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A Evaluation of Bio-Fertilizer and Chemical Fertilizer on Soybean (Glycine max) in Shimoga, Karnataka.

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ARTICLE DETAILS

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ABSTRACT

Soybean is known for its high protein content, which is the reason why it is widely used as one of the main food sources for humans and animals. In order to optimize soybean growth, farmers tend to add excessive dosage of chemical fertilizer to this crop. Furthermore, a continuous chemical fertilizer application without organic fertilizer addition may cause a rapid depletion of nutrients in the soil. Glycine max L. Merrill has becomes an increasingly important agricultural commodity, with a steady increase in worldwide annual production. When produced annually, soybean is commonly rotated with other crops such as wheat, maize, rice, sorghum and sugarcane. From the present investigation it is evident that the application of both the fertilizers had the upper hand in influencing the growth against the bio and chemical fertilizers solitary application. it was also noticed that the bio- fertilizer enhanced the function of chemical fertilizer and then subdue the application quantities of fertilizers and still maintain the same crop yields and the capital used for making bio- fertilizers is cheaper than that of chemical fertilizers, and it also lessen the negative effect.

1. Introduction

Fertilizers are soil amendments applied to promote plant growth. Soybean (Glycine max L. Merrill) is an important and well-recognized oil and protein containing crop of the world. The approximate composition of soybean is 40- 45 % protein, 18-20 % edible oil, 24-26 % carbohydrate and a good amount of vitamins (Kaul and Das, 1986). The soybean oil is cholesterol free and easily acceptable diet. Than the other pulses, Soybean contain 50 % proteins/ gm, it is 2 times richer than pulses (dals) or peanuts, 3 times richer than eggs and 11 times richer than milk. Besides Soya food are rich source of vitamin B and contains essential minerals like magnesium, calcium, iron, potassium and copper. soybean (Glycine max (L.)) is one of the agricultural commodities with important value to humans. Soybean is known for its high protein content, making this commodity widely utilized as a main food source for humans and husbandry as well as oil producer (Capriotti et al., 2014; Pagano and Miransari, 2016). In order to optimize its growth, fertilization plays an important role to improve soybean productivity, especially in marginal soils. Chemical fertilizers can affect the microflora of the soil by modifying the chemical composition and physical character of the soil (Cwalina-Ambroziak and Bowszys, 2009; Klein et al., 2011; Wei et al., 2014; Wei et al., 2012). Naturally, the need of nitrogen (N) for legumes such as soybean has been partially met through the symbiosis of Rhizobium bacteria and root nodule, which absorbs nitrogen from the air. However, farmers tend to add chemical fertilizer excessively during soybean cultivation based on assumption that it may increase the yield (Abbasi et al., 2010). On the other hand, soybean can only absorb 35 to 70% of the entire nitrogen fertilizer applied. It means that chemical fertilizer would leave residues and contaminate the soil, deteriorating the soil quality. Therefore, organic fertilizer should be used to improve land productivity (Masaka et al., 2014), since this kind of fertilizer could be a better choice to mitigate the negative effects of chemical fertilizers by slowing soil degradation. According to some studies, organic fertilizers have a significant impact on soil nutrient availability, aggregate formation, and soil bacterial communities (Chai et al., 2019; Qaswar et al., 2020; Ye et al., 2019). Several researchers found that a high amount of chemical fertilizer would decrease root nodule formation and N-fixation from the air (Hinson, 1975; Saito et al., 2014;

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Dong et al., 2016). Furthermore, an overuse application of chemical fertilizers leads to a loss of soil fertility, bacterial diversity (Dinesh et al., 2010) and soil structure (Melero et al., 2011). Microbial inoculants, also known as bio-fertilizers, are able to mobilise significant nutritional elements in the soil and change their state from unusable to useful by crop plants through biological processes. Unlike chemical fertilizers, which have an adverse effect on the soil, bio-fertilizers boost soil fertility naturally. Therefore, using bio-fertilizer is essential to boosting soil productivity (Nalawde et al. 2015). Legumes fix atmospheric nitrogen due to the relationship that exists between legume plants and a group of soil bacteria commonly known as rhizobacterium. This symbiotic relationship allows the bacteria to live on the roots of the legume plant, consuming carbohydrates from the plant and providing the plant with nitrogen that the bacteria.

2. Method

2.1 Study Area

Shivamoga district lies between 13 27 and 14: 39 north and 74' 38 and 76 4 east. Shivamoga is a place known for its scenic beauty, lush green forest, eye catching waterfalls, and cool climate in the Malnad region.

2.2 Methodology

The experiment is carried out in randomize block design in three replications. The experiment was carried out during January-June, 2023. The plots size is 1.8 x 1.4 mts in length and width number of plots 30 and each plot is mixed with recommended dosage of both the type of fertilizer. Sowing process was carried with PSB (Phosphate Stabilizing Bacteria) treated seeds of the crop. Growth parameters is recorded on 20, 40, 60 days before harvest.

3. Results

Influence of bio-fertilizer and chemical fertilizer on plant height and number of branches in Soyabean is tabulated at Table. l and 2.

3.1 Treatment detail

T1: Control; T2: NPK (Nitro gen, phosphorus, and potassium); T3 :NPK+FYM (Farm Yard Manure); T4: Vermi Compost
TS: NPK+FYM; T6: NPK+Vermicompost; T7: Rhizobium+PSB (Phosphate stabilizing bacteria); T8: NPK+Rhizobium+PSB; T9: NPK+FYM+Rhizobium+PSB; T10: Vermicompost+Rhizobium+PSB

In general plant height increased from 20 days to harvest. The data is presented in Table 1 indicated that among the treatments T5 and T9 showed maximum plant height at all the and control was having minimum plant height. The remaining treatments were on par with each other. The number of branches is presented in Table 2 indicated that it increased from 20 days to harvest. Among the treatments T2, TS, T6, T7 recorded maximum number of branches and remaining treatment did not differ significantly among them.

Table. 1 Variation of Plant Height (in cm) at each treatment

Treatment	20 Days	40 Days	60 Days
T1	10.53	13.12	16.00
T2	11.16	14.2	20.1
T3	12.67	15.2	20.4
T4	15.16	16.12	20.7
T5	16.12	22.21	28.9
T6	11.15	15.4	21.0
T7	12.24	16.15	20.2
T8	11.16	16.16	20.15
T9	14.12	22.15	30.23
T10	12.2	14.1	18.12

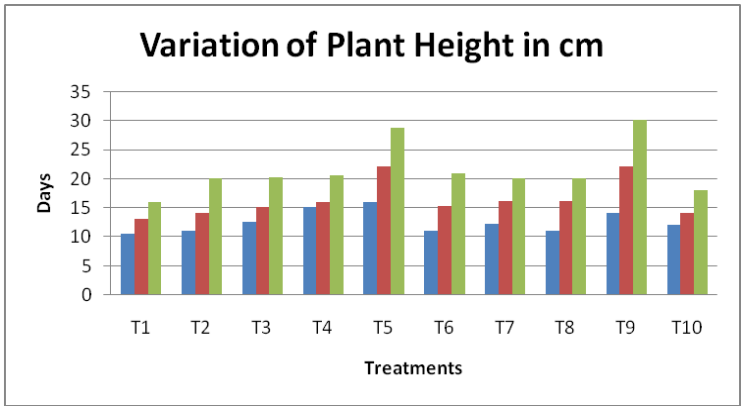

Fig. 1 Variation of Plant Height (in cm) at each treatment

Table. 2 Variation of Number of Branches at each treatment

Treatment	20 Days	40 Days	60 Days
T1	07	12	14
T2	10	16	21
T3	09	14	15
T4	10	15	17
T5	10	15	17
T6	12	15	20
T7	13	15	23
T8	4	9	11
T9	12	14	16
T10	8	12	17

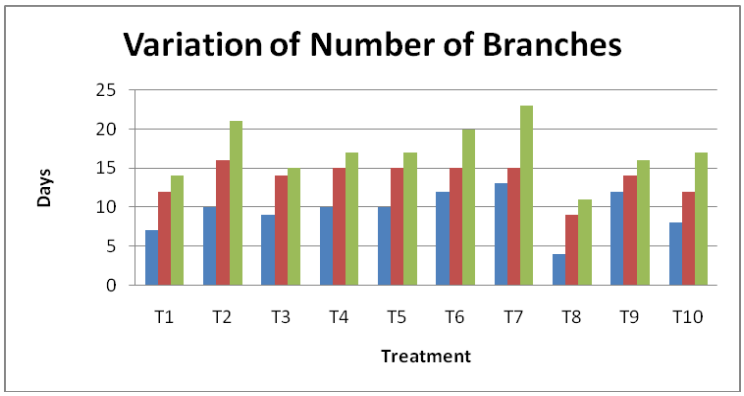

Fig. 2 Variation of Number of Branches at each treatment

4. Conclusion

The combined use of organic and inorganic treatment yielded: higher than in organics in crops. Beneficial effect of combined use of organics and in organics increases crop yield as maintaining soil health on long term basis had also been reported by Mishra et al. (199 beneficial effect' of applied NPK on productivity of Soya bean (Hasnabade et al., 1990); sit s intercropping with legumes (Singh and Balyan, 2000) were attributed to increase growth and relative growth rate with the application of nutrient (Muchow, 1988). Aecot Edward and Daniel (1992) if poultry manure was added in combination with chemical fit supplemented all nutrients to crop, and increased the productivity of the crop. Result of the present study indicated that the application of bio and chemical fertilizer had significantly influence on morphological Character like plant height, no. of branches, no. of leaves, and pots. The application of growth promoting substance increased the plant height of such effect was due to the increase photosynthetic activities, enhancement in the mobilization or plants and change in the membrane permeability.

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