban or rural gardens.

I love Anni's book. She's taken traditional 'big space' ideas and approaches and brought them alive on a domestic scale where most gardeners operate. The bigger picture of redesigning our food system with perennials at its heart underlies, yet it never gets in the way of inspiring and enabling the reader with case studies, examples, advice and experience. A must-have for forward thinking gardeners.

Mark Diacono
experimental gardener, journalist and author of *A Year at Otter Farm*

This is a valuable addition to the literature on growing perennial vegetables. The author's experiences of creating and maintaining polycultures are a great guide and inspiration to this challenging aspect of edible perennial gardening.

Martin Crawford
director of the Agroforestry Research Trust
and author of *Creating a Forest Garden* and *How To Grow Perennial Vegetables*

Anni Kelsey has a knowledge of perennial vegetables second to none. Now all that knowledge has overflowed from her garden into this rich and rewarding book. Perennial vegetables are one field of gardening that is still relatively unknown and Anni makes a significant impact on the body of knowledge we have about them. Follow her into her garden – abundance awaits you!

Patrick Whitefield
permaculture teacher, designer and author of *The Earth Care Manual*

The best books on food growing are those written with a 'warts and all', practical perspective. Edible Perennial Gardening *is an important book to help us to understand this vital topic. This wonderful guide is a bible.*

Michael Kelly
journalist, broadcaster, author and founder of GIY (Grow it Yourself)

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