

How to make easily integrate green manure cropping into your vegetable garden soil fertility - Webinar hand out notes.

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Benefits of green manure cropping for your veg garden soil fertility

Green manures are an essential aspect of sustainable organic gardening. Annual crops are used to feed the soil with legumes and grasses that build both organic matter and nitrogen levels to improve the soil. 'Grass' refers to a cereal grain such as barley, rye, millet, buckwheat, oats or sorghum, not running grass like couch or kikuyu. When used in a crop rotation they can break disease cycles.

Green manure cropping provides the following benefits for the soil, crops and you as the gardener:

- Increases organic matter, earthworms and beneficial micro-organisms
- Smothers persistent weeds
- Brings minerals to the surface and breaks up hardpans
- Increases the soil's available nitrogen and moisture retention
- Stabilises the soil to prevent erosion, especially in rainy periods
- Provides habitat, nectar and pollen for beneficial insects and reducing populations of pests
- Improves water, root and air penetration in the soil
- Gives you a break or rest from intensive cropping and management of veg crops

Crops to use

Download this [PDF file on green manure crop and seasonal planting times](#) to help you choose a crop.

Green manure cropping relies on a unique ability of a group of plants, the legumes, to 'fix' nitrogen. Plants such as clover, peas and beans have an important advantage over other plants, of being able to obtain nitrogen, a major element needed for plant growth, from the soil air and then concentrate this nitrogen in the roots. They do this by forming a symbiotic relationship with a group of bacteria called rhizobium, which live within a specialised structure, called a nodule, on the plant's roots. The rhizobia can take nitrogen (N₂) from the air and convert it to ammonium (NH₄), the form of nitrogen plants normally obtain from the soil. This process is called nitrogen fixation. The nitrogen in this way enters the soil in a living state, making it much more accessible to plants in a balanced way

Rhizobia occur naturally, but they are very host-specific, that is, any one species of *Rhizobia* will only live with a few different types of legume. Consequently, when sowing legumes, the seed should be coated with a culture of the correct *Rhizobium* before sowing. This is referred to as inoculation. It should be stored in the fridge and used within 3 months. To use, moisten the seed with a small amount of water and stir in the inoculant until seeds are coated. Then to allow even spreading of the seed over the seedbed, mix in a small amount of agricultural lime. Do not inoculate the seed until you are ready to sow it and do not leave the inoculated seed in the sun. You can also use sand, vermiculite or perlite to help spread the seed evenly.

Green manures can be used to interrupt pest and disease cycles in much the same way as crop rotation: this is called biofumigation. Growing a biofumigation crop can be used to control root knot nematodes and root rot fungal pathogens, reducing the need to use toxic chemicals for soil fumigation. Plants that do an excellent job of this are BQ Mulch, mustard and marigolds. To be successful this green manure needs to be dug into the soil where it releases natural gases as it decomposes.

Sowing a green manure crop

Use the following steps to sow the green manure crop:

- Choose the right crop for the season and the ideal time of the year. The PDF crop listing above will help with this
- Clear the beds of crops and weeds and level the beds
- Remineralise the beds with gypsum (300gm to m²) and rake in the give the beds a good watering.
- We also commence application of biodynamic seaweed and fish emulsion and do this once per month whilst the crop is growing and fortnightly between the time is cut down and when it is fully broken down in the soil.
- Mix the seed in a bucket with the inoculant (if a legume), water and lime), then walk along the edge of your beds broadcasting the seed with your hands. Make sure the seed is reasonably evenly spread and plant more seed that you think you need as the birds will take some.
- Rake the seed over lightly after broadcast so they are covered with soil
- Start watering and be sure to keep it reasonably moist
- Planted in the right season, the seed will start germinating with 2-3 days so long as soil temperature is ideal.

Managing the green manure crop to finishing off

When the green manure is planned to be followed by a particular crop, enough time needs to be left for the seed to germinate, grow and begin to flower, be chopped down or dug-in and begin to decompose. Generally allow a minimum of 8 weeks for the green manure to grow and 4-6 weeks for it to decompose before planting veg into the space.

Green manures are generally 'harvested' either by slashing or digging-in just as the plants begin to flower, while still green and lush. Leaving them to fully flower and go to seed reduces the nitrogen content and increases the risk of weediness from seed set into the following crop. Digging-in at the end of the green manure crop is traditional but not strictly necessary. Instead this is a management decision as to what suits your aims and gardening style best. By slashing and leaving the green manure crop on the surface you create mulch for the following crop

The breakdown of nutrients is slower, similar to a slow-release fertiliser, which is an advantage if the following crop will not be planted for a while or during heavy rain periods where the nutrient would just wash away. If you choose to dig the green manure in, then just dig it through the top 15cm of topsoil. It helps to mow or slash the green manure crop finely first, before incorporation. Once incorporated the green manure will break down rapidly. This creates an active composting process within the soil which in the very short term can have a negative impact on seeds germinating. To avoid this you need to wait 6 weeks after incorporation. If you need to sow seed sooner then slashing it is the best choice

Biofumigation and weed suppression

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Green manures can be used to smother persistent weeds; they may also make conditions unsuitable for certain weeds by improving the structure and nutrient status of the soil. Good choices for weed suppression include lablab, cowpea, lucerne and buckwheat. Green manures can also be used to under-sow crops such as corn,

reducing weed growth and protecting the soil from erosion. Useful species for under-sowing include subclover, cowpea and woolly pod vetch.

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Peter Kearney – My Food Garden founder