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# INTEGRATED NUTRIENT MANAGEMENT IN AGRICULTURE

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## INTRODUCTION

Integrated nutrient supply, usage or managing systems (INM) encompasses effective and prudent supply, usage or supervision of all the major elements of plant nutrient resources: chemical fertilizers in concurrence with animal manures, compost, green manures, legumes in cropping system, bio-fertilizers, crop residues, or recyclable waste and other locally available nutrient resources for nurturing soil fertility, health and production. The excess usage of synthetic fertilizers with minimum application of organic inputs results into nutrient deficiencies, deterioration of soil and also causes environment pollution. It also affects the sustainability of agricultural production. Sustainable agricultural production includes the management of soil organic carbon, use of organic manure such as animal manure, green manure, crop residues, and sewage sludge. Since only organic manure cannot fulfill the nutrient demands of agriculture crops, hence integration of fertilizers and organic sources

is the need of the hour. Under such circumstances, integrated nutrient management has come up as finest technology in present era. The integrated nutrient management technology enriches the agricultural crops with all essential nutrients, increases production, and sustains productivity & fertility of soil. It is the integrated use of organic manures and chemical fertilizers which encompasses crop rotations, introduction of legumes, and efficient management of water, weed and insect pest. The improvement in nutrient application methods in association with timing of application is helpful in achieving the maximum efficiency of integration of organic and inorganic source of nutrients.

## CONCEPT OF INTEGRATED NUTRIENT MANAGEMENT

For increasing agricultural production, nutrients play an important role. The method of application of fertilizer, its nature and time of application influences the recovery of added nutrients. For example, ammonium nitrate is the best source of nitrogen among nitrogenous fertilizer for upland crops whereas ammonical and amide form of nitrogen are considered best among nitrogenous fertilizers for rice crop. Integrated nutrient supply not only improves the physical, chemical and biological health of soil and increases the availability of both applied and native soil nutrients but also helps in retarding degradation of soil, deterioration of water and environmental quality by enhancing carbon sequestration and checking the losses of nutrient to water bodies and atmosphere. The one of the advantages of using organic sources is that it acts as slow release fertilizer and synchronizes the demand of nutrient by the plants, both in time and space, with supply of

the nutrients from the labile soil and applied nutrient pools.

**COMPONENTS OF INTEGRATED NUTRIENT MANAGEMENT (INM)**

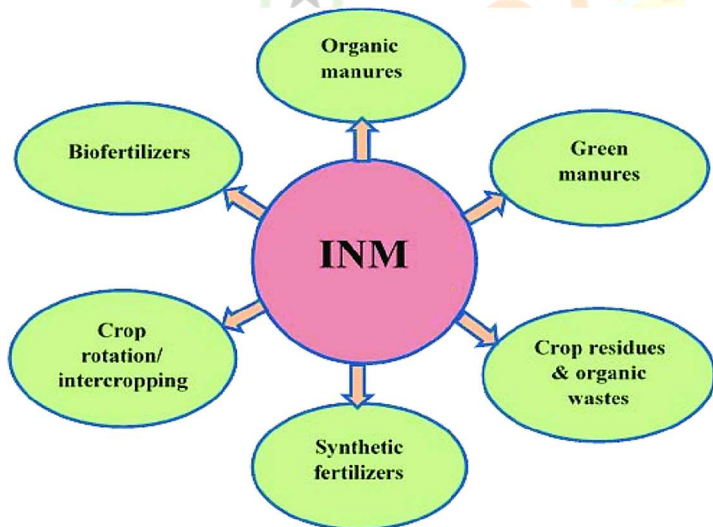
The various components of integrated nutrient management are:

1. Organic manures
2. Green manures
3. Crop residues & organic wastes
4. Synthetic fertilizers
5. Crop Rotation
6. Bio fertilizers

Fig1. Components of integrated nutrient management (INM)

**Basic concepts of INM include:**

1. Regulation of plant nutrient supply to an ideal level for nurturing the desired crop productivity.
2. Appropriate arrangement of chemical



fertilizers, organic manures, crop residues, N fixing crops proper for the system of land usage and ecological, social and economic situations.

The cropping system rather than an idiosyncratic crop and farming system rather than an individualistic field, is the focus consideration in this methodology for development of INM practices for numerous categories. Integrated nutrient management

system enhances the physical circumstances in terms of soil structure, aggregate stability, soil moisture retention and hydraulic conduction. Such enhancements in soil physical conditions support to soil fertility and productivity. Land deprivation and environmental pollution can be underestimated for sustainable agriculture.

The INM is soil fertility sustaining tradition because:

- It enriches the availability of both applied and native soil nutrients during the crop season.
- It orchestrates the nutrient requirement set by the plants both in time and space with supply of nutrients from soil and applied nutrient pool.
- It sustains and enriches chemical, biological, and physical soil health.
- It arrests deprivation of soil, water and environmental quality by elevating or minimizing the not inevitable seepages of fertilizer nutrients to water bodies and atmosphere.

**THE MAIN PRINCIPLES OF INTEGRATED NUTRIENT MANAGEMENT (INM)**

The main principle of INM includes:

- a) All sources of nutrients to optimize their input
- b) Matching soil nutrient supply with crop demand
- c) Reducing nitrogen losses. The timing and amount of nutrient application in accordance with the crop nutrient requirements, is necessary to achieve maximum yields and improve nutrient-use in integrated nutrient Management.

**GOAL OF INM**

Sustainable agricultural production encompasses the concept that organic reserves should be utilized to produce enhanced output and profits, particularly for low-income groupings, without lessening the



natural reserve base. In this perspective, INM preserves soils as storehouses of plant nutrients that are necessary for vegetative growth. INM’s target is to combine the usage of all natural and synthetic sources of plant nutrients, so that crop productivity improves in an effective and ecologically gentle manner, without surrendering soil productivity of future generations. INM have faith in on numerous factors, comprising applicable nutrient submission and protection and the relocation of information about INM procedures to farmers and researchers.

### **INTEGRATED NUTRIENT MANAGEMENT ON SOIL FERTILITY**

The increasing fertility of soil and crop productivity through use of chemical or synthetic fertilizers has often affected negatively on biogeochemical cycles. Also usage of fertilizer caused leaching and run-off of nutrients, especially nitrogen (N) and phosphorus (P) results in degradation of environment. The different sources of nutrients which enhance the productivity of crops are: manure, bio-fertilizers, soil, irrigation water, and atmosphere. The removal of nutrients by crops from the soil exceeded their restoration through fertilizers; manures causing unbalanced nutrients in soil.

### **INTEGRATED NUTRIENT MANAGEMENT ON CROP PRODUCTIVITY**

To increase the productivity of crops, there should be proper nutrient and soil health management. Integrated nutrient management among all strategies of sustainable crop production plays a significant role through reducing chemical fertilizers. Organic manures in combination of chemical fertilizers improve high yield of crop as compare to only fertilizers. The

addition of organic manure, lime and bio-fertilizers enhanced soil organic carbon, moisture retention capacity, infiltration rate. Bio fertilizers promote fertilizer nutrient use through biological nitrogen fixation systems, which further solubilize fewer mobile nutrients and leads to stable and sustainable agriculture system.

### **CONCLUSION**

Agriculture continues a soil-based industry, there is no way that needed yield escalations of the major crops can be accomplished without safeguarding that plants have an satisfactory and steady supply of nutrients. The applicable environment must occur for nutrients to be accessible to a particular crop in the suitable right form, in the proper absolute and relative quantities, and at the right time for high yields to be appreciated in the short and long term. Governments should launch sufficient testing and monitoring systems to assemble data on the nutrient cycle and nutrient balances in delegate areas throughout their rural economies. Governments should take the crucial steps to accelerate the widespread and responsible use of chemical fertilizers. Farmers will need government support to set up an environment in which they will be able to choose the appropriate technologies for their surroundings. In fact, larger application of organic and inorganic fertilizers in these areas could promote the environment and enhance yields.