

Green manure - Cover Crop

In [agriculture](#), a **green manure** is a type of **cover crop** grown primarily to add [nutrients](#) and [organic matter](#) to the [soil](#). Typically, a green manure crop is grown for a specific period of time, and then ploughed under and incorporated into the soil while green or shortly after flowering. Green manure crops are commonly associated with [organic agriculture](#), and are considered essential for annual cropping systems that wish to be [sustainable](#). Traditionally, the practice of green manuring can be traced back to the [fallow](#) cycle of [crop rotation](#), which was used to allow soils to recover.

Functions

Green manure crops may include [legumes](#) such as [cowpeas](#), [soybeans](#), annual [sweet clover](#), [vetch](#), [sesbania](#), and [velvet beans](#), as well as non-leguminous crops such as [sudangrass](#), [millet](#), [sorghum](#), and [buckwheat](#).^[1] Legumes are often used as green manure crops for their nitrogen fixing abilities, while non-leguminous crops are used primarily for weed suppression and addition of biomass to the soil. Green manures usually perform multiple functions, that include soil improvement and soil protection:

- [Leguminous](#) green manures such as [clover](#) and [vetch](#) contain [nitrogen-fixing symbiotic bacteria](#) in [root nodules](#) that fix atmospheric nitrogen in a form that plants can use.
- Green manures increase the percentage of organic matter ([biomass](#)) in the soil, thereby improving [water](#) retention, aeration, and other soil characteristics.
- The [root](#) systems of some varieties of green manure grow deep in the soil and bring up nutrient resources unavailable to shallower-rooted crops.
- Common cover crop functions of [weed](#) suppression and prevention of soil [erosion](#) and compaction are often also taken into account when selecting and using green manures.
- Some green manure crops, when allowed to [flower](#), provide [forage](#) for pollinating [insects](#).

Incorporation of [cover crops](#) into the soil is immediately followed by an increase in abundance of soil microorganisms that aid in the decomposition of this fresh material. The degradation of plant material allows the nutrients held within the green manure to be released and made available to the succeeding crop. This additional decomposition also allows for the re-incorporation of nutrients that are found in the soil on a particular farm such as [nitrogen](#) (N), [potassium](#) (K), [phosphorus](#) (P), [calcium](#) (Ca), [magnesium](#) (Mg), and [sulfur](#) (S). Microbial activity in the soil also leads to the formation of mycelium and viscous materials which benefit the health of the soil by increasing its [soil structure](#) (i.e. by aggregation). Soil that is well- aggregated has increased aeration and water infiltration rates, and is more easily turned or tilled than non- aggregated soil. Further aeration of the soil results from the ability of the root systems of many green manure crops to efficiently penetrate compact soils. The amount of [humus](#) found in the soil also increases with higher rates of decomposition, which is beneficial for the growth of the crop succeeding the green manure crop.

Green manure crops are also useful for weed control, erosion prevention, and reduction of insect pests and diseases. The deep rooting properties of many green manure crops make them efficient at suppressing weeds. Green manure crops often provide habitat for many native pollinators as well as predatory beneficial insects, which allow for a reduction in the input of insecticides where cover crops are planted. Some green manures are also successful at suppressing plant diseases, especially [Verticillium wilt](#) in potato. Incorporation of green manures into a farming system can drastically reduce, if not eliminate, the need for additional products such as supplemental fertilizers and pesticides.

