

## **Effect of Sheep Droppings and Paddy Straw Waste Vermicasts on the Growth and Yield of Red Rose Plant**

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### **Abstract**

The rate of vermicasts production in partly decomposed sheep droppings (SD) and paddy straw waste (PSW) by *Eudrilus eugeniae* and its effect on the growth parameters of red rose plants were studied. The vermicast production was noticed only upto 36 days in SD and 16 days in PSW and its respective production rate was 275 and 300 mg/g earthworm body weight/day. The ratios of total nodes, leaves and flowers of rose plants raised in partly decomposed, vermicasts and residual SD and PSW were 109 : 115 : 93 and 74 : 114 : 70, 420 : 433 : 406 and 283 : 422 : 268, and 23 : 32 : 21 and 21 : 26 : 18 respectively. Of the partly decomposed, vermicasts and residual compost media of SD and PSW used, relatively high count of 115 nodes, 433 leaves and 32 flowers was noticed in the rose plants in SD vermicasts over the plants raised in partly decomposed and residual SD and also in all the 3 media of PSW. Evidently, the organic waste, PSW used in the present study was not suitable either for vermiculture practice or the production of vermicasts and also the vermicasts obtained from SD and PSW exert a better result in the cultivation of rose plants over its partly decomposed or residual compost.

**Key words :** Red rose, Sheep droppings, Paddy straw waste, Vermicasts, *Eudrilus eugeniae*.

Vermicasts which form the major part of the vermicompost have all the macro and micronutrients in available form to plants, humus, organic carbon, growth regulators, enzymes, vitamins, antibiotics and microflora (1, 2) Depending on plant species, soil and environmental conditions, worm cast benefits the soil and plant in many ways. Land application of vermicompost obtained from diverse organic wastes could be one of the most economical and attractive methods of solving wastes disposal problem and increasing the nutrient contents of soil simultaneously. Vermicompost and worm casts utilization in horticulture has been proposed for several years due to their beneficial effect noticed in horticultural plants. Eventhough many works have been carried out on the growth and yield of horticulture plants such as chilly, tomato, radish, greengram and blackgram using different vermicasts / vermicompost (3—9), no work has been made on the effect of different vermicasts in ornamental plant. Hence, the present study was under taken to know the impact of organic nutrients present in vermicompost / vermicasts obtained from sheep droppings and paddy straw waste on the growth and flower yield of red rose plant raised

through pot cultivation.

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### **Methods**

*Collection of Soil.* Dry alluvium and red soil taken respectively from the Cauvery river bank at Govt Arts College (Autonomous), Kumbakonam and the road sides of Kumbakonam by-pass were manually powdered using stone mortar.

*Collection of Sheep Droppings, Paddy Straw Waste and Cowdung.* Fresh sheep dropping (SD), paddy straw waste (PSW) and partly decomposed cowdung (DC) were collected respectively from Anaikudam village, Udayarpalayam Taluk, Perambalur District; Keelamanjeri village, Thanjavur District, and Baburajapuram village near Swamimalai, Thanjavur District.

*Collection and Maintenance of Earthworms.*

**Table 1.** Amount of vermicasts produced by *Eudrilus eugeniae* in partly decomposed sheep droppings (DSD) and paddy straw waste (DPSW) medium. Rate of vermicasts production observed in DSD and DPSW medium is 275 and 300 mg/g body weight/day respectively.

Days	Production of vermicasts (g)	
	DSD	DPSW
1	5	4
2	10	10
3	15	15
4	20	19
5	25	27
6	30	34
7	35	41
8	40	45
9	45	39
10	50	33
11	55	28
12	60	24
13	65	19
14	70	10
15	75	8
16	80	4
17	80	—
18	75	—
19	70	—
20	65	—
21	60	—
22	55	—
23	50	—
24	45	—
25	45	—
26	40	—
27	40	—
28	35	—
29	30	—
30	30	—
31	25	—
32	20	—
33	15	—
34	10	—
35	10	—
36	5	—
Total	1485	360

Specimens of adult epigeic earthworm, *Eudrilus eugeniae* with size  $\pm 1$ g obtained from the vermiculture unit of Zoology Department, Govt Arts College (Autonomous), Kumbakonam were kept in large cement tank with a substrate containing 100% partly DC and maintained under shade place for 15 days.

*Preparation of Substrates for Vermicasts Production.* Partial decomposition and preparation of decomposed SD and PSW materials for vermicasts pro-

duction were followed as per the procedure adopted by Jayaseelan and Bakthavathsalam (10). Two circular cement tanks each with size 50 cm diameter and 45 cm height were taken and filled respectively with 18 and 12 kg of partly decomposed SD and PSW materials. Adult earthworms with body weight 150 and 75 g were respectively introduced in the above tanks. Vermicastes were collected daily on the top surface of the feed bed and stored in separate polythene bags. Production of vermicasts was totally stopped respectively in the above media after days 37 and 17. The unused residual materials were collected after removing all the earthworms from the above media and stored in separate polythene bags.

*Red Rose Cultivation Using Vermicasts.* Forty two circular earthen post with 22 cm diameter and 23 cm height as size were taken and to each 2 liters of alluvium soil and 2 liters of red soil were added. Forty two ordinary red rose siblings purchased from the Shanmugam Nursery Farm, Papanasam were transplanted in the above pots (one plant in each pot). Sufficient water was added in all the pots for proper fixing of plants into the soil. The experimental pots were kept at open terrace for direct sun light. The pots were regularly poured with sufficient water once in a day (either morning or evening). Ten days after transplantation of rose plant, 15 g of DC was mixed in the soil at the edge of each pot just below 3 cm deep. The above rose pots were divided into 7 groups each with 6 numbers. In each pot of first, second and third groups, 20 g of partly decomposed (with out earthworm exposure), vermicasts and unused residual SD (after earthworm exposure) were added respectively after three days of cowdung application. Similarly 10 g of partly decomposed, vermicasts and unused residual PSW were added respectively in each pot of groups 4, 5 and 6. Subsequent manuring was done with the same dose of 20 and 10 g of SD and PSW respectively for 5 times at an interval of 10 days. The plants in group 7 were not provided with any manure and maintained as control. After 10 days of transplantation into the pot, number of nodes, leaves and flowers present in all the rose plants were counted daily upto 60 days and recorded their values for comparison.

*Statistical Analysis.* Statistical comparisons were made between control and experimental data of total number of nodes, leaves and flowers present in the

**Table 2.** Total number of nodes, leaves and flowers present in 6 red rose plants cultivated under control (C) and partly decomposed (D), vermicasts (V) and residual compost (R) of SD and PSW media for 60 days. Upper and lower row values represent the rose plants cultivated respectively in SD and PSW.

Days	No. of nodes				No. of leaves				No. of flowers			
	C	D	V	R	C	D	V	R	C	D	V	R
0	3	9	10	8	9	19	22	16	0	0	0	0
		8	10	7		13	16	11		0	0	0
5	7	17	17	15	15	34	38	32	0	1	1	0
		18	21	14		24	41	23		0	0	2
10	9	24	26	22	39	68	72	68	0	1	3	0
		26	33	21		47	73	47		1	1	2
15	14	34	35	29	68	105	107	107	0	2	5	0
		32	41	29		68	109	71		3	4	2
20	16	41	43	34	87	141	145	139	3	2	7	3
		44	51	37		90	147	97		3	5	5
25	22	51	51	44	112	177	179	175	3	4	9	5
		52	63	43		113	183	121		4	9	7
30	23	58	61	49	130	208	218	208	4	6	14	9
		60	75	52		138	223	147		6	13	9
35	27	68	70	59	151	248	251	241	4	8	15	10
		63	77	51		158	224	159		8	18	13
40	30	74	78	63	177	279	287	274	4	11	15	12
		64	83	54		178	274	181		11	19	16
45	35	86	90	73	200	317	325	311	5	13	18	14
		70	91	59		208	304	206		13	23	14
50	37	92	98	78	218	347	361	342	6	16	22	15
		73	98	60		236	339	224		14	25	16
55	42	103	107	88	247	387	396	376	9	20	28	18
		74	112	61		259	362	248		18	26	18
60	45	109	115	93	266	420	433	406	9	23	32	21
		74	116	70		283	422	268		21	26	18

rose plants cultivated in the media containing partly decomposed, vermicasts and unused residual SD and PSW using Students *t* - test.

### Results and Discussion

The rate of vermicasts production by *Eudrilus eugeniae* in partly decomposed SD and PSW was calculated and (Table 1). A steady increase upto 16 days and a gradual decrease after day 18 onwards was noticed in the production of SD vermicasts. But the vermicasts production observed in PSW medium on the other hand showed a gradual increase only for a short period and then a steady decline that too upto day 16 was noticed. The total amount of vermicasts collected from the above media for the entire period was 1485 and 360 g respectively and it was equivalent to 275 and 300 mg of vermicasts produced per g earthworm body weight per day. From these results it is inferred that the feeding bed prepared from PSW

was not suitable for vermiculture practice or production of vermicompost. These results also revealed that if at all any culture medium prepared with 120 g of SD (18 Kg of SD/150 g of earthworm body weight) and 160 g of PSW (12 kg of PSW/75 g of earthworm body weight) /g of body weight for vermiculture practices or vermicasts production using *Eudrilus eugeniae*, the respective exposed medium should be renewed once in every 36 and 16 days for better biomass and vermicasts productions.

Total number of nodes, leaves and flowers emerged from the red rose plants raised in soil containing partly decomposed, vermicasts and residual SD and PSW recorded at 5-day intervals for 60 days and the mean values arrived for the same after 60 days are given in Tables 2 and 3 respectively. The ratios of total nodes, leaves and flowers of rose plants raised in pots for 60 days using decomposed, vermicasts and residual SD and PSW were 109 : 115 : 93 and 74 : 114 : 70, 420 : 433 : 406 and 83 : 422 : 268, and

**Table 3.** Total number of nodes, leaves and flowers per red rose plant present at the end of 60 days of cultivation in partly decomposed (D), vermicasts (V) and residual compost (R) of SD and PSW. Mean  $\pm$  SD of six red rose plants; \*Significant ( $P < 0.05$ ) over control; \*\*Not significant ( $P > 0.05$ ) over control; Values in parentheses indicate per cent increase over respective control values.

Medium	No. of nodes	No. of leaves	No. of flowers
Control	7.50 $\pm$ 0.55	44.30 $\pm$ 6.83	1.50 $\pm$ 1.05
DSD	18.16 $\pm$ 9.60*(142.1)	70.00 $\pm$ 25.80*(58.0)	3.83 $\pm$ 0.98*(155.3)
DPSW	12.33 $\pm$ 2.65*(64.4)	47.16 $\pm$ 3.82* *(6.5)	3.50 $\pm$ 1.04*(133.3)
VSD	19.16 $\pm$ 6.94*(155.5)	72.16 $\pm$ 10.50*(62.9)	5.33 $\pm$ 2.50*(255.3)
VPSW	19.33 $\pm$ 7.34*(157.7)	70.33 $\pm$ 19.87*(58.8)	4.33 $\pm$ 2.06*(188.7)
RSD	15.5 $\pm$ 4.80*(106.7)	67.66 $\pm$ 12.60*(52.7)	3.50 $\pm$ 1.97*(133.3)
RPSW	12.14 $\pm$ 2.54*(61.9)	44.66 $\pm$ 4.03* *(0.8)	3.00 $\pm$ 1.26*(100.0)

23 : 32 : 21 and 21 : 26 : 18 respectively. The corresponding values observed in control rose plants were 45, 266 and 9. The rose plant raised in soil alone showed poor growth as revealed by their lower counts over plants raised in other organic media prepared from SD and PSW. Of the three media of SD and PSW used, relatively a very high count of 115 nodes, 433 leaves and 32 flowers was noticed in the rose plants raised in SD vermicasts over the plants raised in partly decomposed and residual SD and also in all the 3 media of PSW. Among the two media of partly decomposed and residual compost of SD and PSW studied, the rose plants raised in partly decomposed media showed relatively better results over the plants raised in residual compost. The mean values (Table 3) of growth parameters also showed that the rose plants raised in vermicasts of SD and PSW exhibit significant change ( $P < 0.05$ ) over their respective control and a better result over their respective partly decomposed and residual composts. Obviously, vermicasts obtained from SD and PSW induce the red rose plant in a positive manner to produce more number of nodes and leaves thereby flowers due to the presence of more amount of macro and micronutrients (6). This observation also suggested the rose farmers who are interested in red rose cultivation using SD and PSW and the respective materials may be used only after earthworm exposure for a minimum period of 36 and 16 days.

There have been numerous experiments in which plants have been grown in pots with earthworm cast or vermicompost, where an increase in plant growth has occurred. Kale and Bono (11) found that the vegetative growth of plants was influenced by *E. eugeniae* worm cast in a better way than the chemical fertilizers.

Line (12) reported that vermicomposted mixture of wood waste and sea star waste showed an excellent growth of tomatoes and lettuces. Kale (13) has also recorded an excellent effect of vermicompost on the growth and yield of cereals, pulses, oil seeds, spices, vegetables, fruits, ornamental plants, cash crops and plantation crops. Arulmurugan (14) has also studied the effect of vermicompost on growth, yield, protein and oil content of soybean and recorded an increase in plant height, root length, root volumes, number of seed per plant, protein and oil content of seeds together with increased uptake of NPK by plants. Vadiraj et al. (15) noticed pronounced influence of vermicompost on the growth and yield of turmeric plant. Ramalingam (3) has also studied the differential effect of organic manures (cattle dung, farmyard manure and pressmud) and vermicomposts (obtained from farm waste + pressmud, water hyacinth + pressmud and water hyacinth + pressmud slurry) on the growth parameters of tomato for 60 days from transplantation and found a many fold increase in the growth parameters of vermicomposts treated plants over organic manure treated plants. Senapati (16) reported that the emergence of tomato seedlings in vermicompost is much better than in the recommended commercial potting compost. Bakthavathsalam and Deivanayaki (17) have also noticed a significance influence of vermicompost with or without rhizobium on the growth and yield of black gram cultivated through pot culture studies. Similarly Jayaseelan and Bakthavathsalam (8) and Subramaniyan and Bakthavathsalam (6) have also noticed a significant improvement over control in the yield and growth parameters of radish plants raised in the soil containing vermicompost of green gram waste and

vermicasts of PSW.

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