

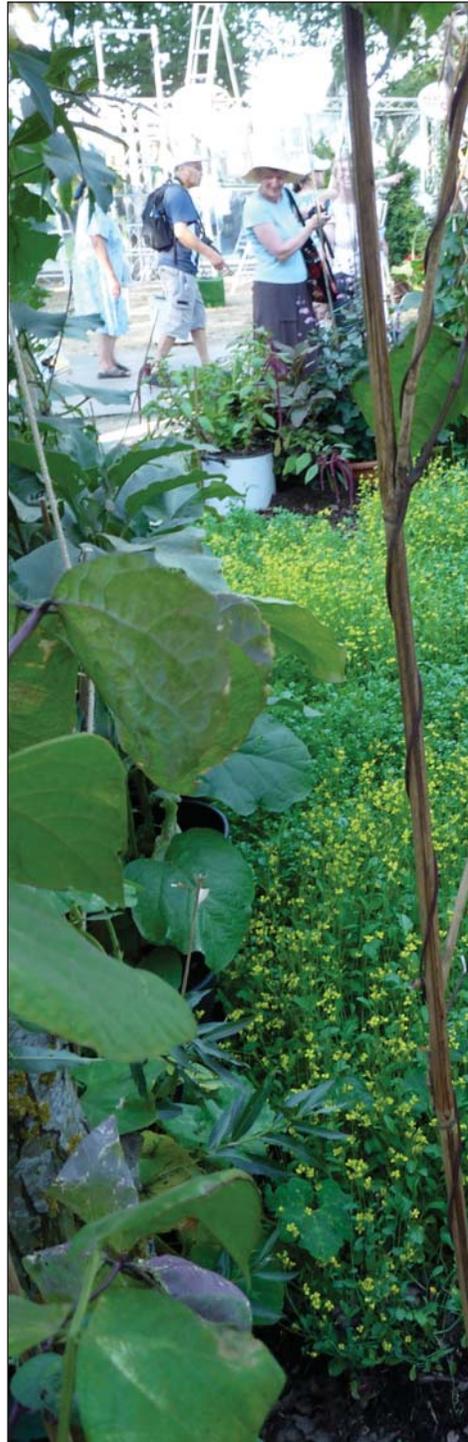


This booklet introduces the idea of **mixed vegetable gardening**, outlining its key benefits and requirements. The original method was developed in Nepal and has been adapted to UK conditions. We hope that future editions of this booklet will include much more information and useful ideas. If you have tried this approach in your own garden and want to share your wisdom / top tips and photos please get in touch.

Contact details are on the inside back cover. Find out more about this and other related projects on our website:

www.permaculture.org.uk/mixedveg

*Photo above: Mixed vegetable salad by Nonelvis
Right: Allotments in East London by LoopZilla*



Mixed Vegetable Gardening



Abundant garden by Garden Buzz

What is mixed vegetable gardening?

Mixed vegetable gardening is an example of a **polyculture**. The word means growing lots of different types of plants together. The growing mix in a polyculture can include vegetables, herbs, flowers and even fruit. People have used this approach all over the world for hundreds of years, often with great success. Examples include the English Cottage Garden, Caribbean kitchen gardens or the allotments of Bangladeshi communities in London.

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How does it differ from other forms of gardening?

In a conventional vegetable garden, each type is planted in rows or patches. Usually similar species are grouped together, such as brassicas, beans and peas and so on. Plants of the same or similar species compete for the same nutrients, and are an attractive habitat for pests of that plant. Usually, the patches are rotated every year to prevent the build-up of pests and diseases and so as not to deplete the soil of nutrients.



A feast in the making!

By contrast, in mixed cropping a large number of different vegetables are grown together in the same space. A well-chosen combination can result in less competition for nutrients, and other beneficial relationships between the different plants mean that plants are healthier.

Some benefits of mixed vegetable cropping:

- Better use of space - a lot of food is produced and many types of vegetables can be grown in the same space over a longer time.
- Fewer pests and diseases - the different colours, shapes, textures and scents of the leaves confuse pests, and diseases can't spread as easily from one plant to the next.
- Less weeding - there is no space and no light on the ground, so weeds can't germinate.
- Less need for watering - greater soil coverage means less evaporation.

What does it look like?

- Different layers above and below ground – Similar to a woodland or a forest garden but on a much smaller scale, the mixed vegetable garden has a canopy, understorey, groundcover, roots and even climbers. This way, plants occupy different spaces or niches above and below ground.
- Development over time – Early ground cover plants give way to slower growing, later crops.
- Plants from different families – Genetic diversity prevents build-up of pests and nutrient depletion.
- Diversity of *leaf shape, colour, texture* and *scent* – this is the traditional ayurvedic approach to mixing vegetables for plant health. Pests use their sense of sight and smell to find their food plants. If there are no obvious large patches of similar looking or smelling plants, they will find it harder to find their favourite food.

Mixed Vegetable Gardening

Table 1: Some plants that can be grown in different layers of the polyculture

Layer	Brassicac (cabbage family)	Legumes (pea family)	Allium (onion family)	Spinach	Composite (daisy family)	Umbellifers (carrot family)	Cucurbite (squash family)	Nightshades	Others
Canopy	Cabbage Cauliflower Broccoli Kale	Broad beans Runner beans Peas	Leek	Amaranth	Sunflowers	Lovage		Tomato	Sweetcorn
Climber		Runner beans					Cucumber Small squashes		Nasturtium
Understorey	Pak Choi Kohlrabi	Dwarf beans Chickpeas	Chives Onions Garlic	Spinach Chard	Lettuce Marigold	Coriander Fennel Dill			Claytonia (Miner's lettuce) Buckwheat
Ground cover (planted early)	Rocket Mustard Landcress Oriental greens	fenugreek		Amaranth	Young lettuce Lambs lettuce		Squash (late crop)		
Root crop	Radish Turnip		Onion Garlic Spring onion	Beetroot		Carrot Parsnip			Potato

Plants shown in italics are good to plant along the edge as well, to protect the patch from pests.

Other crops may be possible too – these are just a few examples. Feel free to experiment! Write successes on here – and please let us know.

So how does a polyculture work?

It's this simple:

1. Choosing your plants
2. Preparing the ground
3. Planting seeds and seedlings
4. Tending the crops
5. Harvesting!

Starting a mixed vegetable garden

If you have your own good method of growing vegetables, don't stop it all at once to try mixed vegetable gardening. Try it out in a small area first and see how well it does. If it works well, you can increase the area next year, or you can spend further time adjusting your methods and plant mixture.

1) Choosing and combining your plants

There are different approaches you can take when developing a polyculture. You can start off with a **tried and tested mix** of plants like the one in this booklet. Most likely you will still find that you can improve on it as your understanding of the method deepens. Alternatively, you can start a mixed vegetable patch simply by **planting everything you like**, observe what does well together and what doesn't, then refine your mixes and methods over time.

Is this companion planting?

Companion planting has been used by gardeners for a long while. Plants that are known to get on well together are combined in the same bed. There are some tried and tested combinations, such as onions, carrots and lettuce, or spinach, onions and brassicas.

Plants that are known not to get on are called antagonists and planted in different beds. Alliums (onion and garlic) and legumes (beans and peas) are a well-known example.

More examples of companions and antagonists can be found on

www.the-gardeners-calendar.co.uk/Companion_Planting/companiontables.asp

In literature the "three sisters" are often cited as a classic combination used in the Americas, but there are differing reports about their success in the UK and Europe, and even differing opinions on what plants actually constitute the three sisters. Maybe this could be another experiment for the future!

The kind of polyculture presented in this booklet is different in that some antagonists can be grown in the same bed, as long as there are some other plants in between. Of course it makes sense to choose the spots of antagonists so they don't clash with each other unnecessarily!

You can also design your own plant combination by going through the following questions:

- What do you like eating?
- Are there any obvious incompatibilities?
- Do you have a good mixture of layers and families? (See table 1 on page 3)
- Do you have a good spread of early, mid-season and late crops? (Table 2 on page 9)

Or you can design a polyculture around one or two crops that you want a lot of, choosing other plants that support your main crop or at least don't set it back in its growth.

The polyculture introduced in this booklet produces mainly leaf and root crops. You can also develop combinations around other crops such as tomatoes, squashes or potatoes.

Materials needed:

Seeds

Seedlings - grown indoors in advance of planting out

Compost

Fine mulch - well rotted leaf mould is ideal; keeps moisture and adds fertility

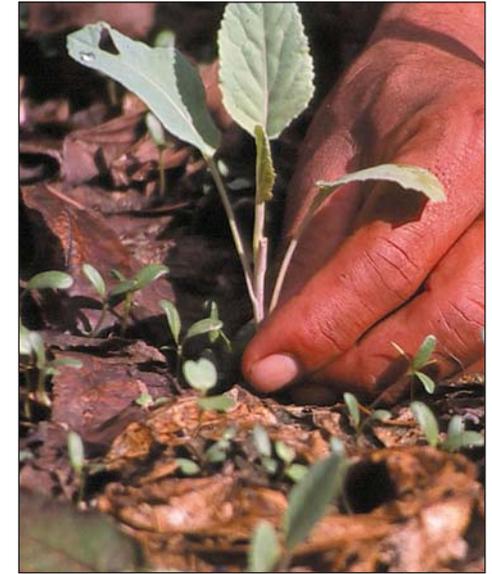
Wood ash, seaweed, rock dust - provide vital plant minerals

Liquid manures - another way to provide nutrients throughout the season

Tools for digging, planting and harvesting

2) Preparing the ground

Prepare the soil as you would for a normal vegetable patch. The more fertile the soil is, the less preparation is needed. Dig the area over, unless you are working with no-dig beds of course! Add compost (ideally in late autumn), then till the soil with a rake in spring. On a very acidic soil you can add some lime as well. It's beneficial to the soil to avoid treading on it. If the width of the beds is less than 1.5m the centre can be reached without treading on the soil.



Planting the seedlings

3) Planting

The best time to plant your polyculture in the open is after the frost has passed, around mid-May for most of Britain. Greenhouse polycultures can be started earlier, and some hardy plants like onions or broad beans could be pre-sown in the same patch.

Starting off seedlings

Start off seedlings in the house, greenhouse or a cold frame, from March onwards.

Some vegetables such as garlic and onion sets can be planted in late autumn or early spring. All other seedlings are best planted after the frost has passed. In most of Britain this will be in early to mid-May. Make sure you harden them off for a few days before finally planting them out.

If you are planting in a greenhouse or polytunnel, you can extend the growing season further by starting earlier and harvesting later.

Planting seedlings

In fertile and fine soil, plant strong, healthy seedlings of cabbages, beans etc. at their normal spacing. Onion sets and garlic bulbs can be planted along the edge of the beds, at 4-6 inch intervals, and some scattered throughout the bed.

Sowing seeds

At the same time as planting out your seedlings, plant all the crops you are planning to grow from seed.

- Large seeds first: peas and beans planted at their usual spacing.
- Medium-sized seeds: beet, spinach, chard, radish scattered or planted in clumps. You can do the same with carrots and other root crops.
- Small seeds: Sow lettuce, onion, carrot, coriander and so on, each of them individually and thinly spread over the bed.
- Ground cover: Sow mustard or rocket, buckwheat, fenugreek (at least two different families) thickly at the end

Companion plants

Marigolds, basil, comfrey, wormwood or other aromatic plants and flowers can be sown or planted around the edge of the bed.

4) Tending the crops

Covering the soil

Once everything is planted, sprinkle ash, rock dust or sea weed powder on top as fertiliser. Cover with enough topsoil or compost to cover all seeds and fertiliser. Then add a thin cover of mulch, taking care not to cover the seedlings. The mulch prevents both the drying out of the soil and compaction in heavy rainfall.



A mulch of leaves is applied on top of the broadcast seeds, between the planted seedlings

Water well, and stand back to admire your work. Your mixed vegetable bed is complete – all you have to do from now on is harvest!

What about slugs?

In Britain, this is the cry of every gardener. Unfortunately this method is not slug-proof, so we recommend you take the same measures against the slimy blighters as in the rest of your garden. Crushed egg-shell defences or table-legs in pots of water for example.

Looking after the mixed vegetable garden

One week after sowing, mustard, radish, fenugreek and onion bulbs have started to germinate. The pre-grown seedlings have also established themselves.



Day 7: A first flush of growth is starting to cover the ground

After 3 weeks all vegetables have germinated. A dense cover will have spread over the ground and you can start picking leaves for salad.



Day 21: All the ground is now covered.

All the ground cover plants (mustard, fenugreek, buckwheat) are good salad crops. They can all be picked over the space of 2-3 weeks, except for a few plants to save your own seed from.



If you have achieved a very dense ground cover you can be quite drastic with your thinning, even using garden shears!

Six weeks after sowing, production is increasing and there is no bare soil. Broad leaf mustard, coriander and lettuce can be harvested, along with the first radishes. The faster growing leaf crops can be picked to make space for the slower, longer living ones.



Lettuces and other greens ready for thinning

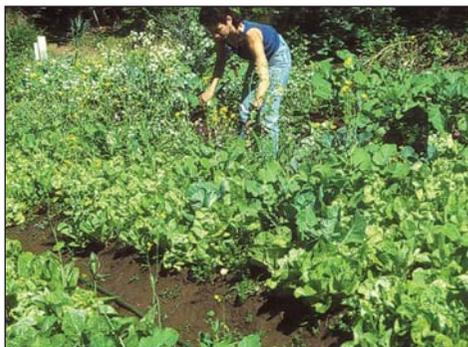
After a few months, a lot of the ground cover will have been harvested and eaten. You will now have fewer but larger plants. You can keep the cropping going all the way to late October or November, and even have some overwintering crops.



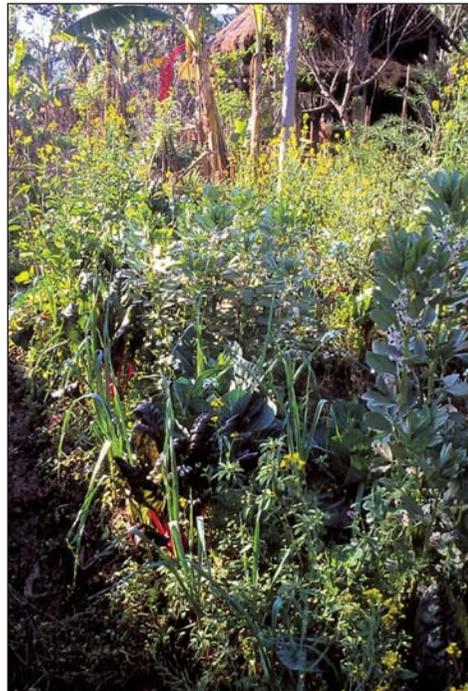
Gaps in groundcover can be filled with mulch, in this case with straw

The mixed vegetable plot should be easy to maintain. The dense planting and the layer of mulch help conserve moisture and keep down weeds, so the need for watering and weeding is minimised.

The maintenance of the mixed vegetable bed can be compared to that of a woodland or a forest garden. Always thin the ground cover and early crops when the later crops need more space, and always try to maintain a “canopy” of leaves to give no chance to the weeds.



4 months: The initial groundcover has gone and longer lasting crops have closed the canopy



Understorey of ruby chard and onions under a “canopy” of broad beans

5) Harvest!

So all you have to really do is harvest. If you don't harvest, the plants will grow too densely, go “leggy” with tall, thin stalks and small leaves. This means that they will lose productivity and run to seed early. So you have to make sure that you always pick enough to give other plants a chance to come through. The space left by a harvested plant will be quickly taken up by its neighbours. This way, there is never any empty space or bare soil.



Photo: Mark Forman

Table 2: Harvesting calendar

These timescales are approximate - times vary depending on local conditions

Likely Season	Time after sowing	Plants that can be harvested (examples)
Spring	2-3 weeks	Mustard greens
	1 month	Mustard greens, Fenugreek, Buckwheat greens, Chinese mustard
	2 months	Radish, Broadleaf mustard, Lettuce, Chinese mustard
Summer	3 months	Radish, Broadleaf mustard, Lettuce, Chard, Coriander leaves, Kohlrabi, Turnip, Beetroot
	4 months	Broadleaf mustard, Lettuce, Chard, Coriander leaves, Kohlrabi, Turnip, Beetroot, Carrot, Coriander, Peas, Chinese Cabbage, Kale
	5 months	Chard, Carrots, Peas, Beans Broad beans, Kale, Cabbage, Coriander seed etc.
Autumn	6 months	Chard, Cauliflower, Carrots, Parsnips, Peas, Beans, Broad beans, kale, Cabbage, Onions, Garlic etc.
	7 months +	Cabbage, Sprouts, Garlic, Leek, Broccoli

After harvesting

After everything has been picked, you can prepare the bed for the next season, using your usual dig or no-dig method. You can follow up with a different crop or plant mixture. Alternatively you can sow a crop of green manure, or leave the area fallow with a big mulch.

How does your garden grow?

There is still much to learn about mixed vegetable gardens, and we would like to gather and share your experiences. We want to learn from both success and failure. If you have found a plant combination or technique that really works for you, we would love to hear about it. We plan to update this booklet with new ideas and plant combinations, so send us your findings, top-tips and photos.

Author's note:

We started using polycultures in Nepal in around 1992, just after I'd seen Masanubo Fukuoka's farm in Japan and Ianto Evans' lovely polyculture beds in Oregon, USA. It made sense, and made more sense when I tried it on another farm in Jajarkot, and then at Sunrise Farm in Kathmandu. No-till, mulch, green manures; diversity in leaf shape, texture, colour and plant scent; diversity in root depth and width, plant height - so much diversity! The villagers loved it - so many vegetables to choose from, and high output but low input.



When we were writing the chapter on polyveg for the Farmers' Handbook Jakob, the book's designer, had taken a photo from right inside a polyveg at ground level, and it looked just like a natural forest, or like a Forest Garden. That was another crucial point, to see the parallel with much larger systems but with the same pattern, a template. Within that pattern, all we have to work out are the details -

what plant associations work best according to our local climate/microclimate and site conditions. This will depend on the collection of many people's experience and some focussed research.

Chris Evans, Nepal & South Wales

Growers' experience:

Roz Brown, Mid-Wales Permaculture Network:

I am now in my third year of working this way, and I can recommend it as low input, high yield, and often surprising. For the first time in four seasons, I was able to grow squash in abundance, plus my first decent crop of Cherokee beans. The only thing I did differently was to grow them together with maize. These '3 sisters' were very happy together.

My other favourite addition to a mixed bed is rocket as an alternative to white mustard - does the same job, but unlike mustard makes great pesto! My other discovery this year was Chinese celery in a polyculture - Celery Leaf as a herb is also good in this situation. For me the main benefits of mixed plantings are their low maintenance and a huge variety of produce from a small area to make meals more interesting!

Photographs

Unless otherwise stated all the photos in this booklet are by Chris Evans.

Resources and inspiration

The Farmer's Handbook, Permaculture Research Institute of Australia

Gaia's Garden, Toby Hemmenway

The One-straw Revolution, Masanubo Fukuoka



Thanks

...to all the people who have helped put this booklet together. This booklet is an adaptation of the "Polyveg" chapter of the *Farmers Handbook* by Chris Evans. The text was revised by Tomas Remiarz, and designed with Stig. Thanks for helpful suggestions from Roz Brown, Sally Cunningham, Ian Fitzpatrick, and Naomi van der Velden.

More copies of this booklet

Download a free PDF in colour (or in B&W for cheaper printing) from: www.permaculture.org.uk/mixedveg
Please share this booklet with friends.

Permaculture

Mixed vegetable planting and other forms of polyculture are good examples of permaculture, which seeks to maximise multiple yields while minimising effort and environmental costs -

working with nature, rather than fighting against it. For a great introduction to the principles and practice of permaculture see the 'knowledge base' of the Permaculture Association website, available here:

www.permaculture.org.uk/knowledge-base



Permaculture Association

This booklet is part of the ongoing work of the Research Working Group of the Permaculture Association. For more information on this research please visit:

www.permaculture.org.uk/whats-going-on/association-work/research

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