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ROLE OF BROWN MANURING FOR EFFECTIVE WEED MANAGEMENT

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INTRODUCTION

Today's agricultural environment is characterized by increased cultivation costs and decreased input availability. In India, farming methods are currently being redefined, and resource conservation techniques are receiving more attention. Weeds represent a major biotic obstacle to global agricultural output. They compete with crops for resources including sunshine, water, minerals, and space in addition to hosting insects and viruses. Weeds reduce the yield and quality of agricultural goods and increase the overall cost of agriculture. The two things that can most likely lower crop output are diseases and weeds. Weeds can cause varying agricultural production losses, up to 100% yield loss if left unchecked. These losses can be attributed to weed species, crop type, weed population, emergence timing, key period of competition, etc.

The most common weed control technique in developing countries, manual weeding, is becoming less common due to growing agricultural wage prices and the migration of rural laborers to cities. Hand weeding is gradually being replaced by the use of herbicides. But over-reliance on herbicides with similar modes of action has led to the development of herbicide-resistant weeds an improper approach. Herbicide-resistant weeds currently exist in more than 500 different scenarios. These issues and concerns have forced and motivated agronomists to develop novel, ecologically friendly weed management strategies, such as brown manuring, and to consider integrating these with the application of herbicides. There are several choices; one of them, "brown manuring," is a relatively new development for the paddy eco-system and is also gaining popularity as an agricultural method.

Traditionally, farmers grow crops for green manure before rice culture and incorporate it by puddling before transplanting rice seedlings. This necessitates more tillage operations because green manuring causes soil moisture loss and requires additional fuel and irrigation water. Farmers have not been able to fully benefit from green manuring throughout the rice-growing season because of water shortages during the height of the summer.

BROWN MANURING

Growing additional crops in standing field crops and killing them with herbicide so that their residue can be used as manure is known as "brown manuring." It is known as brown manuring because the residue turns brown once the excess crop is killed.

An alternative to "no-till" green manuring, brow manuring involves using a non-selective herbicide to dry out the crop and weeds during the blooming period rather than tilling them out.

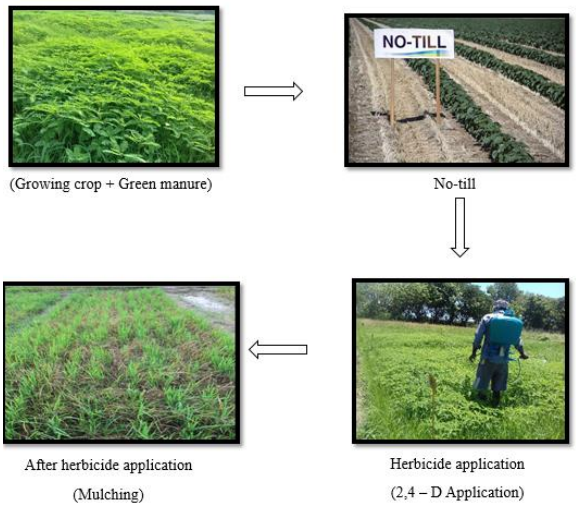

Fig. 1. Concept of brown manuring

This method involves growing Sesbania or other green manure crops in standing cereal crops, killing them with herbicide, and then manuring the crop by leaving the plant residues in the field alongside the main crop without incorporation or in-situ plowing until the residues break down naturally in the soil. The goal is to add organic manure in addition to suppressing weeds by creating shade (fig.1).

Green manuring Vs Brown manuring

Items	**Green manuring**	**Brown manuring**
Definition	It describes the movement of green, undecomposed plant matter through the soil's top layer.	It describes the use of herbicides to destroy a green manuring crop prior to blooming.
Crop Incorporation	Green, actively developing plants are incorporated into the soil.	Alongside the primary crop, brown-colored dead plants decompose naturally.
Risk of soil erosion	It may leave light-textured soil vulnerable to loss due to soil erosion and structural damage.	Since the plant remained in place and protected the lighter soil, there is less chance of erosion.
Process of decomposition	Decomposition requires the microbial population.	Desiccated by selective herbicides.
Methods of cultivation	It might be either ex-situ (green leaf manure) or in situ (green manure).	Only in situ is possible.

SELECTION OF BROWN MANURING

Crops Suitable for Brown Manuring: Both non-leguminous and leguminous plants can be used for brown manuring.

Non-leguminous crops: The non-leguminous crops that provide only organic matter to the soil are used to a limited extent.

Examples: Niger, Wild indigo, etc.

Leguminous crops: Crops provide organic matter along with nitrogen to the soils. The legumes are preferably used, and they can fix atmospheric nitrogen with the help of its nodule bacteria.

Examples: Sun hemp, Dhaincha, Mung, Cowpea, Lentil, etc.

SELECTION OF COVER CROP FOR BROWN MANURING

The choice of crop for brown manure is essential since intense competition with larger

crops may have detrimental effects and lower yield. In an ideal world, the primary crop and the brown manure crop would have complementary resource uses and distinct spatial and temporal niches to optimize resource use. The best crop species that can maximize weed control, fix nitrogen from the atmosphere, and reduce input costs and risk. The selection of brown manure plants should be based on several factors, including the availability of affordable and healthy seeds, ease of cultivation, high vigor and dry matter production in a short amount of time with no or less competition from weeds and crops, respectively, high land coverage to reduce wind erosion and conserve soil moisture, and short life span, high carbon sequestration potential, etc.

METHODS OF INCORPORATING PLANT RESIDUES INTO THE SOIL

Sesbania and rice plants are co-cultured in the Brown Manuring technique, where the sesbania is allowed to grow before the rice plant develops a woody stem, either before, after, or as a mixed crop with rice. The plant is killed by applying 500 g of 2,4-D ester ha-1. In green manure leaves that were becoming brown, the application of a post-emergence herbicide spray caused chlorophyll loss. Afterward, the earth can absorb the brown-colored plant leftovers. When Sesbania plants are sprayed, they turn brown and begin to die after four to five days. The leaves fall to the ground, forming mulch that suppresses weeds. It strikes just Sesbania plants, not rice plants because it is a selective herbicide, i.e. The down-knocking impact is the term for this. The remaining material can be integrated into the soil to decrease soil erosion, boost soil nutrient availability, and inhibit weed development.

REASONS FOR ADOPTION OF BROWN MANURING

A growing number of farmers and researchers have taken an interest in brown manuring because of its many benefits. By providing nutrition organically and so reducing environmental threats to some extent, this environmentally friendly method aids in replacing 25% of inorganic fertilizer (particularly nitrogen through BNF by leguminous brown manure plants). Not only does it provide the crop with a variety of macro and micronutrients, but it also enriches the soil with organic carbon and enhances its physical attributes, such as its structure and ability to retain water. To some extent, evaporated water loss can be prevented by using fallen leaves as a surface mulch or cover. Additionally, the decomposition of these wastes occurs rapidly, providing the soil with additional nutrients, particularly nitrogen. The herbicide-killed plants resist soil erosion because they stay upright after being knocked down.

ADVANTAGES OF BROWN MANURING

- During the early stages of crop growth, brown manuring is an environmentally friendly way to control weed growth and population.
- It increases the soil's organic carbon content and earthworm population.
- It improves the physicochemical characteristics of the soil (soil structure, organic carbon, bulk density, and pH).
- Legume brown manuring crops use biological nitrogen fixation (BNF) to supply nitrogen to component crop plants, which allows for the replacement of a substantial portion of nitrogenous fertilizer.

- Brown manuring increases crop yield and provides farmers with a financial benefit because it enhances soil fertility, lessens weed competition, and has other beneficial impacts. It can also minimize runoff, reduce wind erosion, and retain soil moisture.

CONCLUSION

Brown manuring is a cutting-edge, ecologically friendly weed-control technique that not only gets rid of weeds but also improves the soil, holds onto moisture, boosts crop productivity, and gives farmers extra money. Farmers need to be made more aware of this practice because it is easy to implement and reasonably priced, making it ideal for marginal farmers without access to resources.