

Green Manure

Green manure crops are crops grown, not to be harvested by the grower, but to be incorporated into the soil before they reach maturity to contribute to the care and feeding of the soil. These crops have the benefit of improving soil structure, protecting the soil from compaction and leaching, suppressing weeds, controlling pests and contributing directly to the fertility of the soil through the supply of important plant nutrients. A good healthy soil should contain approximately 5% organic matter and green manures supply large amounts of organic matter.

Legumes, in particular, supply a valuable amount of nitrogen since their roots form an association with soil-borne bacteria (Rhizobia) that can transform nitrogen from the atmosphere into nitrogen compounds that can be used by plants. Different nutrients such as phosphorus are supplied by other green manure crops. The process of decomposition of the crop aids in making further nutrients available that are already present in the soil but in a form that cannot be used by plants.

Of all the techniques applicable to the sustainability and productivity of organic horticulture, regular green manure cropping would have to be the most significant and most rewarding. *[Peter Bennett, Organic Gardening 7th Ed. 2006]*



The roots of green manures and the organic matter they produce when incorporated as mulch or dug in contributes to improved soil structure and moisture retention. Green manures and cover crops also help to repair soils by providing food sources for soil microorganisms which can contribute to the control of pathogens and pests. As well as supplying nutrients through a healthy soil food web, the decomposition of this organic matter (into humus) also helps with drought resistance. Many of the legumes used as green manures, such as alfalfa,

lupins and sweet clover, are very deep-rooted crops. Their roots can penetrate the subsoil and open it up which is an important improvement in compacted soils. Subsequent vegetable crops can use the channels in the subsoil to allow their roots to reach deep into the subsoil and obtain water and nutrients from the lower levels. The roots of many common vegetable crops will penetrate deeply if the soil is loose enough.

Green manures can be grown in three ways:

- As an over winter crop, which is the most common way they are grown. In the Canberra region, autumn is an ideal time to plant green manure crops in beds emptied of the summer harvest. There is usually time to establish the crop before winter.
- As a crop during the main growing season, which, however, has the disadvantage of taking up valuable space at the most productive time of year.
- As an undercover crop grown with the main crop, but planted after the main crop is established. This is an extremely useful method for gardeners in areas with long cold winters where there is not time to plant a green manure crop after the summer harvest.

An organic gardener needs to consider the best time to plant the green manure crop and how long it will grow for and how it fits into the crop rotation in the garden. A green manure crop can be grown whenever a bed would otherwise be left vacant over summer or winter.

The **Australian Certified Organic standard** requires a sheet composted area using animal manures to be followed by two green manure crops before the area is used for crops intended for human consumption. This is to prevent manure-borne animal pathogens entering the human food chain. Green manures promote the healthy soil food web that will over time process these organisms.

The green manure crop can be dug in in Spring prior to planting crops which will generate speedier decomposition. Having dug in a green manure crop you need wait only 4 to 6 weeks before planting summer crops. However, it is not necessary to dig in green manure. It can simply be cut down and spread as mulch. Covering this material with additional straw will give protection to all the microorganisms that will breakdown this green organic matter and convert it into humus in the soil.

The following table lists green manure crops beneficial in gardens in Canberra, the climate of which is classified as 'Cool Temperate'. A mix of types such as legumes and grasses can be useful to optimise the overall beneficial effects (eg deep roots, nitrogen-fixing and bulky organic matter). You should take account of the differing growth rates of some plants to avoid competition.

Common name	Botanical name	Sowing time	Specific benefits
Fava beans (L)	<i>Vicia faba</i>	Autumn	Tolerates frost. Fixes nitrogen. Large volume of organic matter.
Field (dun) peas (L)	<i>Pisum sativum</i>	Early Autumn	Nitrogen fixing. Tolerates frost.
Lupins (L)	<i>Lupinus Augustifolius</i>	Early Autumn	Adds phosphorous. Flowers attract bees and other beneficial insects.
Mung beans (L)	<i>Vigna radiata</i>	Spring	Quick growing. Fixes nitrogen.
Sub-clover (L)	<i>Trifolium Subterraneum</i>	Early Autumn	Strong nitrogen fixing
Hairy Vetch (L)	<i>Vicia villosa</i>	Autumn, Spring, Summer	Vigorous. Strong nitrogen fixing. Attracts beneficial insects.
Fenugreek (L)	<i>Trigonella foenum-graecum</i>	Autumn - Spring	Edible leaves.
Cowpeas (L)	<i>Vigna unguiculata</i>	Spring - Summer	Drought resistant. Controls nematodes
Barley	<i>Hordeum vulgare</i>	Autumn, early Spring	Vigorous growth. A good partner with vetch or dun peas. Tolerates cold soil.
Oats	<i>Avena sativa</i>	Autumn	Helps control nematodes
Rye corn	<i>Secale cereale</i>	Feb-March	Withstands frost and wet soils. Vigorous penetrative root system.
French millet	<i>Panicum milliaceum</i>	Spring	Vigorous growth. Drought tolerant.
Mustard	<i>Sinapsis alba</i>	Spring, summer or early autumn	Fights disease organisms eg nematodes. (Don't follow with other brassicas.)
Buckwheat	<i>Fagopyrum esculentum</i>	Spring	Tolerates poor soil. Flowers attract beneficial insects.