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EFFECT OF COMPOSTED PRESSMUD AND RHIZOBIUM ON BIOMETRICAL AND YIELD PARAMETERS OF SOYABEAN (GLYCINE MAX L.)

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Introduction

The aim of agricultural research is to increase food production per unit area of land or to improve the economic efficiency of production (Manonmani, 2006). Pressmud a by-product of sugarcane industry is a soft, spongy, amorphous, light weight material of dark brown to brownish white colour containing sugarcane fibres, coagulated colloides including can wax, aluminous inorganic salts and soil particles. Application of pressmud improves iron, zinc, calcium and manganese availability in soil.

Biofertilizers are cost effective, ecofriendly and renewal source of plant nutrients to supplement chemical fertilizers in sustainable agriculture system in India (Chaudhang, 2004). Biofertilizers also ensure the supply of micronutrients like Fe, Zn, Mn and Cu etc. Among the biofertilizers, treatment of rhizobium inoculants fixes 20-90 kg N/ha and increase yield by 10 to 25 percent in pulses.

Glycine max L. (Merrill) var. Co Soy 3 (soyabean) is a native of Asia and the crop has been introduced in India as a pulse and oil seed crop (Singh and Awasthi, 1978). Soyabean is termed as "Golden Bean" by agricultural scientists (Xavier ,2002). It is also known as gold of 20th century due to easy cultivation, high cost benefit ratio, less requirement of nitrogen etc. Soyabean provides all the eight amino acids necessary for the human body in the amount needed for the good health. Being a leguminous crop soyabean helps to enrich the soil by fixing atmospheric nitrogen through root nodules (Carsky et al, 1997).

Methodology

Collection of agro-industrial waste

The agro-industrial waste such as pressmud was collected in large amount from Gomuki sugar factory, Kallakurichi, Villupuram district. Rhizobium was collected from Tamil Nadu Agricultural University, Coimbatore.

Pot culture experiment

Treatment application and cultivation

Fifteen pots were filled with 7kg of sandy clay loam soil. The compost was applied to the respective pots and mixed thoroughly. Viable seeds were selected and about five seeds were sown in each pot with

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three replications. After germination three healthy plants were maintained per pots.

Inoculation of seeds with rhizobial culture

200gms of the inoculants was mixed with 250ml of cold rice kanji and the slurry was added over the seeds. The seeds were allowed to dry under shade for 30 minutes. The seeds were sown within 24 hours.

Treatment details

C- Control

T_1- 2.5kg pressmud

T_2- 2.5 pressmud + Rhizobium

T_3- 5kg pressmud

T_4- 5kg pressmud + Rhizobium.

Vegetative parameters

On the 25 and 45 days after sowing (soyabean) the plants were uprooted from the pot and the following vegetative characters were noted like number of leaves, number of nodules, number of flowers, number of pods, shoot length, root length, plant fresh weight, plant dry weight.

Yield parameters

On the 75 days after sowing the soyabean plants were uprooted from the pot and the yield parameters of the pods such as length, circumference of the pod, weight of the pod, number of seeds per pod and weight of the seed were observed.

Statistical analysis

The data obtained from the vegetative and yield parameters were subjected to the statistical analysis and based on the results, inferences were drawn.

Result and discussion

The experiment result pertaining to the biofertilizer and composting of agrowaste pressmud, vegetative and yield parameters during the pot culture experiment on legume Glycine max L. (Merrill) var. Co Soy 3 (soyabean) were analyzed the details of which are indicted in Table 1.

Table 1. Effect of composted pressmud and Rhizobium on vegetative characters of soyabean

Treatment	Shoot length (cm)	Root length (cm)	No. of leaves*	No. of nodules*	Plant fresh weight(g)	Plant dry weight(g)
C	20.40	32.63	8.33	7.69	0.907	0.468
T_1	22.27	36.17	10.33	11.33	1.329	0.435
T_2	23.83	41.40	11.67	17.67	1.386	0.455
T_3	23.40	34.13	11.00	12.67	1.378	0.577
T_4	23.90	43.17	10.67	13.00	1.264	0.472
S.Ed	0.1776	0.6168	0.5578	1.0541	0.0275	0.0221
CD (5%)	0.3958	1.3743	1.2428	2.3481	0.0614	0.0491
CD (1%)	0.5630	1.9579	1.7678	3.3709	0.0878	0.0699
Significance	**	**	**	**	**	**

** ($P < 0.01$)

* Data indicates average of three replications

Table 2. Effect of composted pressmud and Rhizobium at flowering stage of soya bean (45 DAS)

Treatment	Shoot length (cm)	Root length (cm)	No. of leaves *	No. of flowers *	No. of nodules*	Plant fresh weight(g)	Plant dry weight(g)
C	26.23	36.93	9.33	3.67	14.00	1.441	0.289
T_1	27.67	41.67	16.67	7.67	15.67	5.326	1.337
T_2	30.67	40.67	13.67	5.67	19.00	2.316	0.501
T_3	29.17	39.40	13.00	9.33	21.67	2.598	0.747
T_4	28.23	38.27	11.67	9.67	16.80	2.364	0.479
S.Ed	0.8662	1.0394	1.0541	0.8692	1.1353	0.1330	0.0677
CD (5%)	1.9299	2.3160	2.3481	1.9368	2.5296	0.2963	0.508
CD (1%)	2.7452	3.2944	3.3409	2.7550	3.5982	0.4214	0.2145
Significance	**	**	**	**	**	**	**

P(0.01) * data indicates average of three replications

Pot culture experiment

Shoot length

On the 25th day the shoot length of T_2 (23.8 cm), T_3 (23.4 cm) and T_4 (23.90cm) increased compared to that of control (20.4 cm) whereas slight increase was noted in T_1 (22.2 cm). On the 45th day the combination of Rhizobium with composted pressmud was very effective in increasing the shoot length in T_2 (30.6 cm) when compared to the control (26.2 cm). Similar findings was also observed in the study of (Deshmukh, 2004), where an increased shoot length was noted in bengal gram due to the association of Rhizobium with pressmud compost

Root length

On the 25th day the root length had increased significantly in T_2 and T_4 (41.4 cm and 43.1 cm) when compared to control (36.9 cm).

Number of leaves

On the 25th day the number of leaves were highest in T_2 and T_3 (11.6 and 11) treatment than the control (8.3) and on the 45th day increase was noted in T_2 and T_3 (13.6 and 13) than the control (9.3).

Number of flowers

On the 45th day there was a significant increase in the flowers in T_3 (9.3) when compared to the (3.6).

Number of nodules

On the 25th day the numbers of nodules were significantly increased in T_2 (14.6) when compared to control (7.6) and other treatments. On the 45th day the increase was significant in the treatment T_2 (19) and T_3 (21.6) when compared with control (14).

Plant fresh weight

On the 25th day the plant fresh weight increased to 1.32 g (T_1), 1.38 g (T_2) and 1.37 g (T_3) when compared with that control (0.90 g). On the 45th day the plant fresh weight increased significantly in T_1 (5.32 g) when compared to the control (1.44 g) inoculation of rhizobium. This is accordance with the results of Zarrin et al, (2006) and Umamaheshwari (2008).

Plant dry weight

On the 25th day plant dry weight increased in T_3 (0.59 g) when compared to the control (0.46g) where as a slight increase is noted in treatment. On the 45th day the increase in treatment T_1 (1.33g) when compared to the control (0.28g). Effect of composted pressmud and rhizobium on yield parameter of soyabean.

Table 3 shows the effect of composted pressmud and rhizobium on harvest stage of soyabean.

Table 3. Effect of composted pressmud and Rhizobium on harvest stage of soyabean (75 DAS)

Treatment	Length of pod (cm)	Circumference of pod (cm)	Weight of pod (g)	No. of seeds per pod	Weight of the seeds per pod (g)
C	1.33	1.30	0.15	1.33	0.046
T_1	2.53	1.90	0.32	2.00	0.080
T_2	2.67	2.07	0.35	2.33	0.069
T_3	2.63	1.97	0.27	2.67	0.061
T_4	2.87	2.17	0.31	2.68	0.077
S.Ed	0.0789	0.2129	0.0229	0.4216	0.0091
CD (5%)	0.1758	0.4744	0.0511	0.9395	0.0203
CD (1%)	0.2500	0.6748	0.0727	1.3364	0.0289
Significance	**	*	**	*	*

P(0.01) * Data indicates average of three replications

Length of pods

At the harvest stage the length of the pods increased to 2.8 cm (T_4 - composted pressmud and Rhizobium), followed by 2.67cm (T_2) and 2.63 cm (T_3) and 2.5cm (T_1).

Circumference of the pods

The combination of composted pressmud and Rhizobium T_4 and T_2 (2.17cm and 2.07cm) had a very significant effect on the circumference of the pod when compared with the control (1.3cm).

Weight of the pods

The weight of the pods increased significantly in T_2 (0.35g) followed T_4 (2.17g) compared with the control (0.15g).

Number of seeds

At harvest stage the composted pressmud and Rhizobium treatment increased the number of seeds per pod in T_4 (2.6g) when compared with the control (1.3g).

Weight of seed per pod

The weight of the seeds per pod increased in T_1 (0.08g) and T_4 (0.07g) when compared with the control (0.04g). The results were in agreement with the findings of Prabhakaran and Subramanian (2001) in soya bean, Umamaheswari (2008) in cluster bean and soya bean.

Conclusion

The changes in agrowaste after composting, vegetative and yield parameters

under the effect of composted pressmud and Rhizobium on soya bean were analyzed and the results were summarized. The vegetative parameters like shoot length, root length, number of leaves, number of flowers, number of pods, number of nodules, plant fresh weight and dry weight in soya bean were increased by the combination of composted pressmud and rhizobium. Similarly the yield parameters like length of the pods, circumference of the pods, weight of the pods, number of seed per pod, weight of the per pod, also increased in soya bean due to pressmud and rhizobium application.

Agro–industrial waste can be recycled and used as cheaper sources of organic nutrients. From the present investigation it has become evident that the composted pressmud treatment along with rhizobium inoculation increases the vegetative and yield parameters of soyabean. Hence it was concluded that the pressmud on composting can be effectively used as an organic manure substitute individually and in combination with biofertilizer.

REFERENCES

1. Carsky, R.J., Abiadoo, R. Dashiell, K.E. and Sangina, N. (1997), Effect of soyabean on subsequent maize grain yield in Guinea savannah of West Africa. *Crop Sci. J.* 5, 31-39
2. Manonmani, V. (2006), Utilization of solid wastes on crop productivity, *Kisan World*, 33(7) 27.
3. Prabhakaran, N.K. and Subramanian, P. (2001), Performance of soya bean under integrated management of irrigation, composted coir pith and nutrients, *Madras Agric. J., 83* (2):132-133.
4. Umamaheswari, P. (2008), Influence of composted pressmud on the soil health and productivity of legumes Cyamopsis tetragonolaba L. (Taub) var. Pusa Navabahar and Glycine max L. (Merrill) var. Co Soy 3, M.Sc., Thesis, Coimbatore, Avinashilingam University for women.
5. Xavier, P.R. (2002), Soya, the wonder bean – its cultivation and the uses of soya bean products, *Kisan World*, 29(3), 63-65.
6. Zarrin, F., Muhammad, Z.A. and Chaudhary, R. (2006), Effect of rhizobium strains and phosphorus on growth of soya bean and survival of rhizobium and solubilizing bacteria, *Pak. J. Bot.*, 38(2), 459 - 464.