GREEN MANURING AND ITS ADVANTAGES

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Abstract

Green manuring is an agriculture practice in which green crops are grown and then ploughed into the soil while still green to improve its fertility and structure. The value of green manuring lies in the fact that organic matter is worked into the soil and the organic matter in soil is recognized as being one of its most valuable constituents. The soil nitrogen is associated with the organic matter and the decay of this organic matter influences the availability of the soil minerals. For these reasons, it has seemed advisable to discuss the amount of organic matter in soils, its source, and the influences which operate for the destruction of or the increase of organic matter, as well as the part it plays in the soil. Such a discussion is a necessary preliminary to the study of green manuring. The main purpose of green manuring is to enhance soil fertility and health by adding organic matter and nutrients, especially nitrogen, through the decomposition of green plant material. It also aims to improve soil texture, increase microbial activity and promote sustainable crop production.

Keywords: Green manure, leguminous crops, nitrogen fixation, organic matter and soil fertility.

Introduction

Green manuring is a traditional farming technique that includes adding green plant tissues to the soil. As a result, it increases soil fertility, improves biological activity, enhances soil health through nutrient mineralization, and reduces agricultural crop production costs (ICAR, 2020). Furthermore, it increases organic matter and total soil nitrogen concentrations, which might improve soil physical conditions and overall soil productivity (Kumar et al., 2014). Increasing the amount of green manure enhances natural carbon in the soil, and the addition of nitrogen can help rice develop more effectively. As a result, green manure can be beneficial in boosting soil fertility, increasing crop yield, and reducing the risk of nitrogen loss (Anonymous, 2008). It is a practical and advantageous technique to increase rice output while reducing the usage of artificial fertilizers. Moreover, it reduces nitrogen inputs through the potential use of green manure in crop growth (Singh et al., 2018).

In addition to these benefits, green manuring helps filter soluble nutrients and supports beneficial root microorganisms, thereby enhancing bulk density, water conductivity, and other physical and chemical characteristics of the soil over time (ICAR, 2020). It can also increase soil porosity, water-holding capacity, enzyme activity, organic matter, microbial biomass carbon, and overall soil quality (Kumar et al., 2014). As a result, the practice of green manure farming as an intercrop, main crop, or bare fallow depends on the soil and climatic conditions of the region to restore soil fertility in an eco-friendly, low-cost, and sustainable manner while also improving soil physical, chemical, and biological properties that influence crop growth and yield (Singh et al., 2018).

What is Green Manuring?

Green manuring is the practice of growing specific crops, known as green manure crops, and then ploughing them back into the soil while they are still green. This process improves soil fertility and structure by adding organic matter and nutrients, particularly nitrogen from legume crops. It also improves soil health by enhancing water retention, aeration, and preventing erosion.

Types of green manure crops

Green manures are essentially of two types:

1. Legumes (clover family)

Legumes develop on their roots (in association with special bacteria) nodules that have the ability to take nitrogen from the air and convert (fix) it into a form that the plant can use. This can then be utilised by crops grown after the legume has been ploughed and incorporated into the soil.

2. Non-legumes

Non-legumes do not fix nitrogen, but can provide useful amounts of organic matter and retain nutrients that might otherwise be leached. Some, non-legume green manures are very quick growing and can be incorporated within gaps in production during the growing season. Green-manures suitable for Northern Ireland, and their uses. A wide range of green manures is available, but some are less likely to be successful in Northern Ireland due to soil and climatic factors.

Table1: Common Leguminous Green Manure Crops and Their Uses (Kumar et al., 2014).

Legume-based	
Crop or mixture	**Typical issues**
Red clover	Medium term in vegetable rotation
Red clover / Italian ryegrass	2-year in vegetable rotation or during set-aside or for composting
Alsike clover	Medium term - tolerates acidic, damp soils
White clover	Under sowing in vegetables and polytunnels - for example, variety Kent Wild
Field beans	Autumn sown - overwintered - spring incorporated
Vetches (tares)	Medium or long term (overwintered) - smothers weeds
Peas / oats / vetch	Medium term - bulky - can be composted
Lupins	Late spring sown – incorporated prior to autumn planting - tolerates acid soils – produces a lot of nitrogen

Non - Legume - based	
Crop or mixture	**Typical issues**
Grazing rye	Grazing rye autumn sown - bulky - bulids soil strutcure
Mustard*	Late spring sown - short term catch crop
Fodder radish*	Autumn sown overwinted
Sunflower	Late spring sown - incorporated prior to autumn planting
Buckwheat	Short term during summer

Green manures for building soil fertility during conversion

It is quite common to grow green manures, particularly legumes, during the land conversion period to build soil fertility and structure. On arable aid registered land this is sometimes done on land under a 'set-aside' requirement, and some concessions are available for organic producers as to how legumes can be utilised as set-aside crops.

Green manure in field vegetables

Where a farm-type rotation including vegetables is in operation, the incorporation of grass clover leys and grazing livestock probably reduces the need and opportunity for using green manures. In this situation, field vegetables are likely to be grown as a rotational break that also allows reseeding of the leys. Green-manures might, however be grown say between two vegetable crops, or a vegetable crop and one or two cereal crops, if an extended break is desired.

Green manure in market gardens

In a market garden, the situation may be very different, particularly if acceptable manures free from Genetically Modified Organisms (GMOs) are not readily available. Because of restrictions on sources of brought-in manure, concerned with maintaining freedom from GMOs, it is imperative that market-garden vegetable growers make maximum use of green manures for providing organic matter and nutrients, and as a major part of the weed control programme. In practice this means that within the cropping rotation green manures should effectively account for:

- At least 1/4 of the rotation when supplemented with manures
- 1/3 to 1/2 of the rotation when manures are not available

Green manure for weed control

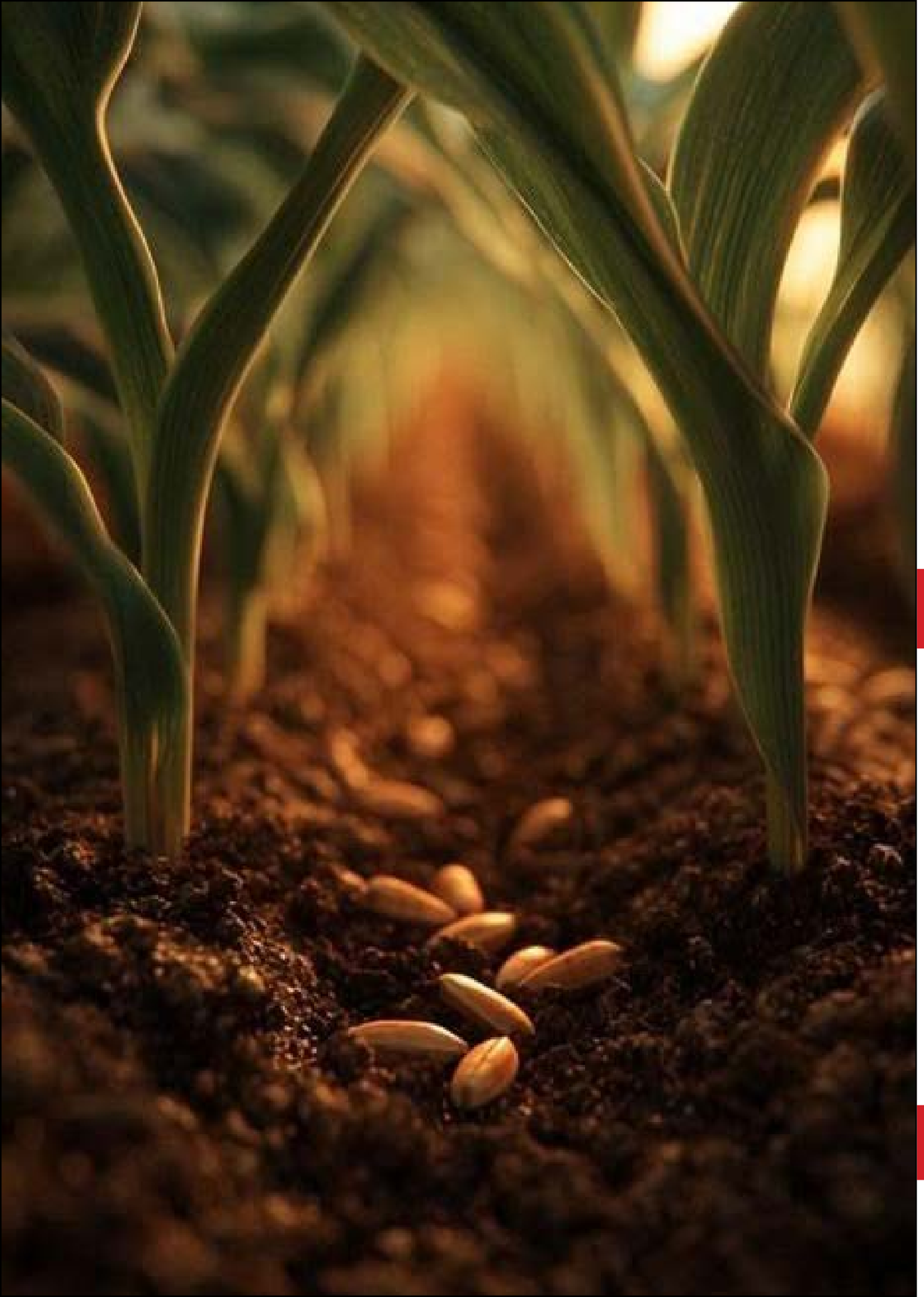
Green manure crops are an effective tool for controlling weeds. The fast growing, short-term green manure between crops will smother weed seedlings, and the cultivations necessary to incorporate the green manure will further reduce the weed burden. This can be taken a stage further by under sowing suitable crops with a green manure such as the small-leaved Kent Wild White clover, which will smother weeds, fix nitrogen for following crops and protect the soil surface. A well-established over-wintering green manure will smother weed seedlings and some, notably grazing rye, will prevent weed seed germination as they decompose after incorporation into the soil. Green manures as over winter cover crops. After a crop has been removed, bare soil is vulnerable to damage to its surface and structure by rainfall, particularly during the winter. A green manure sown in the autumn will protect the soil surface. In addition, nutrients still available for plant growth can be leached out of the soil and lost into watercourses where they can cause pollution. As well as acting as a cover crop a hardy green manure crop will mop up soluble nutrients, and retain them for release when the green manure is incorporated in the spring.

Advantages of green manuring

- Green manures add organic matter to the soil and stimulates activity of soil microorganism.
- Green manure improves the structure of the soil thereby improving WHC decreasing run off and erosion.
- Green manures take nutrients from lower layers of the soil and adds to the upper layer of soil.
- Green manure increases the availability of certain plant nutrients like NPK.
- Green manure improves soil structure and soil tilth. It also improves aeration in rice soils by stimulating the activities of surface film of algae and bacteria.
- Green manuring increases the yield of crops to an extent of 15-20% as compared to non-green manuring fields.

Limitations of green manuring

- Under rain fed conditions, the germination and growth of succeeding crop may be affected due to depletion of moisture for the growth and decomposition of green manuring.
- Green manuring crops inclusive of decomposition period



occupies the field least 75-80 days which means a loss of one crop.

- Incidence of pests and diseases may increase if the green manuring is not kept free from them.

- A green manure crop may compete for time, labour and water, the cost of which must be balanced against the cost of inorganic fertilizers.

- Non availability of good quality seeds restricts raising of green manure crops.

Conclusion

Therefore, it can be concluded that green manures improve soil structure, letting more air into the soil and improving drainage. Organic matter helps sandy soil hold more water and not drain so quickly as a result of increased aggregate stability and porosity. Also, organic matter reduces rate of runoff and soil erosion. Change in chemical property of soil could be clearly observed. leguminous green manure crop increases nitrogen level by fixation.

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