

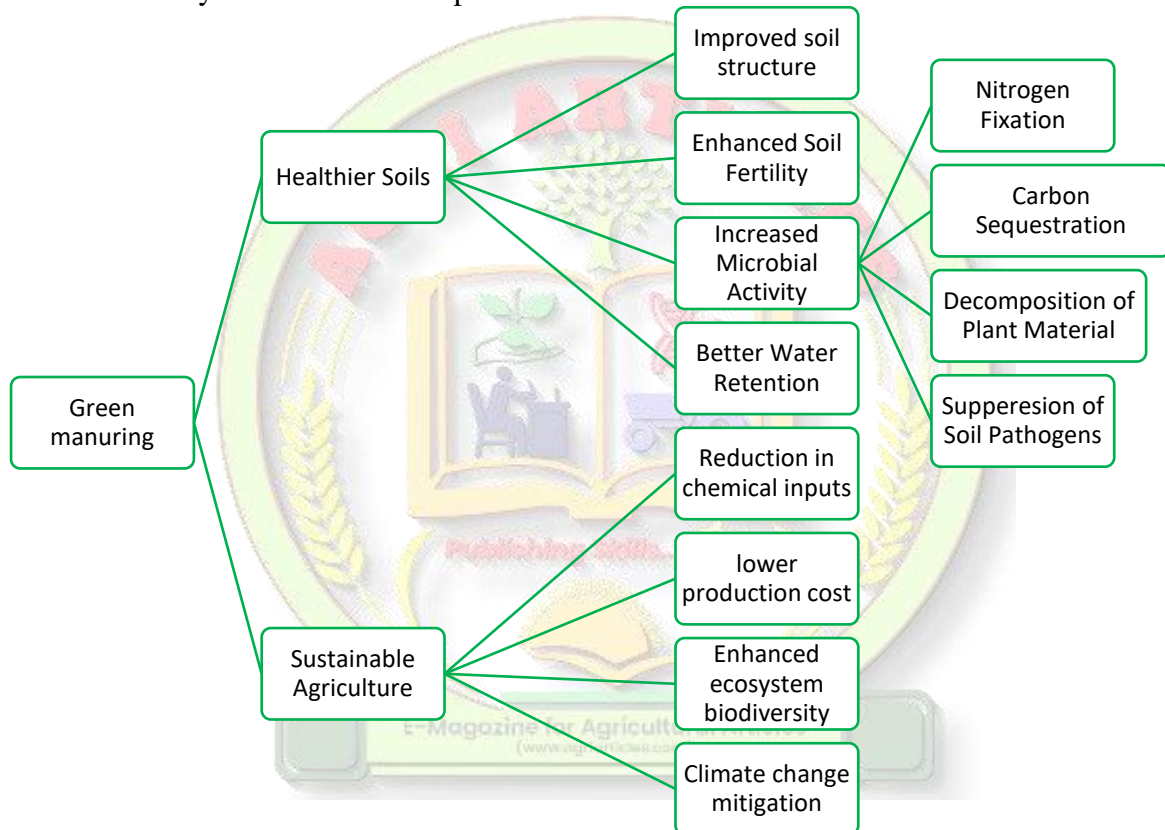
The Comprehensive Benefits of Green Manuring: Cultivating Healthier Soils and Sustainable Agriculture

(Vijay, Gaurav Singh, Pankaj Kumar and Vinod Kumar)

Directorate of Research, Maharana Pratap Horticultural University, Karnal, Haryana

*Corresponding Author's email: vs.apfs@mhu.ac.in

Green manuring is a component of agriculture that has been acting as a pillar and provides its contribution in health of soil, crop yield enhancement and sustainable farming practices. Incorporation of green manures in the field improves fertility of soil, its structure and biodiversity with minimum impact on environment.



- Enhanced soil fertility:** Different legumes and grasses are specifically grown and plowed into the field.
- Nitrogen Fixation:** Leguminous crops are known for their symbiotic relationship and the role of bacteria like *Rhizobium* in nitrogen fixation in root nodules. Atmospheric nitrogen is converted into plant usable forms, enriching the soils and reducing the need of synthetic fertilization (costly and not environment friendly).
- Nutrient cycling:** scavenging previous crop residual nutrients prevent leaching of nutrients. With the decomposition of these crops, nutrients are released in the soil where subsequent crop can utilize them.

2. Soil structure and Organic matter:

- **Soil structure:** organic matter improvement enhances soil aggregation, water infiltration, root aeration and penetration. For healthy crop growth a good soil structure is prerequisite.
 - **Water Retention:** with increased in soil organic matter the ability of the soil to hold water increases which further reduces the need of frequent irrigation and also supports plant in drought like situation. This plays a vital role in areas with irregular rainfall pattern.
 - **Microbial Activity:** microbial activity have been found to be positively co-related with availability of soil organic matter which serves as food source for them. Fungi like *Mycorrhizae* play important role in suppression of various diseases and in nutrient cycling process.
- ## 3. Weed suppression:
- Green manure crops are fast growing and have dense canopy which restrict the sunlight for weeds and eventually helps in their control.
- ## 4. Soil erosion prevention:
- **Ground cover:** A protective covering is provided by the foliage of green manuring crops reducing the raindrops impact directly on the surface of soil and thereby resulting in minimized displacement of soil particles. Similarly, these crops act as a shield from strong winds.
 - **Root system:** the anchoring effect of green manure crops prevent soil erosion. Selection of crop may depend on the agro-ecological conditions of the area.
- ## 5. Enhancing Biodiversity and Ecosystem Health:
- **Beneficial organisms habitat:** These crops create natural habitat for beneficial insects, soil organisms etc. this enhanced biodiversity improves pollination and helps in natural pest control.
 - **Soil biodiversity:** Green manure crops increases soil biodiversity and allows development of beneficial communities of microorganisms which further plays crucial role in organic matter decomposition, disease suppression and nutrient cycling.
- ## 6. Mitigating climate change:
- Green manuring promotes carbon sequestration. As these crops grow they convert atmospheric carbon dioxide into plant constituents. When these green manure crops are incorporated in soil, the organic carbon is credited into soil system. This process reduces carbon emission impact in the environment and helps controlling greenhouse gases concentration in atmosphere.