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Effect of organic manure on yield attributes and seed yield of soybean in Tawang district of Arunachal Pradesh

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ABSTRACT : A field experiment was conducted during the *Kharif* season of 2016 and 2017 at three village's viz., Sernup, Poito and Namtsering in Tawang district of Arunachal Pradesh to study the effect of organic manures on yield attributes and seed yield of soybean (*Glycine max* L.). The experiment, consisted of four treatment of organic manures viz., control, farmyard manure (F.Y.M) @ 6.0 t/ha, vermicompost @ 3.0 t/ha and F.Y.M @ 3.0t/h + vermicompost @ 1.0t/ha resulted in significantly the highest seed (23.39 q/ha.) as compared to application of F.Y.M. @ 6.0 t/ha, vermicompost @ 2.0 t/ha. and control. Significantly the highest number of pods/plant and grain/pod were recorded with the application of F.Y.M @3.0 t/ha.+ vermicompost @ 1.0 t/ha.as compared to sole application of F.Y.M @ 6.0 t/ha. vermicompost @ 2.0 t/ha. and control.

KEY WORDS : Soybean, Farmyard manure, Vermicompost, Seed yield, Economics

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Soybean (*Glycin max* L.) is one of the major oilseed crops in India producing 12.28 million tonnes from 10.18 million hectare area with the productivity of 1207 kg/ha (DAC, 2012). Where as in Arunachal Pradesh producing 13,500 mt. from 14,800 hectare area with the productivity of 10.96 q/ha. In Tawang district soybean cultivated over an area of 823 hectare with a production of 8793 tonnes, with the productivity of 10.68 q/ha. It is a rich source of protein (40%) and oil (20%). Soybean helps in maintaining soil fertility and symbiotically, fix 61-377kg N/ha (Salvagiotti *et al.*, 2008). Soybean is a food that is nearly perfect as cow's milk, but as the same time rich in Iron and vita. C (when sprouted). The yield of protein from soybeans, weight for weight, is approximately twice that of meat, four times that of eggs, wheat and other cereals, five or

six times that of bread, twice of lima and navy beans, walnuts, filberts and most other nuts, twelve times of milk. It can be used as fodder, forage can be made into hay, silage etc. Its forage and cake are excellent nutritive foods for livestock and poultry.

The cultivation of soybean in Tawang district on large scale can be extremely useful, attractive and an economic venture. The lower productivity (10.68q/ha) of the crop is primarily due to uncontrolled climatic factors like erratic rainfall, low organic matter due to the water erosion of it, because heavy rainfall and sloppy land. The optimum nutrition is required for getting the maximum seed yield. Organic manures are good complimentary sources of nutrients and improve the physical and biological properties of soil on the other hand (Chaudhary *et al.*, 2004). A judicious and combined use of F.Y.M and vermicompost

for plant nutrients is essential to maintain soil health and to augment the efficiency of nutrients. Hence, present experiment was carried out to find out the effect of organic manures on seed yield of soybean.

RESEARCH PROCEDURE

The field experiment was carried out during the *Kharif* (May to September) of 2016 and 2017 in the three village's viz., Sernup, poito and Namtsering of Tawang district. In general soil of the study area was sandy loam to loam with low to medium fertility status. The treatment consisted of four levels of organic manures, viz., control, F.Y.M @ 6.0 t/ha., vermicompost @ 2.0t/ha and F.Y.M @ 3.0t/h.+Vermicompost @ 1.0t/ha. Soybean variety "Js-335" was sown @75 kg/ha. seed rate at an inter row spacing of 45 cm. on 10th May 2016 and 16th May 2017, respectively, at the same location. The seed should be inoculated with *Rhizobium japonicum* @ 40 g/kg seed. Since there was enough rainfall during the crop season, irrigation was not required.

The weed reduced the yield of soybean by 40-45 per cent depending upon the intensity, nature and duration of the weed competition. Hand weeding twice after 15 days and 30 days of sowing keep the field reasonably free from weeds. Five random plants/plot were selected in the net plot area and tagged for recording growth and yield attributes. The observations recorded were height of plant (cm), pods/plant and seeds/pod. The crop was manually harvested and threshed in the month of September. The inputs and outputs prices of commodities prevailed during the study of demonstration were taken for calculating net return and benefit: cost ratio.

RESEARCH ANALYSIS AND REASONING

Application of F.Y.M. @ 3.0 t/ha+vermicompost @

1.0t/ha. resulted in significantly taller plants. However, the plant height in the plots treated with F.Y.M @6.0 t/ha and vermicompost @ 2.0 t/ha was similar. Significantly lower plant height was recorded in the control plots where no organic manure was used (Table 1). The effect of F.Y.M. and vermicompost, in combination was more pronounced with the advancement of crop growth, indicating better effect of plant height of soybean. This may be owing to continuous availability of nutrients to soybean plants because of their slow release of nutrients from F.Y.M. during the crop season. Moreover, vermicompost added a good amount of NPK in the soil, besides supplying other essential macro and micronutrients.

Significantly higher number of pods/plant and grains/pod were recorded with combined application of F.Y.M@3.0t/ha +vermicompost @ 1.0 t/ha (Table 1). The plants were healthy under the treatment having combination of F.Y.M. and vermicompost. The minimum number of pods/plant and grain/pod were recorded in the control plots. Organic matter did not influence the 100-seed weight significantly, being a vertical character, is less sensitive to management levels.

Application of F.Y.M. @ 3.0t/ha.+ vermicompost @1.0 t/ha.resulted in significantly highest seed yield followed by vermicompost @2.0 t/ha. and F.Y.M. @6.0 t/ha. The increase in the seed yield was 94 per cent during 2016 and 98 per cent during 2017 (Table 1). Same trend was found when data were pooled. Significantly higher net return (Rs. 64,755/ha.) and B:C ratio (2.2:1) were also obtained from the crop received F.Y.M. @ 3.0 t/ha. + Vermicompost @ 1.0 t/ha. alone. The lowest net returns and B: C ratios were recorded in the control plots. High cost of F.Y.M. and vermicompost, resulted in increased cost of cultivation without too much increase in net returns. Hence, this overall effect of F.Y.M and vermicompost reflected in net return.

Table 1: Effect of organic manures on yield attributes, seed yield and economic returns of soyabean (pooled data of two years)

Treatments	Plant height at harvest (cm)	Pods/plant	Grain/pod	100-seed weight (g)	Seed yield (q/ha)			Cost of cultivation (Rs./ha)	Gross return (Rs./ha)	Net return (Rs./ha)	B:C ratio
					2016	2017	Pooled				
Control	60.0	20.0	2.19	12.25	11.85	11.99	11.92	34,400	53,640	19,240	1.5:1
F.Y.M @ 6.0t/ha.	67.75	23.0	2.35	12.50	14.75	15.25	15.00	38,300	67,500	29,200	1.7:1
Vermicompost @ 2.0 t/ha.	68.5	26.0	2.44	12.75	17.35	18.59	17.97	41,900	80,865	38,965	1.9:1
F.Y.M. @ 3.0 t/ha+ Vermicompost @ 1.0 t/ha.	75.0	30.0	2.60	13.5	23.0	23.78	23.39	40,500	1,05,255	64,755	2.2:1

Conclusion:

Based on two years study, it may be concluded that application of F.Y.M. @ 3.0t/ha+vermicompost @ 1.0t/ha. to soybean will be helpful in increasing seed yield, higher net return and benefit: cost ratio.

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