SUNSHINE AGRICULTURE
e-Newsletter

ISSN (E): 2583 – 0821

Sun. Agri.:e-Newsletter, (2022) *2*(3), 22-25

Article ID: 122

An Introduction to Integrated Nutrient Management (INM) Concept and Its Components

Sumit Bhardwaj*, Akshay Pareek, Amit Sharma and Mehak Nagora

College of Agriculture, CCS Haryana Agricultural University, Hisar, Haryana

Open Access

*Corresponding Author
Sumit Bhardwaj*

Available online at
www.sunshineagriculture.vitalbiotech.org

Article History
Received: 15.03.2022
Revised: 22.03.2022
Accepted: 27.03.2022

INTRODUCTION

What is Integrated Nutrient Management?

Integrated nutrient management (INM) is the use of different sources of plant nutrients like farm yard manure, fertilizers, vermicompost, biofertilizers etc. in an integrated manner to check nutrient depletion and maintain soil health and crop productivity. It is the maintenance or adjustment of soil fertility and plant nutrient supply at an optimum level to sustain the desired crop productivity. This is done through optimization of the benefits from all possible sources of plant nutrients in an integrated manner.

Why INM is needed?

The excessive and imbalance use of chemical fertilizers to increase the production of food and fibre is causing concern for the following reasons and have arisen the need for better integrated use of different sources of nutrients to avert these problems:

- Soils which receive plant nutrients only through chemical fertilizers are showing declining productivity despite being supplied with sufficient nutrients.
- The appearance of deficiency in secondary and micronutrients status.
- 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 nutrient use efficiency (NUE).
- Excess nitrogen use leads to groundwater and environmental pollution apart from destroying the ozone layer through N_2O production.

Concept of INM

The core premise of the INM system is to sustain plant nutrient supply in order to reach a particular level of crop production by integrating the benefits of all possible sources of plant nutrients in a way that is appropriate for given cropping system and farming circumstance. The integration of different sources should be such that it maintains or improves the soil fertility on long term sustained basis.

Principle of INM

The basic principle of INM is to maintain and possibly increase soil fertility in order to sustain increased crop productivity by using all available sources of plant nutrients, both organic and inorganic, in an integrated manner appropriate to each cropping system and farming situation within the given ecological, social, and economic boundaries. Attempts throughout the world to supplement the usage of mineral fertilizers with organic sources of plant nutrients have resulted in useful knowledge on the complimentary and synergistic effects of these materials on crop productivity. Organic sources improve soil structure and bioactivity, which are not directly improved by mineral sources. If the goal of INM is to utilise multiple sources of plant nutrients in a balanced and effective manner, the strategy should be to mobilise all available, accessible, and inexpensive plant nutrients.

Basic Components of INM

There are various components of plant nutrients for INM which can be applied in an integrated way. Some of these are mentioned below:

- 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
- Bio fertilizers like azolla, blue green algae, and *Rhizobium*
- Crop residues
- Green manuring either growing in the same field or incorporating of leguminous plant or leaves.

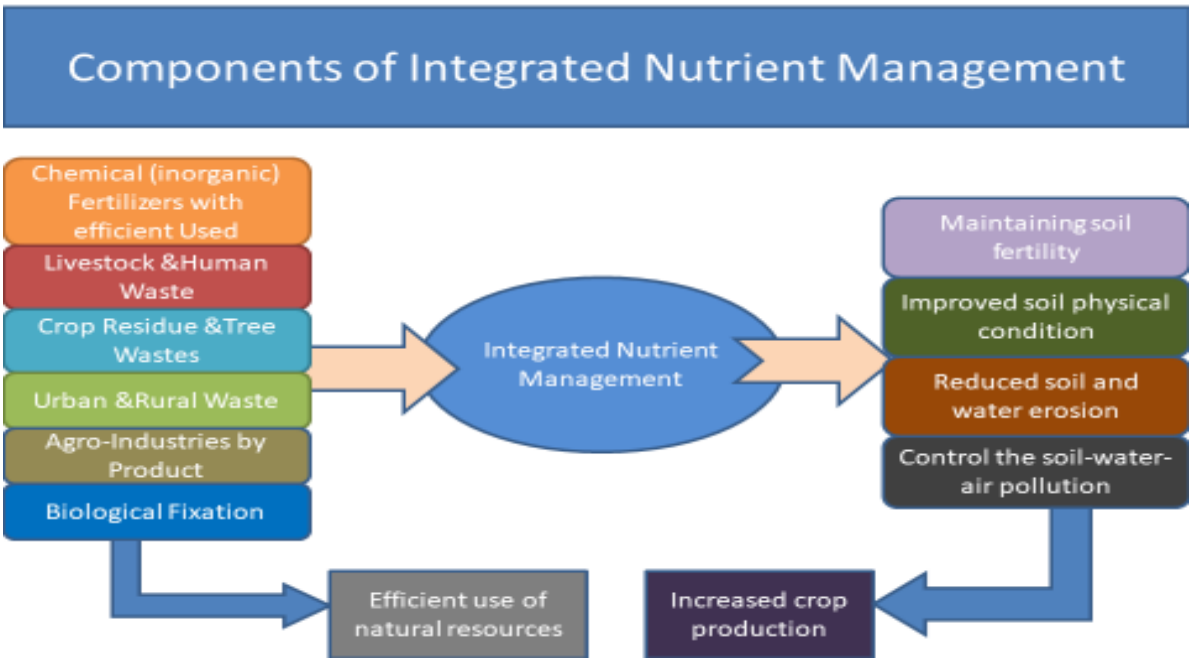
Farmyard Manure

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. On an average well decomposed farmyard manure contains 0.5 per cent N, 0.2 per cent P_2O_5 and 0.5 percent K_2O. 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.

Compost

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. The average nutrient content of farm compost is 0.5 per cent N, 0.15 per cent P_2O5 and 0.5 per cent K_2O.

The compost made from town refuses like night soil, street sweepings and dustbin refuse is called town compost. It contains 1.4 per cent N, 1.00 per cent P_2O5 and 1.4 per cent K_2O.



Green Manure

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.*

Vermicompost

Earthworm is use for decomposing residue to make compost is called vermicomposting, obtained product is called vermicomposting. For this, *Eisenia foetida, Perionyx exacavatus, Eudrillus euginiae* and *Lumbrius rubellus* are important. About 1000 adult earthworms can convert 5 kg waste into compost per day. The earthworm assimilate 5-10% of the substrate and rest passes through the alimentary canal and is excreted as cast. Earthworm cast contains nutrients, vitamins, hormones and antibiotics.

The earthworms through their casts and dead tissues supply about 60-90 kg N to the soil

Earthworms consume biomass and excrete it in digested form called worm casts. Worm casts are popularly called as Black gold.

Nutrient content of green manure crops and green leaf manure

Plant	Scientific name	Nutrient content (%) dry wt. basis		
		N	$P_2 05$	$K_2 0$
Green manure crops				
Sunhemp	*Crotalaria juncea*	2.30	0.50	1.80
Dhaincha	*Sesbania aculeate*	3.50	0.60	1.20
Green leaf manure				
Sesbania	*Sesbania speciosa*	2.71	0.53	2.21
Forest tree leafs		1.20	0.60	0.40
Green weeds		0.80	0.20	0.30
Pongamia leaf	*Pongamia glabra*	3.31	0.44	2.39

Night Soil

Night soil is human excreta, both solid and liquid. It is richer in N, P and K than farmyard manure and compost. Night soil contains on an average 5.5 per cent N, 4.0 per cent P_2O_5 and 2.0 per cent K_2O.

Sheep and goat manure

The dropping of sheep and goats contain higher nutrients than farmyard manure and compost. On an average, the manure contains 3 per cent N, 1 per cent P_2O_5 and 2 per cent K_2O.

Oil Cakes

After oil is extracted from oilseeds, the remaining solid portion is dried as cake, which can be used as manure. The oil-cakes are of two types:

- Edible oil-cakes which can be safely fed to livestock e.g. Groundnut cake, coconut cake etc.
- Non-edible oil-cakes which are not fit for feeding livestock e.g. Castor cake, neem cake, mahua cake etc.

Both edible and non-edible oilcakes can be used as manures. Nutrients present in oil-cakes, after mineralization, are made available to crops 7 to 10 days after application.

Average nutrient contents of oil-cakes Oil cakes

Oilcakes	Nutrient content (%)		
	N	P_2O5	K_20
Non-edible oilcakes			
Castor cake	4.3	1.8	1.3
Cotton seed cake (un-decorticated)	3.9	1.8	1.6
Karanj cake	3.9	0.9	1.2
Safflower cake (un-decorticated)	4.9	1.4	1.2
Edible oil cakes			
Coconut cake	3.0	1.9	1.8
Cotton seed cake (decorticated)	6.4	2.9	2.2
Groundnut cake	7.3	1.5	1.3
Linseed cake	4.9	1.4	1.3
Niger cake	4.7	1.8	1.3
Rapeseed cake	5.2	1.8	1.2
Safflower cake (decorticated)	7.9	2.2	1.9
Sesamum cake	6.2	2.0	1.2

Biofertilizers: are the living micro-organisms which improve plant nutrition by mobilising or increasing nutrient availability in soils.