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Effect of fertilizer levels and organic foliar nutrition on growth and yield of Blackgram under rainfed condition

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Abstract

A field experiment was carried out at college farm, College of Agriculture, Navsari Agricultural University, Campus Bharuch during the *kharif* 2025 to study the effect of fertilizer levels and organic foliar nutrition on growth and yield of Blackgram under rainfed condition. The soil of experimental plot was clayey (*Inceptisols*) with low in available N (234 kg/ha), medium in P₂O₅ (40.67 kg/ha) and high in K₂O (339 kg/ha). The soil reaction (pH) was slightly alkaline (7.65). The experiment was laid out in a randomized block design with ten treatments comprising two fertilizer level 100% and 75% recommended dose of fertilizers with four organic foliar nutrition *viz.* 4% vermibedwash, 4% *Panchgavya*, 4% Cow urine and 2% novel organic liquid with three replications. Foliar nutrition applied at branching and flowering stages of Blackgram. The experimental results revealed that growth parameters *viz.* plant height at 45 DAS (44.32 cm) and at harvest (63.70 cm), number of branches per plant at 45 (4.82) and at harvest (5.69), dry matter accumulation per plant at 45 DAS (25.79 g) and at harvest (45.45 g), yield attributes *viz.* number of pods per plant (59.64) and number of seeds per pod (6.99) as well as seed yield (1347 kg/ha) and stover yield (2749 kg/ha) were significantly higher with the application of foliar spray of 100% RDF + 4% *Panchgavya* (T₄), which was remained statistically at par with 100% RDF + 4% vermibedwash (T₃), 100% RDF + 2% novel organic liquid (T₆) and 75% RDF + 4% *Panchgavya* (T₈).

Keywords: Organic foliar nutrition, Blackgram, growth, yield, RDF, *Panchgavya*

Introduction

Pulses are commonly known as food legumes which are secondary to cereals in production and consumption in India. Pulses play an important source of dietary protein, energy, minerals and vitamins for the mankind. Pulses provide 25% of protein requirements of predominantly vegetarian population. United Nations declared 2016 as “International Year of Pulses” (IYP) to heighten public awareness of nutritional benefits of pulses as part of sustainable food security and nutrition. Pulses account for around 20% of the area under food grain and contribute around 7-10% of total food grains production in the country (Mohanty and Satyasai, 2015) [6] as well as build up soil fertility by adding atmospheric nitrogen (average 30-50 kg/ha) in soil so, it's called as mini fertilizer factory. Pulses are called as “Marvel of Nature”. Pulses are cheaper than meat; they are often referred to as “Poor man's meat” in developing countries like India (Sunilkumar *et al.*, 2018) [11].

Blackgram (*Vigna mungo* L.) is one of the most important pulses of rainfed areas grown throughout the country. It is also known as urdbean, mash and black maple *etc.* People in various regions of India use Blackgram with different names like urd or urid in Hindi, adad in Gujarati, masakalai in Bengali, minappappu in Telugu, ulunthu in Tamil, udri bale in Kannada and uzhummu in Malayalam. This crop is grown in different cropping systems as a mixed crop, catch crop and sequential crop in the country. The composition of Blackgram residue is approximately as follows: cellulose (26.8%±2.3%), hemicellulose (32.48%±3.0%), lignin (23.14%±2.1%), crude protein (16%±0.8%), and ash content (5.1%±1.2%) (Ilyas *et al.*, 2012) [4]. Blackgram seed contains 25-26% protein, 56-60% carbohydrates, 1.5% fat and minerals combination, amino acid and essential vitamins. It is used as nutritive fodder specially for milch cattle. It is also used as a green manuring crop. India produces approximately 17.68 lakh tonnes of Blackgram from around 30.98 lakh hectares, with an average yield of 570 kg/ha during 2022-23. In India, 80% of

Blackgram cultivation occurs during the kharif season and nearly 20% during the rabi season. Blackgram accounts for approximately 10% of the total pulse production in India, with more than 90% of its production coming from ten states: Maharashtra, Karnataka, Madhya Pradesh, Gujarat, Uttar Pradesh, Jharkhand, Telangana, Odisha, Andhra Pradesh and Tamil Nadu. Whereas, Gujarat it occupies an area of about 0.97 lakh hectare with a production of about 0.59 lakh tonnes and productivity of 611 kg/ha during 2022-23 (Anonymous, 2023) [1]. The productivity of black gram in our country is very low. Hence, there is a need for enhancement of the productivity of Blackgram by proper agronomic practices. One among them is foliar application of organic sources of nutrients for exploiting genetic potential of the crop. This is considered to be an efficient and economic method of supplementing part of nutrient requirements at critical stages. Foliar application is credited with the advantage of quick and efficient utilization of nutrients, elimination of losses through leaching, fixation and regulating the uptake of nutrients by plant.

Hence, the present study was conducted to evaluate effect of fertilizer levels and organic foliar nutrition on growth attributes, yield attributes and yield of Blackgram under rainfed condition.

Material and Methods

A field experiment was carried out at college farm, College of Agriculture, Navsari Agricultural University, Campus Bharuch during kharif 2025. The soil of experimental plot was clayey (*Inceptisols*) with low in available N (234 kg/ha), medium in P₂O₅ (40.67 kg/ha) and high in K₂O (339 kg/ha). The soil reaction (pH) was slightly alkaline (7.65). The experiment was laid out in a randomized block design with ten treatments comprising T₁ (Absolute control), T₂ [RDF (20:40:00 kg NPK/ha)], T₃ (100% RDF + 4% vermibedwash), T₄ (100% RDF + 4% *Panchgavya*), T₅ (100% RDF + 4% cow urine), T₆ (100% RDF + 2% novel organic liquid), T₇ (75% RDF + 4% vermibedwash), T₈ (75% RDF + 4% *Panchgavya*), T₉ (75% RDF + 4% cow urine) and T₁₀ (75% RDF + 2% novel organic liquid) with three replications. Foliar nutrition applied at branching and flowering stages of Blackgram. The Blackgram var. Gujarat urad 3 was used for experimental purpose and sown on 2th July, 2025

at 45 x 15 cm spacing, by adopting the recommended seed rate 15 kg/ha and RDF (20-40-00 NPK kg/ha) given through urea and single super phosphate. The crop was harvested during 17th October 2025. Weeds were managed by herbicides and plant protection measures were taken up as and when required. In each plot five plants were randomly selected and tagged to record experimental observations on growth, yield attributes and yield. At maturity, pods per plant, seeds per pod, 100-seed weight, biological yield and seed yield were recorded. The results were statistically analyzed using standard ANOVA techniques as suggested by (Panse and Sukhatme, 1985) to draw appropriate inferences [7].

Results and Discussion

Growth attributes

Plant population per net plot at initial and at harvest was not significantly influenced due to foliar application of different organic formulations. Sufficient soil moisture present at the time of germination and during initial growth stage was responsible for maintaining the satisfactory plant population in the experiment. Application of T₄ (100% RDF + 4% *Panchgavya*) at branching and flowering stages of Blackgram significantly highest influenced the growth attributes viz., plant height at 30 DAS (21.30 cm), 45 DAS (44.32 cm) and at harvest (63.70 cm), number of branches per plant at 30 DAS (2.89), 45 DAS (4.82 cm) and 60 DAS (5.69), dry matter accumulation per plant at 30 DAS (15.32 g), 45 DAS (25.79 g) and 60 DAS (45.45 g). However, it was statistically at par with T₃ (100% RDF + 4% Vermibedwash), T₆ (100% RDF + 2% Novel organic liquid) and T₈ (75% RDF + 4% *Panchgavya*).

The increase in growth parameters it might be due to the application of *Panchgavya* which attributed to increased availability of cytokinin to shoot which played a role in cell elongation process either through cell division or elongation and enhanced the growth rate of plant since it contains the favourable macro and micro-nutrients, growth hormones and microbes in liquid formulation. Foliar application of organic formulations such as *Panchgavya*, vermibedwash and novel organic liquid with RDF likely supplied essential nutrients, growth regulators and microbial metabolites directly to

Table 1: Effect of fertilizer levels and organic foliar nutrition on plant population and growth attributes of Blackgram

Treatments	Plant population per net plot		Plant height (cm)			Number of branches per plant			Dry matter accumulation (g/plant)		
	Initial	At harvest	30 DAS	45 DAS	At harvest	30 DAS	45 DAS	At harvest	30 DAS	45 DAS	At harvest
T ₁ : Absolute Control	121	119	19.20	32.47	47.80	2.40	3.12	4.43	12.98	20.35	32.04
T ₂ : RDF Only (20:40:00 kg NPK/ha)	122	120	19.50	34.21	50.00	2.50	3.37	4.52	13.31	21.81	37.08
T ₃ : 100% RDF + 4% Vermibedwash	124	122	21.00	41.21	59.20	2.80	4.53	5.36	14.92	25.11	44.87
T ₄ : 100% RDF + 4% <i>Panchgavya</i>	126	124	21.30	44.32	63.70	2.89	4.82	5.69	15.32	25.79	45.45
T ₅ : 100% RDF + 4% Cow urine	124	122	20.60	38.66	54.30	2.73	4.11	4.93	14.69	22.44	39.01
T ₆ : 100% RDF + 2% Novel organic liquid	125	123	21.10	41.89	61.10	2.87	4.68	5.51	15.29	25.56	44.93
T ₇ : 75% RDF + 4% Vermibedwash	123	121	20.10	36.93	52.50	2.57	3.70	4.88	14.39	22.51	38.65
T ₈ : 75% RDF + 4% <i>Panchgavya</i>	124	122	20.90	40.80	59.00	2.84	4.52	5.47	14.75	25.09	44.85
T ₉ : 75% RDF + 4% Cow urine	122	120	19.90	36.33	51.90	2.57	3.73	4.72	14.20	21.92	38.17
T ₁₀ : 75% RDF + 2% Novel organic liquid	123	121	20.20	38.01	53.80	2.69	3.78	4.82	14.54	22.38	38.70
SEm (±)	3.72	4.14	0.57	1.64	1.91	0.11	0.19	0.25	0.65	1.09	1.96
CD at 5%	NS	NS	NS	4.87	5.68	NS	0.55	0.73	NS	3.24	5.81
C.V (%)	5.22	5.90	4.82	7.37	5.96	7.18	7.93	8.44	7.85	8.08	8.36

Yield attributes and yield

the plant system, thereby promoting better physiological activity and plant growth. Enhanced nutrient uptake and improved metabolic activities might have resulted in greater photosynthetic efficiency. These findings are in close conformity with earlier reports which indicated that combined application of RDF and organic foliar nutrition significantly improved growth attributes in pulse crops by Chaudhari *et al.* (2024), Sakpal *et al.* (2022) and Kumar *et al.* (2011) [3, 5, 9].

Significantly yield attributes of Blackgram viz., number of pods per plant (59.64) and seeds per pod (6.99) were recorded with T4 (100% RDF + 4% *Panchgavya*) at branching and flowering stages of Blackgram. However, it was statistically at par with T3 (100% RDF + 4% Vermibedwash), T6 (100% RDF + 2% Novel organic liquid) and T8 (75% RDF + 4% *Panchgavya*). While, 1000 seed weight (g) and harvest index (%) was not significantly influenced by different treatments. This might be due to easy transfer of nutrients to plant through foliar spray of *Panchgavya* and the quantities of IAA and GA present in *Panchgavya* could have created the stimuli in the plant system which in turn increased the

production of growth regulators in cell system. Hence, stimulated the necessary growth and development in plants, leading to significant increase in number of pods per plant.

Significantly the highest seed yield (1347 kg/ha) and stover yield (2749 kg/ha) of Blackgram was observed under T4 (100% RDF + 4% *Panchgavya*), which was statistically at par with T3 (100% RDF + 4% Vermibedwash), T6 (100% RDF + 2% Novel organic liquid) and T8 (75% RDF + 4% *Panchgavya*) in case of stover yield which was statistically at par with T3 (100% RDF + 4% Vermibedwash) and T6 (100% RDF + 2% Novel organic liquid). The overall improvement in all the growth and yield attributing components may be due to adequate supply of nutrients with easy availability to plant at most critical growth period resulted into better growth and yield attributing characters. The better growth of crop ultimately diverted more energy under sink source relationship which helped in providing more yield. The present findings are found in agreement with Chaudhari *et al.* (2024), Sakpal *et al.* (2022), Kumar *et al.* (2011), Parmar *et al.* (2022) and Asari (2023) [2, 3, 5, 8, 9].

Table 2: Effect of fertilizer levels and organic foliar nutrition on yield attributes and yield attributes of Blackgram

Treatments	No. of pods per plant	No. of seeds per pods	Test weight (g)	Seed yield (kg/ha)	Stover yield (kg/ha)	Harvest index (%)
T ₁ : Absolute Control	38.41	5.76	48.17	734	1493	32.96
T ₂ : RDF Only (20:40:00 kg NPK/ha)	42.73	5.81	49.04	818	1605	33.76
T ₃ : 100% RDF + 4% Vermibedwash	55.92	6.80	51.67	1249	2558	32.70
T ₄ : 100% RDF + 4% <i>Panchgavya</i>	59.64	6.99	52.43	1347	2749	32.89
T ₅ : 100% RDF + 4% Cow urine	50.71	6.12	50.14	906	2156	29.59
T ₆ : 100% RDF + 2% Novel organic liquid	57.21	6.88	52.15	1285	2674	32.46
T ₇ : 75% RDF + 4% Vermibedwash	47.48	5.91	49.68	821	1925	29.90
T ₈ : 75% RDF + 4% <i>Panchgavya</i>	54.75	6.77	51.24	1235	2207	35.83
T ₉ : 75% RDF + 4% Cow urine	45.65	5.90	49.39	826	1853	30.84
T ₁₀ : 75% RDF + 2% Novel organic liquid	49.60	6.04	49.39	847	2036	29.38
SEm (±)	2.62	0.26	2.10	84	179	1.47
CD at 5%	7.79	0.77	NS	252	531	NS
C.V (%)	9.04	7.11	7.21	14.34	14.49	7.86

Conclusion: Based on the results of the present investigation, it can be concluded that the application of 75% recommended dose of fertilizers (15:30:00 kg NPK/ha) with foliar spray of 4% *Panchgavya* at branching and flowering stages found most economical practices for improving growth and getting profitable yield of Blackgram. Further, foliar spray of 2% novel organic liquid fertilizer or 4% vermibedwash with 100% RDF also produced higher growth and profitable Blackgram yield.

References

- Anonymous. Crop-wise area, production and productivity of pulses from 2010-11 to 2020-21. Bhopal: Directorate of Pulse Development, Government of India; 2023.
- Asari SB. Nutrient management in *Vigna radiata* (L.) [MSc thesis]. Navsari (Gujarat): College of Agriculture, Navsari Agricultural University; 2023.
- Chaudhari SN, Patel PH, Chaudhari PR. Effect of organic formulations on growth and yield of summer greengram (*Vigna radiata* L.). International Journal of Research in Agronomy. 2024;7(2):404-408.
- Ilyas U, Ahmed S, Majeed A, Nadeem M. Exploration of indigenous agrowastes for cellulase production by *Aspergillus niger*. African Journal of Biotechnology. 2012;11(38):9276-9279.
- Kumar RS, Ganesh P, Tharmaraj K, Saranraj P. Growth and development of blackgram (*Vigna mungo*) under foliar application of Panchagavya as an organic source of nutrient. Current Botany. 2011;2(3):9-11.
- Mohanty S, Satyasai KJ. Feeling the pulse: Indian pulses sector. NABARD Rural Pulses. 2015;Issue X:1-12.
- Panse VG, Sukhatme PV. Statistical methods for agricultural workers. New Delhi: Indian Council of Agricultural Research; 1985. p. 87-89.
- Parmar SK, Virdia HM, Pankhaniya RM. Response of integrated nutrient management on growth and yield of chickpea (*Cicer arietinum* L.). The Pharma Innovation Journal. 2022;11(7):2841-2843.
- Sakpal VM, Jagtap DN, Upadhyay L, Pinjari SS, More SS, Jadhav MS, Bodake PS. Effect of foliar application of different organic sources and levels of fertilizer on growth attributes, yield attributes, yield, quality and economics of cowpea (*Vigna unguiculata* L.). Agricultural Science Digest. 2022;42(4):414-419.
- Singhal VK, Patel GG, Patel DH, Kumar U, Saini LK. Effect of foliar application of water-soluble fertilizers on growth, yield and economics of vegetable cowpea production. An International Quarterly Journal of Environmental Science. 2015;7:79-83.
- Sunilkumar NM, Jadhav RL, Bhavani K, Mallikarjun N, Ravi S. Demonstration of black gram integrated crop management technology through frontline demonstrations in Bidar district of Hyderabad Karnataka region. Journal of Pharmacognosy and Phytochemistry. 2018;7(6):11-14.