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Research Notes

Response of greengram to varied concentrations of Panchakavya (organic nutrition) foliar application

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Green revolution over years has enhanced the vulnerability of natural resources to degradation. At this context, a keen awareness has been created on the adoption of "Organic Farming" as a remedy to maneuver the illeffects from modern chemical agriculture (Kunnel, 1997). It is very much essential now to develop a technically feasible package involving organic resources for various crops. Panchakavya is a foliar nutrition prepared by organic growers of Tamil Nadu as an indigenous material and used widely for agricultural and horticultural crops (Natarajan, 2002).

In Sanskrit, Panchakavya means a combination of five products obtained from cow. When suitably mixed and used, it has positive influence on living organisms. It has got reverence in Hindu literature also. The products from cow have the ability to bring the flow of cosmic energy. Cosmic energy, when made to pass through a living system, removes the imbalances in terms of physical,

chemical, biological and physiological aspects and harmonizes the basic elements which revitalize the growth process (Natarajan, 2002). Panchakavya is used in crops as foliar spray, soil application along with irrigation water, seed or seedling treatment etc. Spraying two rounds of Panchakavya, one before the flower initiation and another during pod setting phase gives quick flowering and high setting percentage. In jasmine it ensures continuous flowering and in annual moringa sprayings double the fruit yield besides giving resistance to pest and diseases (Vivekanandan, 1999). For foliar spray 3% concentration is being adopted by organic farmers using hand-operated sprayers with high pore sized nozzle (Natarajan, 2002).

Field experiment was conducted during *kharif* 2002 to investigate the response of greengram (CO4) to varied concentrations of Panchakavya (organic nutrition) foliar application. The experiment was laid out in the eastern block farm of Tamil Nadu Agricultural University,

Coimbatore. The design was Randomized Block Design with four replications. The treatments included were control (RDF without Panchakavya) and Panchakavya alone (without RDF) at different concentrations (1,2,3,4,5 and 6 per cent). The control plot received inorganic fertilizers at the rate of 25:50 kg NP ha⁻¹. This treatment comes under the category of conventional farming and the other treatments involving Panchakavya under organic farming. The crop was grown under irrigated condition adopting a spacing of 30 x 10 cm. The soil of experimental field was low in N (129 kg ha⁻¹) and P₂O₅ (6.5 kg ha⁻¹) and high in K₂O (570 kg ha⁻¹). FYM @ 12.5 t ha⁻¹ was applied basally to the entire experimental site. Four foliar sprays were given each on 15, 25, 40 and 50 DAS coinciding with vegetative, pre-flowering, flowering and pod setting stages of greengram for the treatments involving Panchakavya. Two per cent DAP was sprayed during first appearance of flowers and 15 days after first spray for control (RDF without Panchakavya).

Panchakavya stock solution, 20 litres was prepared using the following ingredients. Biogas slurry/cow dung (5 kg), cow's urine (3 litres), cow's milk (2 litres), cow's curd (2 litres) and cow's ghee (1 litre). In addition sugarcane juice (3 litres), tender coconut water (3 litres) and riped banana (1 kg) were also used to accelerate the fermentation. All the materials were added to a wide mouthed mud pot, and kept open under shade. The contents were stirred twice a day for about 20 minutes, both in the morning and evening to facilitate aerobic microbial activity. After 10 days the Panchakavya stock solution was ready for use. From the stock solution varying concentrations were prepared according to the requirement (three litres of Panchakavya for 100 litres of water gives spray fluid of 3 per cent concentration). The spray solution @ 500 litres ha⁻¹ was sprayed using hand sprayer with higher pore size.

There were no significant differences among the treatments evaluated for plant height, LAI and number of pods per plant (Table 1).

Table 1. Influence of nutritional practices on greengram growth, yield attributes and yield

Treatments	Plant height at flowering (cm)	LAI at flowering	Grain yield (q ha ⁻¹)	No. of pods plant ⁻¹	No. of seeds pod ⁻¹	100 grain weight (g)
Control with RDF (No Panchakavya)	77.7	8.17	17.87	76.75	12.9	3.87
Panchakavya @ 1% (No RDF)	67.7	8.04	12.67	58.12	9.4	3.65
Panchakavya @ 2% (No RDF)	69.6	8.40	15.07	68.25	10.0	3.71
Panchakavya @ 3% (No RDF)	80.3	8.65	17.71	79.25	12.1	3.99
Panchakavya @ 4% (No RDF)	80.0	8.13	15.35	75.75	11.1	3.92
Panchakavya @ 5% (No RDF)	77.8	8.46	14.97	74.74	10.6	3.84
Panchakavya @ 6% (No RDF)	71.7	8.49	14.05	68.87	10.2	3.72
Mean	75.0	8.33	15.40	71.66	10.9	3.82
SEd	5.26	1.02	0.30	6.944	0.60	0.09
CD (P=0.05)	NS	NS	0.63	NS	1.26	0.20

Table 2. Comparative economics (Rs ha⁻¹) of Panchakavya spray (3%) Vs Conventional farming on greengram

Packages of Practices	Conventional farming	Organic farming
Preparatory cultivation	(Rs. ha ⁻¹)	
Ploughing and leveling	1100	1100
Formation of beds and channels (10 men)	540	540
Seeds and sowing		
Cost of greengram (CO 4) seed (20 kg ha ⁻¹)	500	500
<i>Rhizobium</i> seed treatment and soil application (5 pkts)	25	25
Bio-fertilizer application cost (1 women)	45	45
Sowing (10 women)	450	450
Manures / fertilizers and manuring		
Basal application of Recommended dose of fertilizers (25:50:0 NPK ha ⁻¹)	1218	
Application of FYM @ 12.5 t ha ⁻¹	1250	1250
Cost of Panchakavya (3%) (15 lit. ha ⁻¹)	-	525
Application of Panchakavya (4 men and 2 women)	-	306
Basal application of fertilizers (1 man)	54	-
Foliar spray of DAP (2%) two times (20 kg DAP)	184	-
Spraying cost (2 men)	108	-
Plant protection		
Dusting of endosulfan 4% (25 kg ha ⁻¹)	500	-
Dusting cost (1 man)	54	-
Prophylactic spray of neem seed kernel extract	-	250
Spraying cost (1 man)	-	54
After cultivation		
Hand weeding (16 women) on 15 and 30 DAS	720	720
Irrigation and drainage		
Labour cost (8 irrigations) (8 men)	432	432
Cost / Irrigation (8 x Rs. 100)	800	800
Harvesting and threshing (20 women)	900	900
Total cost of cultivation	8880	7897
Total yield (kg ha ⁻¹)	1787	1771
Gross income	28592	28336
Net income	19712	20439
Additional income over conventional farming	-	727
Benefit Cost Ratio (BCR)	3.22	3.59

Greengram (seed @ 25 kg⁻¹; grain @ 16 kg⁻¹)

Fertilizer (N @ Rs. 10.23; P @ Rs. 19.25 as urea and single super phosphate and DAP @ 9.2 kg⁻¹)

Biofertilizer (Rs. 25 kg⁻¹)

Panchakavya (Rs. 35 L⁻¹)

Labour (Rs. 54 men⁻¹ and Rs. 45 women⁻¹)

Significantly maximum number of seeds per pod has been recorded only under control with RDF (12.9) and this was at par with Panchakavya foliar application @ 3 per cent (12.1). Linear trend in yield was observed from 1% level to 3% level (12.67 q ha⁻¹ to 17.71 q ha⁻¹). Increasing or decreasing the levels of Panchakavya from 3 per cent level had decreased the yield parameters and yield of greengram. Scorching was observed in the leaves at higher concentrations might have resulted in decreased photosynthetic activity which ultimately resulted in reduction in yield.

Significantly the highest test grain weight (3.99 g) was recorded under Panchakavya 3% spray followed by 4%. Significantly lower hundred grain weight has been recorded under Panchakavya @ 6% (3.72) and 2% (3.71) respectively. Greengram with recommended dose of fertilizers recorded significantly the highest grain yield of 17.87 q ha⁻¹ and it was par with Panchakavya foliar spray application @ 3% (17.71 q ha⁻¹).

Additional revenue (Rs. 727 ha⁻¹) and higher BC ratio (3.59) were observed under Panchakavya spray @ 3% sprayed on greengram on 15, 25, 40 and 50 DAS which might be due to the lower cost of nutrition and plant protection as compared to that of control (Table 2). Soil drenched with Maha Panchakavya stock slurry @ 10% prepared using cows products like ghee, curd, milk, urine and dung along with common salt and baker's yeast successfully controlled the wilt of tomato (Mishra, 2002) and it was found to be superior to carbendazim in reducing the plant disease index and increasing the vigour of plant and fruit yield of tomato (Ramachandra Reddy and Bhaskara Padmodaya, 1996). Highest benefit cost ratio was recorded under Panchakavya applied along with poultry manure and neem cake with and without RDF in both main and ratoon crop of annual moringa

(Beulah, 2001). By replacing costly chemical inputs, Panchakavya ensures economic gain (Natarajan, 2002).

From the present study, it could be concluded that foliar application of Panchakavya @ 3% on 15, 25, 40 and 50 DAS without RDF was the most effective low cost technology in terms of grain yield of greengram on par with or recommended doses of fertilizers.

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