



Integrated Nutrient Management: Components, Advantages and Constraints

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The greatest challenge in today's world is food production whose demand is rising day by day with the increasing population. The food security has to be ensured by conserving the natural resources and safe guarding the environment. In order to achieve this it is very necessary to maintain the soil fertility and increase the food production on sustainable basis. Integrated nutrient management (INM) plays a key role here by sustaining the desired productivity through management of nutrient sources of organic, inorganic and biological components. It involves the proper combination of organic manures, green manures, crop residues, chemical fertilizers and biofertilizers to maintain the soil fertility and nutrient supplying capacity for achieving the target crop production. INM helps to meet the growing nutritional demands of the people without harming the environment.

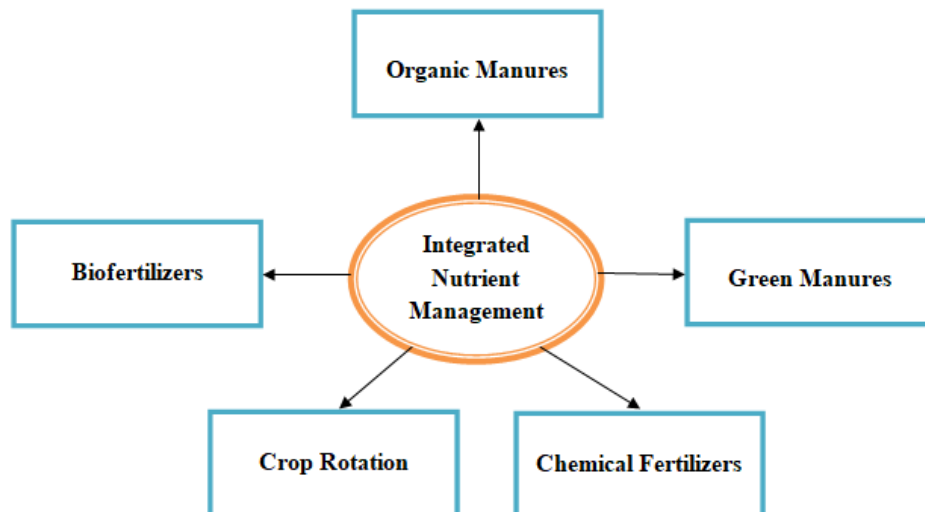
Introduction

Green revolution in India was started to feed the population of the country and address the hunger crisis. It involved usage of high yielding varieties, irrigation facilities, chemical fertilizers and pesticides. It improved the food grain production but the large scale non judicious application of chemical fertilizers led to the soil and environmental pollution. The intensive agricultural practices followed resulted in the decline of soil fertility and nutrient use efficiency and contributed to the degradation of soils. The nutrient supplying capacity, water infiltration, and water retention is hampered in the degraded soils. Therefore there is a need for a way to increase the agricultural productivity which is environmental friendly, economically viable and sustainable. The balanced nutrient application is also required to maintain the soil fertility on the long run. Integrated nutrient management can be a perfect solution to fulfill this need. It is the optimum combination of organic, inorganic and biological sources of nutrients in a cropping system to achieve the optimum yield without deteriorating the environment in a sustainable manner. The application of chemical fertilizers alone will cause the environmental pollution and does not achieve sustainable food production. Therefore the combined application of organic sources like farm yard manure, compost, vermicompost, crop residues, green manures and inoculation of nitrogen fixing legumes in cropping systems and biological sources like biofertilizers in conjunction with chemical fertilizers will help in maintaining soil health, crop productivity and nutrient use efficiency.

Components of Integrated nutrient management

1. Organic manures: The organic manures are usually prepared from the plant residues and animal wastes. It is comprised of bulky organic manures and concentrated organic manures. The bulky organic manures are applied in large quantities as they are low in nutrient composition. The bulky organic manures include farm yard manure, compost, vermicompost

and biogas slurry. The concentrated organic manures contain higher percentage of plant nutrients compared to bulky organic manures. The concentrated organic manures include oil cakes, bone meal, blood meal, meat meal and fish meal. These organic manures provide macro and micronutrients and improve soil physical properties like structure, porosity and water holding capacity. They also improve the nutrient availability to plants.



2. Green manures: Green manuring is a practice of ploughing or incorporating the undecomposed fresh green plants into the soil. The in situ green manuring and green leaf manuring are the two types of green manuring. Green manuring in situ involves growing of green manuring crops and burying them in the crop field. Sunhemp, cowpea, dhaincha, green gram and cluster bean are some of the green manure crops. Green leaf manuring involves the collection of leaves and tender twigs from trees and shrubs and incorporating them into the crop fields. Glyricidia, pongamia, neem, mahua and subabul are some of the green leaf manuring plant species.

3. Chemical fertilizers: The chemical fertilizers are known to contain nutrients in higher and definite concentrations. They need not be applied in large quantities like bulky organic manures. They are easily and readily available plant nutrients. However the balanced use of the chemical fertilizers based on soil test recommendation is essential in to avoid soil and environmental pollution.

4. Crop rotation: The practice of growing different crops on the same piece of land one after the other in a specific period of time is known as crop rotation. It helps to improve the soil fertility and reduces the pest, disease and weed incidence. The incorporation of legumes in the crop rotation helps in biological nitrogen fixation and increases the availability of nitrogen to host plant. They also improve the microbial activity in soil, restore organic matter and improve the soil physical and chemical properties.

5. Biofertilizers: Biofertilizers are carrier based or liquid live formulations of beneficial microorganisms. They include nitrogen fixers, phosphorus solubilizers and mobilizers and plant growth promoters. Biofertilizers are eco friendly and cost effective. They improve the soil organic matter content, microbial activity and soil physical properties like soil porosity, soil structure and water holding capacity.

Advantages of Integrated Nutrient Management

- **Crop productivity:** Adoption of INM helps in the better nutrient availability and absorption of essential plant nutrients resulting in good plant growth and productivity.
- **Soil health:** Application of organic manures, green manures, biofertilizers and incorporation of legumes in the crop rotation improves the physical and biological

properties of soil. It also increases the soil organic matter content making the soil healthier.

- **Utilization of crop residues:** INM involves in the utilization of crop residues and wastes effectively which acts as an additional source of nutrients.
- **Environmental benefits:** INM encourages judicious use of chemical fertilizers and reduces the soil, water and environmental pollution and soil degradation.
- **Profitability:** INM will minimize the total cost of production leading to better returns and increase farmer's income.
- **Food security:** INM enables healthy food production and meets the demands of the growing population.

Constraints of Integrated Nutrient Management

- **Availability of inputs:** The availability of organic manures, chemical fertilizers and biofertilizers may be a constraint in local and remote areas.
- **Lack of knowledge:** Farmers may not have proper information on balanced utilization of resources.
- **Economic conditions:** The economic conditions of the farmers must also be considered as they lack sufficient funds to purchase the fertilizers and manures.
- **Land holdings:** The farmers in India majorly have small holdings which makes it difficult to implement INM.
- **Time and labour intensive:** INM is time and labour intensive as it requires extra attention in application of organic manures, chemical fertilizers and biofertilizers.

Conclusion

Integrated nutrient management is one of the best options to meet demand of increased food production by conserving the natural resources and maintaining the environmental quality. Environmental pollution and degradation of soil is becoming an issue of serious concern due to excessive use of chemical fertilizers in crop production. INM can prevent the excessive use of chemical fertilizers and nutrient losses to the environment. It also mitigates the declining soil fertility in the cropping systems and ensures food security by achieving high yields.