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Effect of Different Fertilizers on Yield of Wheat

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Abstract: ***Plant nutrient plays very important role in the production of the crop as well as for the environment. The use of organic and inorganic sources for the production of wheat crop is very good. The alone use of chemical fertilizers have disadvantages because they are not environmental friendly they pollutes our environment as well as kills the beneficial soil microorganisms, while on the other hand the use of biofertilizers are very beneficial for the crop growth and these are environmental friendly because they do not pollute our environment. The combined use of farmyard manure, chemical fertilizer and biofertilizer has beneficial effect on crop plants. The use of farmyard manure is very good because it increases the water holding capacity of soil, improves the infiltration rate of water. As a whole it increases the water holding capacity of soils. The research on various aspects of integrated nutrient on wheat is received.***

Keywords: *Azospirrillum, Azotobacter*, Phosphate Solubilizing microorganisms

1. Introduction

1.1 Effect of Biofertilizer on Wheat Yield

Biofertilizers are the minute organisms which are beneficial to the plants growth and responsible for maximum yield production. Various free living bacteria are very beneficial for the growths of plant as well as the cause of maximum yield are known as plant growth promoting rhizobacteria PGPR (Kloepper, 1994). These play very important role to enhance the growth as well as the yield of crop plants. They involves in various biotic activities and sustainable for crop production (Ahemad *et al.,* 2009). Biological nitrogen fixation plays an important and positive role in the maintenance of nitrogen in the soil. In the past the use of nitrogen fertilizers, green revolution, mono-cropping systems use to obtain maximum yield in less time. But now days there is judicious use of chemical fertilizers with nitrogen fixing inoculants and Rhizobium (Dobrei *et al*., 2001). Biofertilizers play an important role in the growth of plants as well as they bring down the cost of chemical fertilizers e.g phosphorous, nitrogen and potassium. Biofertilizers contains microscopic microorganisms which are used as fertilizers for the growth of plants e.g *Azospirillum sp.* and *Azotobacter sp.* (*Ribaudo et al.,* 2006). Biofertilizers are the safe alternative to the use of chemical fertilizers because these are environmental friendly and they do not have any effect on animals and human beings and they also help in the reduction of pollution from the environment. If biofertilizer apply to any crop it improves the absorption availability of many nutrients to plant, create resistance to root diseases, it reduce the 25% of nitrogen requirement to the plants. Kannaiyan , 2002). *Azotobacter* belongs to the Azotobacteraceae family and they can fix atmospheric nitrogen. Different species have the abilities to synthesize the polyhydroxybutyrate (P-$_{OH}$B), plant hormones and alginates (Safwat et al., 2009). *Azotobacter* plays a very important role in the growth of plants especially it improves the yield of wheat. The yield of wheat increases when it was inoculated with yeast + *Azotobacter* with 20 m^{-3}fad (Ahmed *et al.,* 2011). The combined application of *Azospirrillum, Azotobacter* significantly increases the spikes, no of tillers, grain weight, grain size, spike let per plants, spike length etc, therefore the use of 75 % mineral nitrogen and biofertilizer with *Azospirrillum* and *Azotobacters* increases all the growth character in wheat (Chuan *et al.,* 2010). *Azotobacter* increases the yield of all the agriculture crop plants about 10-12 % (Jaga and Singh 2011). If we inoculated any seed crop with *Azotobacter* it increases the yield of crop about 54.3 q^{-1}ha to 57.2 q^{-1}ha respectively (Singh and Singh. 2002). The integrated use of biofertilizer and inorganic sources increase the yield of crop plants as well as the properties of soil may also improves. (Syed Ismail *et al.,* 2001). The combine use of organic fertilizer, chemical fertilizer and biofertilizers all are increase the physical properties of soil as well as the structure of soil also improve (Katyal , 2000). The optimum uses of fertilizers are achieved to maintain the balance management of crop for better yield (Jen-Hshuan Chen, 2006). If the wheat seed was inoculated with *Azotobacter* it increases the yield up to 1.92 – 2.0 % as compared to non-inoculated seed (Katiyar *et al*., 2011). The use of plant growth promoting rhizobacteria which containing the strains of ACC-deaminase *(Pseudomonas fragi, Pseudomonas Jessenii, Serratia Fonticola*) and rhizobium under the anexic condition increases the yield of lentil. It increases the number of pods per plant, no of nodules per plant, dry nodules weight, grain yield and straw yield up to 76%, 196%, 109%, 150% and 164 % under the pot experiment (Zahir *et al.,* 2011). There are many reports available on legume inoculation with rhizobium increase the yield and growth and growth of legume crop (Shahararoona *et al.,* 2006a).

Innoculation of *Azospirillum* with *Phosphate Solubilizing bacteria* increased the straw and grain yield up to 11.9, 9.9, 21.6, 23.2, 15.7 and 32.2 respectively over the controlled. (Kaushik *et al.,* 2012). The use of biofertilizers that is *Azotobacter* increases the nitrogen contents (1.92-2.00%) as compared to the un-inoculation or controlled (1.82-1.9%) (Pandy *et al.,* 2003). Biofertilizers increases the grain yield of wheat as well as the micronutrients were also increase in the soil like Fe, Mn, Zn etc (Malik *et al*., 2009). The use of multifunctional biofertilizers (*mixture of Bacillus sp. Bacillus erythropalis, Bacillus Pumilus, Bacillus Subtillis, Psudomonas rubiacearum*) on soil rhizosphere increases the growth of water celery (Youngs *et al.,* 2004).

1.2 Organic Manure

Organic matter is very important for the growth of many plants because it improves the growth of plants directly or indirectly. Large amount of macronutrients and

micronutrients are present in the organic matter. Organic manures are very important for agro industries and farming. Humic is a substance which is produce in the soil by the decomposition of organic material and this material is very useful for the production and high yield of crop plant. One of the most important beneficial roles of organic matter i.e improving the chemical, physical and microbial state of soil (Gaur *et al.*, 1973). To obtain maximum yield from the crop the soil contains about 5% organic manure but in the Pakistani soils there is less than 1% organic manure, majority of the soils contains 0.5% organic manure. This is fulfilled by the addition of different fertilizers.

2. Preparation of Farmyard Manure

Farmyard manure prepared in the pits under the shed. Its width about two meters wide, depth not more than 90 centimeters and length about seven meters. In the pit the cow dung, urain, leaf litters, when this section is filled up to 60 centimeters above the ground level plastered with the dung of cow soil-slurry. The pit is containing farmyard manure and it ready for the field.

2.1 Effect of Farm Yard Manure on Wheat Yield

Farm yard manure is very important for the growth of plants. It improves the soil physical properties; increase the infiltration rate and soil absorb maximum quantity of water. Farmyard manure is environmental friendly it do not have any bad effect on soils and crops and it helps in the uptake of nutrients as well (Singh and Tomer, 1991). The yield of wheat was obtained maximum when nitrogen and farmyard manure was applied as 75:25, the biological (10952 kg^{-1}ha) straw (7710 kg^{-1}ha) and grain (3242 kg^{-1}ha) yield of wheat was obtained. (Zahir *et al.*, 2006). The yield of maize was obtained maximum when 25% poultry manure + 75% mineral nitrogen added; due to this 1000 grain weight was high due to the application of poultry manure and mineral nitrogen (Muhammad *et al.*, 2012). The combine use of farmyard manure, green manure and biofertilizer increase the rice yield. The use of green manure saved about 50 kg^{-1}ha (M. N. Jha *et al.*, 2013).

The use of farmyard manure (FYM) + poultry manure (PU) + vermicompost (VC) and seed inoculation with *Azotobacter* increases the shoot, plant height, dry matter, leaf area index and as a whole increase the yield of potatoes from 240.07 q^{-1}ha in the year respectively. The use of different combination of farmyard manure + Green manure + NPK increases the yield of rice such that the use of farmyard manure @ 12.5 t^{-1}ha; NPK @ 66 – 42-31 kg N, P_2O_5, K_2O t^{-1}ha; green manure @ 12.5 t^{-1}ha give maximum yield of rice (Rana *et al.*, 2012). While the use of inorganic fertilizers like green manure, crop residue, poultry manure and farm yard manure plays an important role in the physical properties of soil and reducing the bulk density of soil as well. (Singh *et al.*, 2007). According to the Sharma in 1997 reported that the balancing in the use of fertilize application reduces the bulk density. The use of nitrogen and farmyard manures at 75:25 increases the maize grain yield 4210 kg^{-1}ha (Zahid *et al.*, 2007). Farmyard manure significantly very important for the wheat crop it increases the grain weight as kg grains/tones in a year (Mahapatra *et al.*, 2007).

2.2 Effect of Chemical Fertilizers on Wheat Yield

Chemical fertilizers place an important role in the growth of any crop plants. These have beneficial effect on the growth and biological yield of plants but on the other hand chemical fertilizers have some disadvantages they pollute our environment and also damage the surface of soil. The optimum uses of fertilizers are achieved to maintain the balanced management of the crop for better yield (Jen-Hshuan Chen, 2006). If the fertilizers were added as the recommended dose of fertilizers as N @ 30 kg^{-1}ha + P_2O_5 @15 kg^{-1}ha + biofertilizers (*Phosphate Solubilizing bacteria* + *Azotobacter*) increases the yield of crop (A.V.Ramanjan eyulu *et al.*, 2010). The use of chemical fertilizers with organic fertilizers had beneficial effect on crop growth and soil health as compared to the alone use of organic fertilizers (Dutta *et al.*, 2003). While the alone use of chemical fertilizers were also non-significant; thus the use of organic matter + chemical fertilizers increases the absorption of NPK in several ratoon crops and sugarcane crop (Boktiar and Sakuria 2005). The chemical fertilizers are no doubt very important source of fertilizers they increases the growth of plants, yield of crop that is the full dose of NPK increases the yield of crop up to 44.67 q^{-1}ha – 121.16 q^{-1}ha while on the other hand the excessive use of chemical fertilizers are dangerous for the environment because they are not eco-friendly they are the cause of pollution as well as harmful for the soil microorganisms (Kharub and Sharma, 2002). The application of 100 % NPK significantly improves the yield of wheat about 21.5 % (Bandyopdhyay *et al.*, 2009).

Application of 180 kg^{-1}ha NPK increase the grain and straw yield in wheat 32.5 % and 33.7 % (Kumar *et al.*, 2005). If the nitrogen was applied as 1/3 basal + 2/3 at node under zero and in 1/3 basal + 1/3 at tillering +1/3 at floral initiation index rotary tillage the uptake of nitrogen in wheat was highest (Chander 2010). The use of sulphur in wheat was not necessary but if the sulphur was added in wheat crop the sulphur contents was increases (Amandeep *et al.*, 2009). In the wheat crop the addition of DAP increased the height of plant as the use of 80 kg $P_2O_5^{-1}$ha DAP increase the height of wheat crop. Wheat seed inoculation with phosphate Solubilizing bacteria + chemical fertilizers increased the grain yield of wheat as compared to the non inoculated seed or without combination of chemical fertilizers (Duvivedi *et al.*, 2004).

2.3 Combined Effect of Farmyard Manure, Biofertilizers and Chemical Fertilizers on Wheat

The combined use of chemical fertilizer, farmyard manure and biofertilizer plays a significant role on the growth of crop plants. Almost the combined use have significant effect on crop growth as compared to the alone use of chemical fertilizers. The use of 25 % nitrogen + 25 farmyard manure / poultry manure / city waste + 50 % NPK increase the grain yield of 3.5 t^{-1}ha in wheat (S. Azam *et al.*, 2010). The combined use of *Arbuscular mycorrhizal* fungi, plant growth promoting rhizobacteria (PGPR) *Bacillus polymyxa*, *Azospirillum* mixed with phosphorous increased the growth of crop plants (Ratti *et al.*, 2001). The application of farmyard manure @ 5 and 10 t^{-1}ha to the wheat crop it

increases the yield of crop (Singh and Singh 2002). The use of farmyard manure 15 t^{-1}ha + 100% NPK increases the yield of wheat crop as compared to the use of 75% NPK + 15% farmyard manure (Chauhan *et al*., 2011). The application 100% NPK + farmyard manure @ 10 t^{-1}ha increases the biological parameters like soil microbial biomass dehydrogenises activity 9.8 and 9.0 % (Katkar *et al.,* 2011). The use of 100 % NPK + 50 % nitrogen has beneficial effect on plant height and dry matter in wheat (Kumar, P. *et al*., 2005). According to Dutta *et al* (2003) reported that the use of chemical fertilizers + farmyard manure + organic fertilizers increases the yield of crop. The use of farmyard manure + chemical fertilizers increase the absorption of NPK which is present in the soil as compare to the alone use of chemical fertilizers (Bokkhtiar and Sakurai 2005).

Efficient plant nutrient management plays an important role in the growth of plants as well as has no any bad effect on the environment. The addition of different fertilizers like organic fertilizers, chemical fertilizers have some advantages and disadvantages while the use of farmyard manure, green manure, poultry manure, city waste and biofertilizers have no any negative impact on soil and environment.

3. Conclusion

In the above mentioned review it is stated and recommended that the use of biofertilizers improves the growth characters and biological yield of wheat. These are very useful because bacteria fix their nitrogen in the soil that's the reason production is increased. So, the combined application or the single use of biofertilizers can considered as the beneficial for the growth and yield of wheat.

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