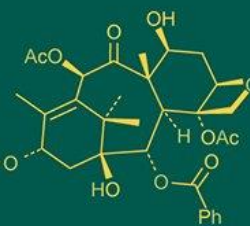
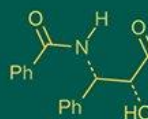


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Deependra Singh Sarangdevot
Ph.D. Research Scholar,
Department of Agronomy,
MPUAT, Udaipur, Rajasthan,
India

Renuka Bhakher
Ph.D. Research Scholar,
Department of Agronomy,
MPUAT, Udaipur, Rajasthan,
India

Kapil Dev Gurjar
Ph.D. Research Scholar,
Department of Agronomy,
SKNAU, Jobner, Rajasthan,
India

Shaifali Tanwar
Ph.D. Research Scholar,
Department of Horticulture,
MPUAT, Udaipur, Rajasthan,
India

Ankit Kumar
Ph.D. Research Scholar,
Department of Agronomy,
MPUAT, Udaipur, Rajasthan,
India

Yuvraj Nath Chouhan
Ph.D. Research Scholar,
Department of GPB, MPUAT,
Udaipur, Rajasthan, India

Corresponding Author:
Deependra Singh Sarangdevot
Ph.D. Research Scholar,
Department of Agronomy,
MPUAT, Udaipur, Rajasthan,
India

Effect of pelleted vermicompost on quality and nutrient content of organic greengram (*Vigna radiata* L.)

Deependra Singh Sarangdevot, Renuka Bhakher, Kapil Dev Gurjar, Shaifali Tanwar, Ankit Kumar and Yuvraj Nath Chouhan

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Abstract

A field experiment was conducted during *kharif* 2022 at the Organic Farming Unit, Rajasthan College of Agriculture, MPUAT, Udaipur to evaluate the effect of pelleted vermicompost and its scheduling on quality and nutrient content of organic greengram. The experiment was laid out in factorial randomized block design with three replications comprising five levels of pelleted vermicompost (control, 1, 2, 3 and 4 t ha⁻¹) and three scheduling treatments.

The results revealed that application of pelleted vermicompost significantly improved protein content and nutrient composition of greengram seed. The highest protein content (24.97%) and nitrogen content (3.99%) were recorded under 4 t ha⁻¹ pelleted vermicompost. Similarly, phosphorus (0.56%) and potassium content (1.39%) were also highest under this treatment. Among scheduling treatments, split application (50% at sowing + 25% at 4 WAS + 25% at 6 WAS) recorded significantly higher values of quality and nutrient parameters. However, carbohydrate and fat content were not significantly influenced by treatments.

Thus, application of pelleted vermicompost at 4 t ha⁻¹ along with split scheduling improved nutritional quality of organic greengram.

Keywords: Greengram, pelleted vermicompost, protein, nutrient content, organic farming

Introduction

Greengram (*Vigna radiata* L.) is an important pulse crop widely cultivated in India and serves as a major source of dietary protein (Kumar and Ali, 2004) [1]. Improving the nutritional quality of pulses is essential for addressing malnutrition and ensuring food security.

Globally, organic farming is practiced on about 76 million hectares of land (FiBL, 2021) [4], while in India about 9.11 million hectares are under organic cultivation (APEDA, 2023) [3]. Under organic farming systems, nutrient availability plays a crucial role not only in yield but also in determining the quality and nutrient composition of produce. Organic manures such as vermicompost are known to enhance soil fertility, microbial activity and nutrient availability.

Pelleted vermicompost offers additional advantages such as ease of application, improved nutrient use efficiency and slow release of nutrients. However, limited information is available on the effect of pelleted vermicompost and its scheduling on quality and nutrient composition of greengram. Therefore, the present investigation was undertaken.

Materials and Methods

The experiment was conducted during *kharif* 2022 at the Organic Farming Unit, Rajasthan College of Agriculture, MPUAT, Udaipur. The soil of the experimental site was typical of the region and the climate was sub-humid.

The experiment was laid out in factorial randomized block design (FRBD) with three replications, comprising 15 treatment combinations involving four levels of pelleted vermicompost (1, 2, 3 and 4 t ha⁻¹) along with control, and three scheduling treatments. The treatment combinations were randomized with the help of random number table (Fisher,

1950) [5] Greengram variety GM-4 was sown at spacing of 30 cm × 10 cm using seed rate of 15 kg ha⁻¹.

Preparation of vermicompost pellets

Well dried vermicompost is taken after proper sieving into a container and bentonite as binding agent, is thoroughly mixed and then taken into the pellet making machine which makes small cylindrical pellets. The cylindrical pellets are then placed in centrifugal machine which helps in transforming the cylindrical pellets into spherical pellets.

Quality analysis

- Protein content was determined by multiplying nitrogen content with factor 6.25 (Lowry *et al.*, 1951) [8]
- Carbohydrate content was estimated by Anthrone method (Sadasivam and Manickam, 2008) [11]
- Fat content was determined by AOAC (2005) [2] method using Soxhlet apparatus.

Nutrient analysis

Plant samples were analyzed for N, P, K, Zn and Fe using standard laboratory procedures Colorimetric method by Snell and Snell (1949) [12], Ammonium vanado-molybdate yellow colour method by Richards (1968) [10], Flame Photometer method by Jackson (1973) [6], Estimation on AAS by Lindsay and Norvell (1978) [7], respectively. Statistical analysis of the individual data of various characters studied in the experiment will be carried out as per Factorial Randomized Block Design (FRBD) as suggested by Panse and Sukhatme (1985) [9].

Results and Discussion

Quality Parameters

Protein Content

Protein content in seed was significantly influenced by pelleted vermicompost. The highest protein content (24.97%) was recorded under 4 t ha⁻¹, which was significantly superior to all other treatments.

Among scheduling treatments, split application (S₃) recorded significantly higher protein content (24.01%) compared to S₂ and S₁.

The increase in protein content may be attributed to enhanced nitrogen availability and uptake, which promotes protein synthesis in plants.

Carbohydrate and Fat Content

Carbohydrate and fat content were not significantly influenced by doses and scheduling of pelleted vermicompost. This indicates that these parameters are relatively stable and less responsive to nutrient management.

Nutrient Content in Seed

Nitrogen Content

Nitrogen content in seed increased significantly with increasing dose of pelleted vermicompost, with maximum value (3.99%) recorded under 4 t ha⁻¹.

Split application (S₃) also recorded significantly higher nitrogen content compared to S₂ and S₁.

Phosphorus Content

Phosphorus content was significantly higher under 4 t ha⁻¹ (0.56%) compared to lower doses.

Scheduling treatment S₃ recorded significantly higher phosphorus content, indicating better nutrient availability.

Potassium Content

Potassium content in seed increased significantly with increasing dose, with highest value (1.39%) recorded under 4 t ha⁻¹.

Split application also resulted in higher potassium content.

Zinc and Iron Content

Zinc and iron content were significantly higher under 4 t ha⁻¹ pelleted vermicompost and S₃ scheduling.

This may be due to enhanced microbial activity and improved nutrient solubilization.

Nutrient Content in Haulm

Nitrogen, phosphorus, potassium, zinc and iron content in haulm were significantly higher under 4 t ha⁻¹ pelleted vermicompost and split application.

Improvement in nutrient content may be attributed to better nutrient uptake and translocation under improved soil conditions.

Table 1: Effect of pelleted vermicompost and its scheduling on quality parameters of organic greengram

Treatments	Protein content in seed (%)	Carbohydrate content in seed (%)	Fat content in seed (%)
Doses of pelleted vermicompost			
Control	22.18	46.25	1.66
1 t ha ⁻¹	23.06	46.40	1.71
2 t ha ⁻¹	23.87	46.49	1.75
3 t ha ⁻¹	24.65	46.61	1.77
4 t ha ⁻¹	24.97	46.69	1.78
S.E.m.±	0.070	0.48	0.057
C.D.(P = 0.05)	0.202	NS	NS
Scheduling of pelleted vermicompost			
100% at sowing	23.41	46.07	1.66
50% at sowing + 50% at 4 WAS	23.82	46.55	1.75
50% at sowing + 25% at 4 WAS + 25% at 6 WAS	24.01	46.84	1.79
S.E.m.±	0.054	0.37	0.044
C.D.(P = 0.05)	0.157	NS	NS

Table 2: Effect of pelleted vermicompost and its scheduling on nutrients content in organic greengram

Treatments	Nutrients content (%)					
	Nitrogen		Phosphorus		Potassium	
	Seed	Haulm	Seed	Haulm	Seed	Haulm
Doses of pelleted vermicompost						
Control	3.549	1.242	0.524	0.342	1.233	1.426
1 t ha ⁻¹	3.689	1.295	0.535	0.358	1.295	1.556
2 t ha ⁻¹	3.819	1.372	0.542	0.372	1.329	1.648
3 t ha ⁻¹	3.944	1.399	0.550	0.396	1.362	1.708
4 t ha ⁻¹	3.995	1.427	0.558	0.421	1.393	1.784
S.E.m.±	0.011	0.009	0.003	0.001	0.010	0.023
C.D.(P = 0.05)	0.032	0.026	0.008	0.003	0.030	0.066
Scheduling of pelleted vermicompost						
100% at sowing	3.745	1.294	0.532	0.374	1.277	1.559
50% at sowing + 50% at 4 WAS	3.812	1.362	0.543	0.378	1.333	1.626
50% at sowing + 25% at 4 WAS + 25% at 6 WAS	3.841	1.386	0.550	0.381	1.357	1.688
S.E.m.±	0.009	0.007	0.002	0.001	0.008	0.018
C.D.(P = 0.05)	0.025	0.020	0.006	0.003	0.023	0.051

Table 3: Effect of pelleted vermicompost and its scheduling on zinc and iron content in organic greengram

Treatments	Nutrients content (ppm)			
	Zinc		Iron	
	Seed	Haulm	Seed	Haulm
Doses of pelleted vermicompost				
Control	25.91	16.46	62.42	40.41
1 t ha ⁻¹	26.86	17.65	65.39	42.39
2 t ha ⁻¹	27.65	18.50	67.07	43.62
3 t ha ⁻¹	28.68	19.44	68.78	44.82
4 t ha ⁻¹	29.80	20.30	70.59	45.97
S.E.m.±	0.242	0.270	0.530	0.325
C.D.(P = 0.05)	0.702	0.781	1.534	0.941
Scheduling of pelleted vermicompost				
100% at sowing	27.03	17.70	65.09	42.44
50% at sowing + 50% at 4 WAS	27.88	18.50	67.12	43.55
50% at sowing + 25% at 4 WAS + 25% at 6 WAS	28.43	19.21	68.33	44.34
S.E.m.±	0.188	0.209	0.410	0.252
C.D.(P = 0.05)	0.544	0.605	1.188	0.729

Conclusion

Application of pelleted vermicompost significantly improved quality and nutrient composition of organic greengram. Among treatments, 4 t ha⁻¹ proved most effective. Split application (50% at sowing + 25% at 4 WAS + 25% at 6 WAS) further enhanced quality parameters.

Thus, application of pelleted vermicompost at 4 t ha⁻¹ along with split scheduling can be recommended for improving nutritional quality of greengram.

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