

Integrated effect of biofertilizers with recycled sago waste and pressmud on the yield of soybean and cowpea

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SUMMARY

A pot culture study was undertaken to study the effect of biofertilizers – *Rhizobium* and phosphobacteria with recycled sago waste and pressmud on the yield characters of soybean [*Glycine max* (L.) Merrill.] and cowpea [*Vigna unguiculata* (L.) Walp]. The investigations included 10 treatments using various combinations of biofertilizers and biocomposts. Composted agrowastes applied individually and in combination with biofertilizers had increased the yield of soybean and cowpea.

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Key words :

Sagowastes,
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Recent years have witnessed renewed interest in microbial technique for composting of farm urban and industrial wastes. It saves environment by converting a wide variety of wastes into valuable agricultural inputs and minimize the environmental problems. The present investigation involves the utilization of agrowastes in combination with biofertilizers. To evaluate the efficacy of these composts, this research was carried out using soybean [*Glycine max* (L.) Merrill] and cowpea [*Vigna unguiculata* (L.) Walp.] as the test crops.

MATERIALS AND METHODS

Pot culture experiments were carried out to study the yield characters of soybean and cowpea in red sandy loam soil. There were 12 treatments with three replications. The treatment details were T₁ – Control, T₂ – NPK 100%, T₃ – Raw sago, T₄ – Composted sago, T₅ – Raw pressmud, T₆ – Composted pressmud, T₇ – Phosphobacterium, T₈ – *Rhizobium*, T₉ – Composted sago + Phosphobacterium, T₁₀ – Composted pressmud + *Rhizobium*, T₁₁ – Composted pressmud + Phosphobacterium and T₁₂ – Composted pressmud + *Rhizobium*.

The agrowastes, sago waste and pressmud were applied at the rate of 12.5 t / ha and bio-fertilizers 10 g per pot. NPK were applied at the rate of 25, 50 and 40 kg / ha,

respectively. Cultivation practices were followed properly. On the 90th day, the following parameters were studied : plant height, plant fresh weight, plant dry weight, number of pods / plant, number of seeds / pod, 100 seeds weight and weight of seeds / plant.

RESULTS AND DISCUSSION

The results obtained from the present investigation are presented in Tables 1 and 2.

The yield parameters of soybean and cowpea were increased significantly due to addition of biocomposts and biofertilizers. The height of soybean increased significantly in T₄ treatment. A very significant increase in plant fresh weight was noted in T₂ and T₁₂ treatments. Plant dry weight increased in T₂ (20.7 g), T₇ (18.2 g), T₁₀ (19.6 g), T₁₂ (20 g) than the control. The number of seeds / pod increased in T₄, T₉, T₁₀, T₁₁ and T₁₂ treatments. Treatments T₇ and T₁₂ gave best results on the weight of seeds per pod. (Table 1). The increased yield is in accordance with the results of Yadegari *et al.* (2008) in *Phaseolus vulgaris* and Vaiyapuri *et al.* (2009) in soybean.

Table 2 depicts the effect of biocomposts and biofertilizers on the yield parameters of cowpea. The maximum plant height was obtained in T₁₁ treatment. The maximum increase in plant dry weight, number of pods / plant, number of seeds / pod, weight of the seeds / pod and 100 seeds weight were noted

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Table 1 : Effect of raw and composted sago, pressmud and biofertilizers on soybean (90 days)

Treatments	Plant height (cm)	Plant fresh weight (g)	Plant dry weight (g)	Number of pods / plant	Number of seeds / pod	100 seed weight (g)	Weight of seed / plant (g)
T ₁	116.2	44.9	10.3	15.7	2.1	11.6	4.0
T ₂	159.8	69.9	20.7	27.7	1.9	9.5	3.6
T ₃	145.2	60.2	12.6	21.5	2.1	10.0	2.6
T ₄	182.7	63.1	15.8	41.8	2.1	10.5	4.2
T ₅	177.9	55.2	11.2	37.0	2.0	10.3	3.5
T ₆	176.7	60.7	12.0	45.0	2.0	13.3	4.9
T ₇	136.1	67.1	18.2	25.7	2.0	10.0	6.1
T ₈	142.4	65.5	14.4	26.0	2.0	10.8	5.2
T ₉	165.7	65.3	19.4	43.0	2.0	11.7	5.6
T ₁₀	174.6	66.5	19.6	50.7	2.1	11.1	5.0
T ₁₁	175.1	64.6	13.5	51.0	2.0	11.2	4.7
T ₁₂	178.7	69.7	20.0	49.5	2.1	11.5	6.4
S.E.±	10.767	7.433	2.183	4.452	0.117	4.626	0.519
C.D. (P=0.05)	32.829	22.664	6.655	13.576	0.358	14.106	1.581

Table 2 : Effect of raw and composted sago, pressmud and biofertilizers on cowpea (90 days)

Treatments	Plant height (cm)	Plant fresh weight (g)	Plant dry weight (g)	Number of pods / plant	Number of seeds / pod	100 seed weight (g)	Weight of seed / plant (g)
T ₁	95.6	17.9	3.5	3.3	30.3	8.7	2.3
T ₂	107.6	27.9	5.6	5.3	52.5	12.0	5.6
T ₃	103.8	17.8	5.7	3.8	40.2	9.7	3.5
T ₄	107.2	18.3	6.0	4.2	42.7	9.9	3.9
T ₅	95.8	20.0	4.5	4.0	47.2	11.6	4.3
T ₆	104.3	21.7	6.2	4.3	52.0	12.1	4.4
T ₇	100.0	21.2	5.8	4.4	48.3	11.9	3.6
T ₈	105.0	22.3	5.7	4.0	44.7	11.7	3.4
T ₉	104.1	25.4	5.9	4.0	49.7	11.8	4.2
T ₁₀	106.4	33.8	7.4	4.2	50.3	11.9	4.3
T ₁₁	109.4	29.4	5.3	4.0	50.2	11.6	4.1
T ₁₂	106.8	34.5	8.3	4.5	52.7	12.7	4.6
S.E. ±	4.405	4.929	1.395	0.902	8.392	0.400	0.448
C.D. (P=0.05)	13.432	15.030	4.253	2.750	25.589	1.220	1.366

in T₁₂ treatment when compared to the control. During degradation, the available nutrients increased and this is the reason for maximum significant increase in yield of soybean and cowpea. This result is in accordance with Natarajan (2001) who reported that the compost was superior in its macronutrients and micronutrients. The composts applied individually and in combination with biofertilizer gave a significant increase in yield. This results is in agreement with Singh *et al.* (2007) and Rathi *et al.* (2009) who reported that *Rhizobium* inoculation increased the yield characters of cowpea.

The addition of composted pressmud and sago with

biofertilizers not only increased the yield of legumes but also will gain advantages in soil fertility to overcome the fertilizer bill and pollution hazards.

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