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Integrated Nutrient Management in Relation to Soil Fertility

Isha Ahlawat[1]*, Garima Dahiya[2], Shital Kumar[3], Charan Singh[4]

[1]Ph.D Scholar, Department of Agronomy, CCS HAU, Hisar
[2]Ph.D Scholar, Department of Soil Science, CCS HAU, Hisar
[3]Ph.D Scholar, Department of Agronomy, ICAR- Indian Agricultural Research Institute, New Delhi
[4]Ph.D Scholar, Department of Soil Science, CCS HAU, Hisar

*Corresponding Author
Isha Ahlawat*

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INTRODUCTION

After green revolution, increasing the use of chemical fertilizers to increase the production of food and fibre is causing concern for declining productivity despite being supplied with sufficient nutrients. The decline in productivity can be attributed to the appearance of deficiency in secondary and micronutrients. The physical condition of the soil is deteriorated as a result of long-term use of chemical fertilizers, especially the nitrogenous ones. It also aggravates the problem of poor fertilizer nitrogen use efficiency (NUE). Excess nitrogen use leads to groundwater and environmental pollution apart from destroying the ozone layer through N_2O production.

Integrated nutrient management (INM) is the maintenance or adjustment of soil fertility and plant nutrient supply at an optimum level to sustain the desired crop productivity. In other words, integrated nutrient management is the use of different sources of plant nutrients integrated to check nutrient depletion and maintain soil health and crop productivity. This is done through optimization of the benefits from all possible sources of plant nutrients in an integrated manner. The basic concept of INM system is to maintain the plant nutrient supply to achieve a given level of crop production by optimizing the benefits from all possible sources of plant nutrients in an integrated manner, appropriate to each cropping system and farming situation. One major task of INM system will be at least to stop the ongoing loss of surface and top soil nutrients.

Principle of INM

The basic principle underlying INM is the maintenance and possible increase of soil fertility for sustaining increased crop productivity through the use of all possible sources, organic and inorganic plant nutrients required for crop growth and quality in all integrated manner, that's appropriate to each cropping system and farming situation within the given ecological, social and economic boundaries.

Attempts have been in the world to complement the use of mineral with organic sources of plant nutrients generated useful, though information on the complementary and synergistic effects of these materials on the yield of crops. Because organic sources of nitrogen are also improving soil structure and soil bioactivity which are not directly improved by mineral sources of N. The productivity of the crop for each kg of N may be better with organic sources (slow release of nutrient) than inorganic sources (quick release of nutrient). If the objective of INM is the balanced and effective use of various sources of plant nutrients then the strategy should be the mobilization of all available, accessible and affordable plant nutrient.

Component of INM

There are various components of plant nutrients for INM which can be applied in an integrated way. Some of these are chemical fertilizers, organic manures like FYM in situ, vermicomposting, Farm wastes like paddy straw, wheat straw, industrial waste, inclusion of legume crops in cropping system, biofertilizers like azolla, blue green algae, rhizobium, crop residues, green manuring either growing in the same field or incorporating of leguminous plant or leaves. Farmyard manure refers to the decomposed mixture of dung and urine of farm animals along with litter and left over material from roughages or fodder fed to the cattle. The entire amount of nutrients present in farmyard manure is not available immediately, about 30% N, 60-70% P and 70% K are available to the first crop. A mass of rotted organic matter made from waste is called compost. The compost made from farm waste like sugarcane trash, paddy straw, weeds and other plants and other waste is called farm compost. Green un-decomposed plant material used as manure is called green manure. It is obtained in two ways: by growing green manure crops or by collecting green leaf (along with twigs) from plants grown in wastelands, field bunds and forest. Green manure plants usually belonging to leguminous family and incorporating into the soil after sufficient growth. The plants that are grown for green manure are known as green manure crops. The most important green manure crops are sunhemp, dhaincha, pillipesara, clusterbeans and *Sesbania rostrata*. INM enhance the availability of applied as well as native soil nutrients, synchronize the nutrient demand of the crop with nutrient supply from native and applied sources, provide balance nutrients to crops, minimizes the antagonistic effects resulting from hidden deficiencies and nutrient imbalance, improve and sustain the physical, chemical and biological functioning of soil, minimizes the deterioration of soil, water, and ecosystem by promoting carbon sequestration, reducing nutrient losses to ground and surface water bodies and to atmosphere.