



## Green Manuring: Procedure, Principles and Advantages

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Green manuring is a soil management technique in which specific plants are grown prior to, between, or after the actual crops are planted. When you hear the term “green manure,” you might assume it’s just fertilizer. However, this could not be further from the truth! It is our goal to demonstrate in this essay the numerous benefits of using green manure in an organic garden and why it should not be omitted.

### Types of Green Manure

#### 1. Legumes

These are plants with roots that collaborate and work with the bacteria in the soil to trap nitrogen from the atmosphere, in a process called nitrogen fixation. The process is further aided by an inoculant or treatment medium that helps the legumes work.

#### 2. Non-legumes

These are any other green manures, and mainly serve as cover crops. They also enrich the soils with organic matter. They include ryegrass, phacelia, turnips, rye, chicory, oats, barley, mustard and buckwheat. Winter rye is a form of rye that grows in the coldest zone.

### Green manure crops can also be classified based on their purposes:

- Cover crops:** These are crops sown to cover soils and prevent erosion. They include vetch, Sirius peas, oats, clovers, winter rye, and lentils
- Break crops:** They are crops that interrupt the lifecycle of pests or diseases and include alfalfa, mustard, brassica and rye
- Nitrogen-fixing crops:** They are leguminous crops planted to enrich soils of available nitrogen. Some examples include beans, vetches, clovers, peas, soybeans, lupins, and alfalfa.
- Nutrient conserving crops:** As the name suggests, they minimize nutrient leaching and add more nutrients into the soil. They include ryegrass, oil radish, buckwheat and red clover.
- Smother crops:** These are crops grown to out compete weeds in growth, and they include winter rye, buckwheat, yellow sweet clover and oil radish.

### Procedure of Green Maturing

The green maturing practices (techniques) are given below:

- Green manure crop can be grown in any type of soil, provided there is sufficient rainfall or alternatively irrigation available.

- To ensure success with a leguminous green manure crop is to inoculate the seed with the proper strain of bacteria.
- The green manure crop should be sown with a higher seed rate than usual so that there will be a good canopy produced very quickly. The usual seed rate for sannhemp is about 40 to 50 kg per hectare.
- The production of green manures is limited by the plant food elements (plant nutrients) deficient in the soil. Leguminous green manure plants are able to fix atmospheric nitrogen. When the soil is rich in nitrogen, leguminous plants do not fix nitrogen so well, as when grown in poor soils. The application of phosphatic fertilizers improves the growth of leguminous crop markedly and promotes the fixation of nitrogen by profuse nodulation.
- The best stage at which the crop should be incorporated in the soil as a green manure is when it reaches the flowering stage. Sannhemp crop is ready for turning in at the age of 7 to 8 weeks whereas dhaincha crop is ready for incorporation when 5 to 6 weeks old.
- Burying of green manure crop is done in the different ways. In some case the plants are cut close to the ground and the green material is put in the furrows opened by a mould board plough, and is later buried. One of the methods is to plank the material down with a heavy plank or leg, and then plough the field. The other method is to mix the uprooted or cut plant material (green leaf manure) by means of disc harrow. In drier areas this method has been proved to be better than ploughing in.
- Immediately after ploughing the material, careful packing of the soil should be done by suitable implements to ensure proper decomposition. Packing (compacting) is especially necessary if the soil moisture supply is deficient.
- Under certain favourable circumstances, green manure crop such as dhaincha can be sown in between the rows of cotton or Jowar. When the dhaincha is sufficiently tall it can be uprooted and mixed with the soil by inter-cultivations.
- Under limited moisture supply condition, it may be advisable to grow the green manure crops in one field and add the green material to another field. By doing this, the moisture required for growing the green manure crop is saved.
- For proper decomposition, in light soils the crop should be buried deeper than that in the heavy ones.

**Selection of Green Manure Crops: The characteristics of good green manuring crops are given below:**

- It should be quick growing, so that timely incorporation of green manure crops may be done. For example, Sannhemp and Mung.
- It should yield large quantities of green material in a short period. For example, Dhaincha.
- It should be preferably from the legume family so that nitrogen would be fixed in addition to green matter production. For example, Dhaincha and Sannhemp.
- It should be tender (more leafy growth than woody growth) so that its decomposition will be rapid. For example, berseem and lobia.
- It should have a deep root system so that it would penetrate deep layers of the soil. Thus, it utilizes nutrients and water from deeper layers and also helps in developing good soil structure. For example, sannhemp and dhaincha.

**Principles of Green Manuring:**

- Green manure crop should be grown in irrigated area or where annual rainfall is more than 30 inches. Lack of moisture is harmful for the growth of the crop as well as for

decomposition. An un-decomposed crop may harm the subsequent crop by upsetting the balance of carbon and nitrogen.

- After green manuring subsequent crops should be sown in well decomposed crops. Un-decomposed green manure may cause poor germination, and problem of diseases and insects.
- In irrigated area, the best stage at which the crop should be incorporated in the soil as a green manure is when it reaches the flowering stage. In rainfed or dry region, green manure crop should be incorporated before flowering stage (tender or leafy stage).
- Green manure crop should be quick growing.

### **Advantages of Green Manuring**

**Green manuring has the following advantages:**

- ❖ Green manuring adds organic matter and nitrogen to the soil. Fresh organic matter (leaves, twigs, roots etc.) decomposes and liberates plant nutrients. Leguminous green manure crop fixes nitrogen in the soil.
- ❖ Green manuring checks weed growth. The plants used for green manuring are usually, grow very quickly and thus, tend to suppress the growth of weeds.
- ❖ Green manuring crops aid in the reclamation of saline and alkaline soils by the release of organic acids.
- ❖ Green manuring increases the availability of plant nutrients. When fresh organic matter decomposes, carbon dioxide is evolved, more organic acids are formed and as a result, plant nutrients become more soluble in organic acids and therefore, more readily available to crops (Please see 'Advantages of Organic Matter').

### **Disadvantages of Green Manuring**

- ❖ Growing green manure crops in rainfed area where annual rainfall is less than 30 inches, there is a likelihood of harmful effects. The reason for this is because the green material added to the soil does not decompose readily due to lack of sufficient water. Retarded decomposition results in nitrogen starvation of the following crop. (Becker, M. (2001).
- ❖ Due to improper decomposition, problems of insect-pests and diseases may come up.
- ❖ Sometime the cost of green manuring is more than chemical fertilizers.
- ❖ Green manure crop may be taken as a catch crop between the main crops. Due to late sowing of green manure crop and insufficient moisture, burying of green manure crop become late. Therefore, sowing of main crop may not be done or delayed. If rainfall is scanty, growth of green manure crops would be less vigorous which results in less production of green matter.