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Study on Productivity, Quality and Profitability of Soybean (*Glycine max* L.) as Influenced by Fertility Levels and Enriched Compost in Typic Haplustepts Soil

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ABSTRACT

Background: Enriched composts supply the plant nutrients and add a sufficient amount of organic matter to the soil, which helps in improving the physical, chemical and biological properties of the soil. It helps to maintain and sustain soil fertility for enhancing crop productivity and also acts as a recess for microbes and enriches the soil with a variety of the indigenous micro-flora and fauna. Hence, the present investigation was carried out to study the effect of fertility levels and enriched compost on productivity, quality and profitability of soybean (*Glycine max* L.) in sub-humid southern plain and Aravalli hills region of Rajasthan.

Methods: The experiment was undertaken during *kharif* 2018 at Rajasthan College of Agriculture, Udaipur (Rajasthan) in a factorial randomized block design with three replications. The treatments were comprised of three levels of recommended dose of fertilizers (RDF) (control, 50% RDF and 100% RDF) and four levels of enriched compost (control, 2.0, 4.0 and 6.0 t ha^{-1}).

Result: The increasing fertility levels upto 100% RDF and enriched compost upto 4 t ha^{-1}, significantly increased (P=0.05) the plant height, dry matter accumulation, number of pods per plant, number of seeds per pod, seed yield, haulm yield and protein and oil content in seed of soybean. However, the combined application of 100% RDF along with 6 t ha^{-1} enriched compost recorded higher seed and haulm yield. The results further revealed that the application of 100% RDF and 4 t ha^{-1} enriched compost significantly improved the productivity, quality and profitability of soybean under Typic Haplustepts soil.

Key words: Enriched compost, Fertility, Productivity, Profitability, Quality, Soybean.

INTRODUCTION

India is the largest producer and consumer of pulses in the world, accounting for about 25 per cent of global production, 27 per cent of consumption and 34 per cent of food use. More than 2/3rd area and production has been obtained from the six states of India *viz.*, Madhya Pradesh, Rajasthan, Maharashtra, Karnataka andhra Pradesh and Uttar Pradesh (Shukla and Mishra, 2020). Soybean (*Glycine max* L.) is most popular *kharif* legume and oil seed crop of India grown in various agro-climatic conditions. It is also called as 'vegetarian meat', 'wonder crop', 'miracle crop' and 'golden bean' because of its rich and cheap source of quality protein (40-42%) and oil content (18-20%) having about 85% unsaturated fatty acids including 55% polyunsaturated fatty acids (PUFA) and about 0.3% is flavones (Smith and Huyser, 1987). Fat-free soybean meal is a primary and low-cost source of protein for animal feeds and most prepackaged meals (Nira *et al.*, 2020). In India, it is cultivated in 11.39 million ha with the production of 13.51 million tonnes having the productivity of 1185 kg ha^{-1} (FAI, 2019-20). In Rajasthan, it is cultivated in 10.60 lakh ha with the production of 66.85 metric tons having the productivity of 1150 kg ha^{-1} (FAI, 2019-20). The productivity of soybean in Rajasthan is low due to erratic distribution of monsoonal rains, continuous nutrients mining by high yielding crops, insufficient addition of organic manure, continuously growing of soybean in the same piece of land and low organic carbon status of soil (Wilmot, 2009).

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Organic and inorganic sources should be used in a balanced manner for better nutrition of crop plants. Combined application of enriched compost with inorganic source of fertilizers ensures the higher productivity with better net return due to lesser expanses on costly fertilizer inputs. These improves the physical and chemical properties of soil and at the same time being an eco-friendly approach ensures better soil health (Sutaria *et al.,* 2010). Therefore, to meet out the shortage of nutrients and due to economic considerations, the use of alternative sources such as rock phosphates enriched compost and biological ingredients is gaining importance to reduce the dependency on costly chemical inputs. Although P is available in low grade resources but its availability needs to be improved by using compost of regionally available organic agro-wastes and crop residues (Biswas, 2011). Also, the value added compost made from crop residues serves dual purpose of crop productivity enhancement and reduction in environmental pollution (Singh *et al.,* 2015). Keeping the above facts in mind, the present study was carried out to assess the effectiveness of fertility levels and enriched compost on productivity, quality and profitability of soybean (*Glycine max* L.) in Sub-humid Southern Plain and Aravalli Hills Region of Rajasthan.

MATERIALS AND METHODS

Experimental site and soil

The experiment was conducted during *kharif* 2018 at the Instructional Farm (Agronomy), Rajasthan College of Agriculture, Udaipur situated at an altitude of 579.5 meters above mean sea level and at 24°34′ N latitude and 73°42′ E longitude under the agro-climatic zone-IVa (Sub-humid Southern Plain and Aravalli Hills) of Rajasthan. The climate of the study area is sub-humid with an average maximum and minimum temperatures during rainy season (July–October) ranged between 27.9 to 34.4°C, respectively and the average annual rainfall of 637 mm occurs mostly during the months of July to October. Soil of the experimental field was clay loam in texture, alkaline in reaction, medium in organic carbon; low in available N, P and high in available K (Table 1).

Raw material for enriched compost (EC)

For preparation of enriched compost, four mineral and organic sources were used (low grade rock phosphate, maize stover and FYM). Rock phosphate was taken from Jhamar Kotra mining sites in Udaipur district of Rajasthan, whereas maize stover and FYM were obtained from the Instructional Farm, Rajasthan College of Agriculture, Udaipur. Before compost preparation, the raw materials were analyzed for their chemical composition with the following standard laboratory procedures (Table 2).

Enriched compost preparation

The pit size for composting was 4.0 m × 1.5 m × 1.0 m. Enriched compost was prepared by mixing ground low grade rock phosphate @4 kg per 100 kg of air-dried maize stover with phosphate solubilizing bacteria (@50 g per 100 kg of maize stover) and cow dung (@10 kg per 100 kg of maize stover) was also mix in the pit of composting mixture to enhance the solubility of phosphorus and decomposition rate of plant materials. Water was added to keep the moisture level between 50-60 per cent at the interval of 3-4 days. The upper most layers were prepared by cow dung and covered with jute bags for maintaining the moisture in pit. The composting mixture was left to decompose. A fortnight later, turning of composting mixture was done to ensure the even distribution of the heat. The composting mixture was turned at every 2 weeks, until the compost is dark brown, crumbly and uniform. For nutrient rich well decomposed compost, the composting process was continued for 120 days. The chemical composition of enriched compost used in field experiment is mentioned in Table 3.

Experimental design and treatments

The experiment was laid out in factorial randomized block design and replicated thrice in the plot size of 4.0 m × 3.0 m (12 m^2). The treatments were comprised of three levels of recommended dose of fertilizers (RDF) [Control (F_0), 50% RDF (F_1) and 100% RDF (F_2)] and four levels of enriched compost (EC) [Control (EC_0), enriched compost 2 t ha^{-1} (EC_1), enriched compost 4 t ha^{-1} (EC_2) and enriched compost

Table 1: Initial fertility status of the soil of experimental site.

Parameters	Value
pH	8.18±0.13
Electrical conductivity (dS m^{-1})	0.81±0.01
Organic carbon (%)	0.57±0.01
Available N (kg ha^{-1})	270.84±5.17
Available P_2O_5 (kg ha^{-1})	18.52±0.35
Available K_2O (kg ha^{-1})	390.14±6.22

Table 2: Chemical composition of mineral and organic raw materials.

Nutrient element	Low grade rock phosphate	Maize stover	FYM
Total C (%)	-	45.2±0.7	-
Total N (%)	-	0.66±0.01	0.55±0.007
Total P (%)	8.84±0.25	0.16±0.002	0.25±0.004
Total K (%)	-	1.35±0.020	0.54±0.008
Ca (%)	6.51±0.19	-	-
Mg (%)	5.60±0.17	-	-
Fe (%)	0.13±0.004	184.0±2.85	-
Mn (mg kg^{-1})	663.2±19.51	-	-
Cu (mg kg^{-1})	20.8±0.63	-	-
Zn (mg kg^{-1})	41.2±1.21	23.0±0.35	-

Table 3: Nutrient contents in enriched compost.

Nutrient content	Value
N (%)	0.65±0.01
P (%)	1.21±0.02
K (%)	0.66±0.05
C:N ratio	23.20±1.70

6 t ha^{-1} (EC_3)]. The soybean var. JS-9560 was sown in lines of 30 cm apart. As per the treatments, whole quantity of enriched compost was broadcasted and incorporated into the soil at the sowing time. The 20 kg N ha^{-1} was applied in two equal splits, half as basal and the remaining half was top dressed at the time of first irrigation. The basal dose was applied through urea after adjusting the quantity supplied through di-ammonium phosphate (DAP). The 40 kg P ha^{-1} was applied through DAP as basal and drilled at the depth of 8-10 cm along basal dose of N prior to sowing. The test crop was sown on 6th July, 2018 and harvested on 25th September, 2018. The seeds obtained from the produce of individual plot were recorded as seed yield kg $plot^{-1}$ and later it was converted into kg ha^{-1}.

Observations recorded

Parameters on growth and yield attributing characters *viz.,* plant height, dry matter accumulation per plant, number of pods per plant, number of seeds per plant, test weight and seed and haulm yield were recorded and statistically analyzed by the method of analysis of variance as described by Panse and Sukhatme (1985).

Protein content

Protein content in seed was obtained by multiplying the per cent nitrogen (N) content by 6.25 (A.O.A.C., 1960).

$$\text{Protein content (\%)} = \text{N content (\%)} \times 6.25$$

Oil content

Oil content in soybean seed was determined by Soxhlet's Ether Extraction method (A.O.A.C., 1955).

Statistical analysis

The data recorded for different parameters were analyzed with the help of analysis of variance (ANOVA) technique for a factorial randomized block design. The results are presented at 5% level of significance (P=0.05).

RESULTS AND DISCUSSION

Growth and yield attributes

Effect of fertility

The applied fertility levels significantly enhanced the growth and yield attributes of soybean (Table 4). The significantly higher plant height (52.07 cm), dry matter accumulation per plant (21.00 g), number of pods per plant (23.82) and number of seeds per plant (3.26) at harvest were recorded with the application of 100% RDF (F_2) over rest of the levels. Application of 100% RDF (F_2) resulted in enhanced plant height, dry matter accumulation per plant, number of pods per plant and number of seeds per plant by 24.09 per cent, 40.56 per cent, 68.10 per cent and 33.60 per cent, respectively over control (F_0). It is clear that the increasing levels of fertility improved the test weight of soybean but the effect was found non-significant. The positive effect of fertilizer levels on growth and yield attributes might be due to its demand for the formation of chlorophyll and nucleic acids and also the presence of large amount of nitrogen in the cell sap in the form of protein, amides and amino acid in the growing region of meristematic tissues (Jat *et al*., 2014). Similarly, phosphorus is considered essential for transfer of energy obtained from photosynthesis and metabolism of carbohydrates stored in the form of ATP and ADP for succeeding use in growth which in turn resulted in vigorous growth of plant (Marschner, 1995). Pattanashetti *et al.* (2002) also reported that the varied fertilizer doses applied to soybean significantly improved the yield attributes such as number of pods per plant and number of seeds per pod and this increase was observed up to 100% RDF.

Effect of enriched compost

The application of enriched compost significantly increased the growth and yield attributes of soybean (Table 4). The maximum plant height (51.04 cm), dry matter accumulation

Table 4: Effect of fertility levels and enriched compost on growth and yield attributes of soybean.

Treatments	Plant height (cm)	Dry matter accumulation per plant (g)	No. of pods per plant	No. of seeds per pod	Test weight (g)
Fertility levels					
Control	41.96	14.94	14.17	2.44	107.35
50% RDF	46.33	17.27	19.88	2.84	107.95
100% RDF	52.07	21.00	23.82	3.26	108.93
SEm ±	1.00	0.47	0.46	0.09	0.68
CD (P=0.05)	2.93	1.39	1.34	0.26	NS
Enriched compost levels					
Control	41.46	15.29	14.60	2.41	107.31
Enriched compost @ 2 t ha^{-1}	45.26	17.14	17.86	2.73	107.75
Enriched compost @ 4 t ha^{-1}	49.37	18.80	21.68	3.05	108.25
Enriched compost @ 6 t ha^{-1}	51.04	19.72	23.02	3.20	108.99
SEm ±	1.15	0.55	0.53	0.10	0.78
CD (P=0.05)	3.38	1.60	1.55	0.31	NS

per plant (19.72 g), number of pods per plant (23.02) and number of seeds per pod (3.20) were observed with the application of 6 t ha^{-1}enriched compost (EC_3) but were found statistically at par with 4 t ha^{-1} enriched compost (EC_2). The increase in plant height, dry matter accumulation per plant, number of pods per plant and number of seeds per pod were observed to the extent of 21.90, 28.97, 57.67 and 32.78%, respectively with the application of 6 t ha^{-1} enriched compost, respectively as compared to control. Whereas, the difference between EC_2 and EC_3 treatment were found statistically at par. The increasing levels of fertility improved test weight of soybean but the effect was remained non-significant. It is an established fact that balanced nutrition under favourable environment might have helped in production of new tissues and development of new shoots (Sharma *et al*., 2017). Also this might be happened due to soluble P released from rock phosphate by the organic acids produced during composting (Mali *et al*., 2017). Similarly, Biswas (2011) have also documented the positive impact of enriched organic manures for enhancement of growth and yield of plants. It is pertinent to mention that phosphate solubilizing organism have been reported to solubilize inorganic forms of P by extracting organic acid that directly dissolves phosphatic material and/or chelate partners of the P ion in soil (Lal *et al*., 2015). Organic matter also functions as source of energy for soil microflora which brings about the transformation of inorganic nutrients present in soil in plant available form or applied in the form of fertilizers (Patil *et al*., 2011). The similar results were also reported by Mali *et al.* (2017) and Meena (2017).

Yield

Effect of fertility

The seed and haulm yield of soybean increased significantly with the application of different fertility levels as compared to control. The maximum seed yield (1739.12 kg ha^{-1}) and haulm yield (2618.34 kg ha^{-1}) was recorded with 100% RDF which proved significantly superior over 50% RDF and control. The application of 50% RDF and 100% RDF increased the seed and haulm yield to the extent of 44.69% and 77.55% and 23.00% and 44.09%, respectively as compared to control (Table 5). The increased yield might be due to better uptake and nutritional status of the crop. The increased supply of nitrogen and phosphorus and their higher uptake by plants might have stimulated the rate of various physiological processes in plant and led to increased growth and yield parameters and resulted in increased seed and haulm yield (Jat *et al*., 2014). The significant improvement in seed yield under the influence of application of fertilizer was largely a function of improved growth and the consequent increase in different yield and yield attributes (Pal, 2010). These results are similar with the findings of Begum *et al.* (2015) and Jat *et al.* (2013) who reported that combined application of 25 kg N with 54 kg P ha^{-1} significantly increased yield attributes and yield of soybean.

Effect of enriched compost

The application of different levels of enriched compost imposed significant influence on seed and haulm yield over control. The maximum seed yield (1717.63 kg ha^{-1}) and haulm yield (2602.02 kg ha^{-1}) were recorded under 6 t ha^{-1} enriched compost (EC_3) which was found statistically at par with 4 t ha^{-1} enriched compost (EC_2). The application of enriched compost 2 and 4 t ha^{-1} increased the seed and haulm yield to the extent of 35.47% and 74.43% and 15.38% and 29.08%, respectively as compared to control (Table 5). The significant increase in seed and haulm yield under the influence of enriched compost was largely a function of improved growth and yield attributes which eventually contributed in increased seed and haulm yield (Yadav *et al*., 2019). The incorporation of enriched compost in the soil ensures successive and almost continuous supply of macro and micro nutrients to the soybean over the entire crop growth period (Biswas, 2011). The higher availability of nutrients in soil due to enriched compost application during seed development might have retarded senescence and resulted in large filling period for greater seed yield. These results corroborate the findings of Meena (2017) that

Table 5: Effect of fertility levels and enriched compost on yield and quality of soybean.

Treatments	Seed yield (kg ha^{-1})	Haulm yield (kg ha^{-1})	Protein content (%)	Oil content (%)
Fertility levels				
Control	979.49	1817.15	34.98	18.94
50% RDF	1417.25	2235.15	37.98	20.03
100% RDF	1739.12	2618.34	40.77	21.27
SEm ±	32.61	72.99	0.36	0.21
CD (P=0.05)	95.64	214.07	1.07	0.63
Enriched compost levels				
Control	926.26	1826.61	35.75	19.22
Enriched compost @ 2 t ha^{-1}	1254.88	2107.67	37.24	19.78
Enriched compost @ 4 t ha^{-1}	1615.71	2357.90	38.97	20.45
Enriched compost @ 6 t ha^{-1}	1717.63	2602.02	39.66	20.86
SEm ±	37.65	84.28	0.42	0.25
CD (P=0.05)	110.44	247.19	1.23	0.72

attributing the effect of enriched compost to the release of P from rock phosphate during decomposition and partially additive effect of organics. The inter relationship between yields attributes and its seed and haulm yield were also observed by Mali *et al.* (2017) and Sharma *et al.* (2018).

Protein content

Effect of fertility

The increasing levels of fertility significantly increased the protein content in soybean seed (Table 5) where maximum protein content in seed (40.77%) was observed under 100% RDF and the minimum under control. The application of 50% RDF and 100% RDF increased the protein content in seed to the extent of 8.57 and 16.55%, respectively as compared to control. Nitrogen is a basic constituent of protein and with the increased N application through fertilizers, resulted in enhanced protein content in soybean crop (Yadav *et al*., 2019). Similar, results were also reported by Meena *et al.* (2015).

Effect of enriched compost

The increasingly applied enriched compost significantly increased the protein content in soybean seed (Table 5). The maximum protein content in seed (39.66%) was observed under 6 t ha^{-1} enriched compost and the minimum under control. The application of 2, 4 and 6 t ha^{-1} enriched compost increased the protein content in seed to the extent of 4.16, 9.00 and 10.93%, respectively as compared to control. However, the difference between EC_2 and EC_3 treatment were found statistically at par. The significant increase in protein content in seed with an application of enriched compost seems to be due to increased availability of most of the nutrients to the plant along with nitrogen (Jat *et al*., 2008). The application of enriched compost increases the availability of N to the plant which ultimately utilized for synthesis of protein and its translocation into seed. These results are in agreement with those of Mali *et al.* (2017).

Oil content

Effect of fertility

The increasing levels of fertility significantly increased the oil content in soybean seed (Table 5) to the tune of 21.27% under 100% RDF while minimum of 18.94% was recorded under control. The oil content was increased in seed to the extent of 5.75 and 12.30%, respectively due to application of 50% and 100% RDF as compared to control. Under high N supply, a large proportion of photosynthesis may have diverted to protein formation while leaving a potential deficiency of carbohydrate to be degraded to 'acetyl co-enzyme A' for the synthesis of fatty acids (Bonde *et al*., 2017). Further, increase in oil content and oil yield due to phosphorus might be due to the fact that synthesis of fatty acids in plant occurs through conversion of acetyl coenzyme-A to malonyl coenzyme-A in presence of ATP and phosphate (Saxena *et al*., 2005).

Effect of enriched compost

The increasing levels of enriched compost, significantly increased the oil content in soybean seed (Table 5) to the tune of 20.86% with 6 t ha^{-1}enriched compost while minimum of 19.22% was recorded under control. Application of 2, 4 and 6 t ha^{-1}enriched compost increased the oil content in seed to the extent of 2.91, 6.39 and 8.53%, respectively as compared to control. It might be due to the unique role of organic matter in improving the nutritional environment of rhizosphere via improvement in nutrient availability (Jat *et al*., 2008). Thus, the balance nutrient uptake by plant owing to enhanced level of compost probably favoured enzymatic activities responsible for oil synthesis. These results are in agreement with those of Mankotia and Sharma (1996) who had reported increased oil content of gobhi sarson and toria due to application of organic manure. These results are also in agreement with those of Mali *et al.* (2017).

Interactive effect of fertility and enriched compost levels on number of pods per plant and seed yield

A significant interactive effect of fertility levels and enriched compost on number of pods per plant and seed yield of soybean ware observed (Table 6). Although all the combinations of fertility levels and enriched compost recorded significantly higher number of pods per plant and seed yield over control. However, the significantly maximum

Table 6: Interaction effect of fertility levels and enriched compost on number of pods per plant and seed yield of soybean.

Treatments	Control (EC_0)	Enriched compost @ 2 t ha^{-1} (EC_1)	Enriched compost @ 4 t ha^{-1} (EC_2)	Enriched compost @ 6 t ha^{-1} (EC_3)
		Number of pods per plant		
Control (F_0)	11.30	13.87	15.29	16.21
50% RDF (F_1)	14.72	17.55	22.70	24.53
100% RDF (F_2)	17.78	22.16	27.03	28.32
SEm ±	0.92	-	-	-
CD (P=0.05)	2.68	-	-	-
		Seed yield (kg ha^{-1})		
Control (F_0)	663.99	895.43	1146.37	1212.17
50% RDF (F_1)	840.43	1272.32	1702.79	1853.45
100% RDF (F_2)	1274.35	1596.88	1997.98	2087.26
SEm ±	65.22	-	-	-
CD (P=0.05)	191.28	-	-	-

number of pods per plant (28.32) and seed yield (2087.26 kg ha^{-1}) were obtained under 100% RDF and 6 t ha^{-1} EC (F_2EC_3) treatment combination and the lowest under control (F_0EC_0). However, the treatment F_2EC_2 was found statistically at par with treatment combination F_2EC_3. The improvement in yield attributes and yield could be attributed to additive effect of P, S, Zn and Fe, supplementation and continuous availability of nutrients, growth promoting effect of fertilizer and enriched compost which ultimately led to more photosynthetic activities, cell division, cell elongation and enhanced carbohydrate as well as metabolic process and improvement of soil structure and enriched compost incorporation improved the overall physical conditions of soil thereby, increased the water and nutrient retention in the root zone by reducing infiltration and percolation (Jat *et al*., 2008). These results were also corroborated with the findings

Table 7: Relationship (Correlation coefficient) between seed and haulm yield and yield attributes of soybean.

Variables	Seed yield	Haulm yield	Test weight	No. of seeds per pod	No. of pods per plant	Dry matter accumulation per plant	Plant height
Seed yield	1	-	-	-	-	-	-
Haulm yield	0.959**	1	-	-	-	-	-
Test weight	0.946**	0.976**	1	-	-	-	-
No. of seeds per pod	0.974**	0.919**	0.925**	1	-	-	-
No. of pods per plant	0.989**	0.976**	0.957**	0.950**	1	-	-
Dry matter accumulation per plant	0.948**	0.970**	0.960**	0.948**	0.958**	1	-
Plant height	0.971**	0.976**	0.974**	0.942**	0.976**	0.978**	1

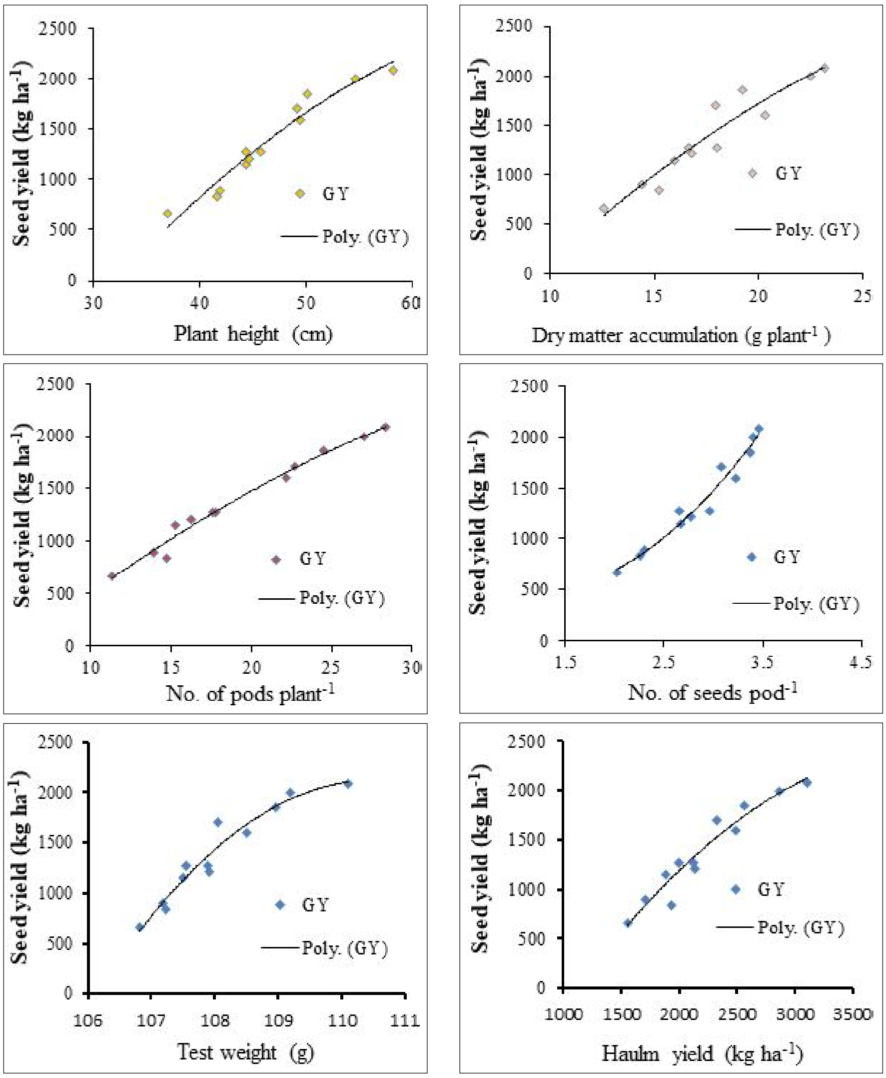

Fig 1: Relationship between growth, yield attributes and yield of soybean.

Table 8: Effect of fertility levels and enriched compost on economics.

Treatments	Net return (Rs ha^{-1})	B:C ratio
Fertility levels		
Control	19260.64	0.93
50% RDF	34571.14	1.56
100% RDF	45808.08	2.01
SEm ±	1178.23	0.06
CD (P=0.05)	3455.62	0.17
Enriched compost levels		
Control	21498.44	1.28
Enriched compost @ 2 t ha^{-1}	30288.20	1.50
Enriched compost @ 4 t ha^{-1}	40068.40	1.70
Enriched compost @ 6 t ha^{-1}	40998.10	1.52
SEm ±	1360.50	0.07
CD (P=0.05)	3990.20	0.19

of Ramasamy and Umapathi (2010). The beneficial effect of fertility levels and enriched compost on yield attributes might be attributed to its ability of sustaining the availability of nutrients throughout the growing season. These findings corroborate with those of Mathivanan *et al.* (2012).The combined application of compost and fertility levels on seed yield was also found significant by Choudhary *et al*. (2015).

Correlation studies

A critical scrutiny of results presented in Table 7 and Fig 1 reveal that the seed yield of soybean gave positive significant correlations with haulm yield (r = 0.959**), test weight (r =0.946**), number of seeds per pod (r = 0.974**), number of pods per plant (r = 0.989**), dry matter accumulation per plant (r = 0.948**) and plant height (r = 0.971**) of soybean crop. Same trend of inter relationship was noticed in case of haulm yield. Wajid *et al*. (2007) also reported correlation (P= 0.05) between total dry matter production and seed yield.

Economics

The maximum net returns (Rs. 45808 ha^{-1}) and B:C ratio (2.01) were recorded with 100% RDF(F_2) followed by 50% RDF (F_2) and control (Table 8). Among the enriched compost application, 4 t ha^{-1} recorded significantly higher B:C ratio but found statistically at par with 6 t ha^{-1} enriched compost. The magnitude of B:C ratio decrease was due to higher dose application of enriched compost from 4 t ha^{-1} (1.70) to 6 t ha^{-1} (1.52). Likewise, addition of enriched compost significantly increased the net return over 2 t ha^{-1} and control. It was predictable because increasing levels of both the treatments gave correspondingly higher seed and haulm yield which ultimately gave more net returns over the input cost incurred in these treatments in comparison to others treatments (Jat *et al*., 2008). These results are also in agreement with those of Mali *et al.* (2017).

CONCLUSION

On the basis of experimental finding, it can be concluded that the application of enriched compost @4 t ha^{-1} + 100% recommended dose of fertilizer (RDF) results in significantly higher productivity, quality and profitability of soybean under Typic Haplustepts soils of Sub-humid Plain and Aravalli Hills Region of Rajasthan.

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