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Role of integrated nutrient management on pulses and cereals

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Abstract
The integrated nutrient management is the main technique where all the components are used and the effect of INM causes the productivity of the soil more. Along with the usage of INM by farmers create awareness to use the fertilizers wisely and studies which are working on practices of INM are bringing more success in the term of yield and conservation of the soil. The legumes, cereals takes more advantage by the practices of INM. The recycling of nutrient like nitrogen and conservation of nutrient from the losses are the main boom in the approach of INM. The environment which are facing problem due to more soil pollution are also tackle by the reduction of overuse of chemicals and fertilizers. Several cropping system with INM makes its importance more and more and makes the agriculture resources more sustainable.

Keywords: Cropping system, INM, organic, sustainable

Introduction
The world population has been rising and it leads to over exploitation of resources. The agriculture resources like crops that are widely cultivated on the land are also impacted due to degradation of land. As the estimated data the food production at global level should increased by seventy percent in the coming year 2050 to meet the demand of world population (Bruinsma, 2009) [4]. To meet the demand of global populations the average annual increment of forty three million metric tonnes cereal production will be require. Integrated nutrient management is the concept where the uses of chemical, biological methods are involved. When the dosage of fertilizers has been increased the fertilizers part and native soil nutrient which were already used by grown crops especially when two or three crops grown annually. The application of inorganic fertilizers is not always a best option because it can deteriorate the land and it also cost more to the marginal farmers. From the medieval period there was an emphasis on the use of organic fertilizers like farm yard manure to crops. The usage of organic manure not only restore the fertility of soil but it can also improve the ability of the crop to take nutrient efficiently (P. A. Adeoye, S. E. Adebayo, and J. J. Musa). The modern concept of integrated nutrient management has revolutionized the agriculture world because this consists of integrated system of nutrient restore the fertility of soil and also maintains soil health. Apart from this it also restrict the overuse of fertilizers and pesticides and reduce the wastage of nutrient (Haddad *et al*., 2010) [11]. Despite of the fact that researches supports the usage of integrated nutrient management and insist the farmers to use more practices of INM. Apart from this there is a need of assistance which will be beneficial to famers from many spheres like scientific researcher, extension officer, government sector and other NGOs. To increase the more usage of INM farmers also put the efforts and achieved the goals of sustainable agriculture for better productivity of soil (W. Wu, *et al*., 2014) [20].

Concept of INM
INM which is the old and also the innovative techniques to manage the nutrient economically and this system benefits from the entire organic and inorganic source wisely.it consist of integration of the resources (Janssen, 1993) [14]. The main aim of nutrient cycling of N, P and K along with the use of macro and micro nutrient to contemporize the demand of nutrient by the crop and liberated into the environment. The losses like leaching, runoff, immobilization and volatilization which takes place in the year 1950 to 2010 are also comes under INM practices (Zhang *et al*., 2012) [22].

Moreover the aim of INM is to improve the soil physical properties like chemical, biological and also the physical properties that can increases the productivity of the soil. This steps also prevent the land from degradation of the soil (Janssen, 1993; Esilaba *et al*., 2004) [14, 8]. Awareness has risen on the use of INM to increase the productivity of crop but also conserve the resources of the soil. The use of organic manures like farm yard manure, residues of crop, chemical fertilizers, manures like green manure, cover crops, cropping system like intercropping, crop rotations, conservation tillage and other water conservation measures like drainage. These all practices can improve the structure of the soil and boost the plant nutrients. (Janssen, 1993) [14]. Along with it the other advanced techniques like deep placement of fertilizers and use of urea which is coated by neem that act like inhibitors that have been used to decrease the loss of nutrient. It also enhanced the uptake of nutrient to plants. (Zhang *et al*., 2012) [22].

Effect of INM on plant growth

Integrated nutrient management (INM) act as source of energy, organic carbon, and nutrient for growth of soil microbes and improvement of physical properties of soil and also have great effect on crops. Today we have a big problem that farmer say their field soil not able to take nutrients from soil. This is because their regular use of chemical and pesticides more and more. So the INM is technique of using minimum effective dose of sufficient and balanced quantities of organic and inorganic fertilizer with microorganism. This makes nutrients to more available and most effective for high yield. A field experiment was conducted in college farm of Dapoli which had split plot design and have three replication. The green gram was seed treated with Rhizobium and PSB biofertilzers @25g each per kg of the seeds. By three replications the plants were labelled with proper notations and used for recording the observation. The result was seen throughout germination on growth of plant and also on weed growth there will be less weed and overall growth has been improved. The variety name Phule mung 2 have more stover yield as compared to the other varieties. The agronomic parameters has also improved like number of leaves per plants, number of branches per plants and increment in height. Same findings were also observed by Abraham and Lal (2003) [2], (Yadav *et al*., 2007) [21] and Paramar and Thanki (2007). In addition to this there is an improvement in soil condition under organic matter addition. Use of organic manure and organic fertilizer will increase the availability of nutrients over a long period of crop. Better absorption of nitrogen facilitated vegetative growth. (Garai *et al*., 2014) [10].

Effect of INM on pulses

Nutrient imbalance is one of the major problems that can affect the yield and growth of pulses. Pulses required less fertilizer in comparison to cereals and oilseeds but the method of application is very important (Marimuthu *et al*., 2014) [15]. Pulses can meet their 80 to 90% requirement of nitrogen from their inbuilt mechanism of biological nitrogen fixation so that a small dose of 15-25kg of N ha-1 is sufficient to meet out the requirement of pulses. In recent years use of sulphur and some other nutrient like Zn, B, MO, have improved the productivity of pulses crops. There is urgent need to address environmental issues and their results imbalanced use of nutrients. Availability of pulses should be increased by expansion of area. Pulses should be easily included in cropping system as mix or intercrop. The productivity of pulses should be increase by quality seed availability, agronomic management, INM, make crop free from abiotic stress. (Parkinson 2013) [17]. Nutrients imbalanced are one of the major abiotic stresses of pulses. Balanced fertilization and recommended quantity of nutrition is required at right time at right method can increase the yield and growth parameter like higher grain yield of pigeon pea (18.92 q/ha). (Bairwa *et al*., 2013) [3]. It result in higher net returns by sowing with normal rainfall and application of FYM. The same can show the effect of INM on green gram and was extremely beneficial for releasing the higher productivity of green gram. Phosphorus deficiency in soil is wide spread in most of pulses crop have shown good response to 20 to 60kg P2O5/ha. Use of bio fertilizer enhances the efficiency of applied as well as native foliar nutrients of some micronutrients prove quite effective. The amount of application is determined by (INS) indigenous nutrient supply. Balanced nutrients are important for achieving higher productivity. In view of increasing demand there is immense need to exploit alternate source of nutrients, organic materials, and bio-fertilizer to increase the productivity and yield to more environment friendly nutrient management system. Study was conducted in South Africa where on farm N budget shows that legumes like green gram have deep root system and the residues was high quality. It is one of the way that can improve the nutrient cycling (Snapp, *et al*., 1998) [18]. It was observed that Wheat Manures/fertilizer application (farmyard manure, potassium and zinc fertilizers) produced significantly higher grain yield than the control plots. Leguminous crops significantly increased the yield of succeeding crops. (Nawab *et al*., 2011) [16].

Effect of INM on cereals

The effects of INM on cereals are also research by various scientist where there is combined effect of FYM, compost and chemical fertilizers were studied. One research which was done by (Fassil *et al*., 2009) [9] where erosion of the soil creates many destruction to the physiochemical properties of the soil like decreases of organic matter, soil fertility and less rate of infiltration. Along with it the water holding capacity of the soil were also decreased and it lead the soil fertility poor. These losses of nutrients are lost and this occurs due to overuse of chemicals and fertilizers which can practices continuously for a period of time. The nutrient recycling are also disturbed and this consequences leads the degradation of environment quality (Edward, 2005) [7]. The practices of INM like use of FYM with inorganic fertilizers make more advantage like up gradation of organic matter in the soil and refine the water holding capacity of the soil (Hati *et al*., 2006) [13]. One study was conducted in South Ethopia by Hawassa Agriculture Research Centre observed that by using green manure name *Erythrina bruice* biomass alone or with combination with any mineral fertilizer increased the bread wheat yield and also the yield component (Haile, 2012) [12]. The green manure crop which is nitrogen fixing crop, it can fix the nitrogen through the leaves (Haile, 2012) [12]. The combination of chemical as well as organic fertilizers mitigates the deficiency of macro nutrients and micronutrients (Chand *et al*., 2006) [5]. The integrated nutrient management is the approach where usage of organic and inorganic fertilizers are focus on strategy the nutrient in rational way so that the yield is improved (Wakena *et al*., 2002; Abay and Tesfaye,

2012; Dejene K.*et al*, 2012) [1, 6]. The scientist was observed that INM significantly increased boro rice yield and application of PSB and Azotobacter significantly increased available P and N in soil. (Garai *et al*., 2014) [10].

Concluding remarks

The key note of INM is the judiciously use of organic and inorganic fertilizers to improve the nutrient in the soil and diminishes the over exploitation of chemical fertilizers. To identify the need of nutrient to soil and provide the proper amount of nutrient to crop is the main aim of INM where it can be achieved by usage of practices of INM at efficient way. Several researches have focused on the benefits of INM where it has been observed that the greenhouse gases emission are also controlled by the use of INM practices. The reduction of reactive loss of nitrogen are also reduced by the integrated nutrient management. Moreover, the continuous use of chemicals in the soil leads to the pollution of soil and also affects the environment that can create the problems in the food chain. The techniques of INM is also called as profit based approach where the crop yield are also increase and problems of the environment are not there. To make INM more popular there should be the demand driven approach of INM.

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