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Nutrient management through organic sources and its impact on yield and economics of gram

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Abstract

A field experiment was conducted at the College Farm, N. M. College of Agriculture, Navsari Agricultural University, Navsari, during *rabi* and summer seasons of 2023–24 and 2024–25 to study the “Nutrient management through organic sources in gram (*Cicer arietinum* L.) - fodder pearl millet (*Pennisetum glaucum* L.) cropping sequence under south Gujarat condition”. The experiment comprised of five main plot treatments viz., control (N_1), RDN through FYM (N_2), RDN through biocompost (N_3), RDN through ghanjeevamrit + jeevamrit 500 l ha⁻¹ at first irrigation (N_4) and RDF (N_5) applied to gram in *rabi* season and replicated four times in randomized block design. Pooled results indicated that growth and yield attributes of gram were significantly influenced by nutrient management treatments. The treatment N_4 (RDN through ghanjeevamrit supplemented with jeevamrit 500 l ha⁻¹ at first irrigation) resulted in significantly higher values of most of the parameters. Whereas, application of RDF (N_5) resulted in significantly higher values of stover yield. The overall trend of effectiveness was $N_4 > N_5 > N_2 > N_3 > N_1$. While, application of RDF (N_5) noted higher net return (₹1,09,901 ha⁻¹) with a B:C ratio of 1.97. Whereas, lower values were obtained under the treatment N_1 (control).

Keywords: Biocompost, Ghanjeevamrit, RDN, RDF, FYM etc.

1. Introduction

Chickpea (*Cicer arietinum* L.) also known as Bengal gram or Chana is an important and unique food legume that is used in variety of food products such as snacks, sweets, condiments, vegetables etc. It is also consumed in the form of processed whole seed (boiled, roasted, parched, fried, steamed, sprouted etc.) or as dal, flour (besan). It is also an excellent animal feed and its straw has good forage value. Chickpea is an ancient crop and has been grown in India, Middle East and the parts of Africa for many years.

In India, Chickpea is cultivated on an area of 10.91 million hectares with total production of 13.75 million tonnes with productivity of 1260 kg per hectare. While in Gujarat, chickpea is cultivated in an area of 1.10 million hectares producing 2.10 million tonnes with the productivity of 1908 kg per hectare (Anonymous, 2022) [2]. India is the world's largest producer of chickpea, accounting for 64% of global production (Gaur *et al.*, 2010) [7]. Despite its importance in our daily nutrition and agricultural production, this crop's productivity in India and Gujarat is quite poor.

Continuous use of fertilizers, ignoring organic sources would lead to gradual decline of organic matter content and native fertility status in the soil, which in turn reflect on the productivity of succeeding crop (Umadevi *et al.*, 2018) [16].

Cultivation of legume crops is the key aspect of organic nutrient management system. Inclusion of legumes in cropping systems improves the nitrogen status of soil and increases the yield of succeeding cereal crops (Ali *et al.*, 2015) [1]. Organic manures influence soil productivity through their effect on soil physical, chemical and biological properties (Watson *et al.*, 2002) [17]. FYM plays a vital role in dictating biochemical cycles, as it supports the growth and activity of soil microflora. It enhances the colonization of Mycorrhizae, Rhizobium, Azotobacter and Azospirillum which in turn improve the nitrogen (N) as well as phosphorus (P₂O₅) supply and other micronutrients (Zn, Fe, Cu, Mn) besides imparting the resistance to plant against various soil borne diseases and insect pest attack which ultimately improves the grain yield (Rolaniya *et al.*, 2023) [11].

Organic nutrient management is a key aspect in enhancing chickpea output among the different factors impacting crop productivity. Balanced use of nutrients in the form of organic fertilizers may be beneficial for increasing the crop production. The use of organic manures, inorganic fertilizers and leguminous crops has been advocated to restore the nutrients in lost soils (Fening *et al.*, 2005) [6].

2. Materials and Methods

The present investigation was carried out during *rabi* and summer seasons of 2023-2024 and 2024-2025 at College Farm, Navsari Agricultural University, Navsari (Gujarat). The topography of experimental site was fairly uniform and levelled which geographically situated at 20° 92' North latitude and 72° 90' East longitudes with an altitude of 12.33 meters above the mean sea level. The soil of experimental field was clayey in texture and medium in organic carbon (0.61%), low in available N (217.48 kg ha⁻¹), medium in available P₂O₅ (35.24 kg ha⁻¹) and high in available K₂O (300.60 kg ha⁻¹)

The experiment comprising five nutrient management treatments viz., N₁ (Control), N₂ (RDN through FYM), N₃ (RDN through biocompost), N₄ (RDN through ghanjeevamrit + jeevamrit 500 l ha⁻¹ at first irrigation) and N₅ (RDF). The seeds of cultivar GG 5 (Gujarat Gram 5) were used in the present investigation. A randomized block design with four replications was used to set up the experiment.

The required amount of organic manures (FYM, bio compost and ghanjeevamrit) was calculated and they were applied to the gram crop in accordance with the treatments and evenly distributed and incorporated in individual plots. Before applying organic manures, they were tested for N, P₂O₅ and K₂O content on dry weight basis. The fertilizers were applied in gram as per treatment. Gram was sown using a 60 kg ha⁻¹ seed rate with 45 cm × 10 cm spacing.

Average values of five randomly selected plants for different characters were used for statistical analysis. The RBD analysis was carried out for the characters studied.

3. Results and Discussion

3.1 Growth attributes

The results summarized in Table 1 revealed that treatment N₄ (RDN through ghanjeevamrit alongwith jeevamrit 500 lit ha⁻¹ at 1st Irrigation) resulted in significantly higher plant height (44.33 and 42.38 cm, respectively) during second year of investigation and in pooled results and remained at par with treatment N₂ (RDN through FYM), N₃ (RDN through biocompost) and N₅ (RDF) during second year of investigation and in pooled analysis over control. Similarly, at harvest same treatment *i.e.*, N₄ resulted in significantly higher number of branches plant⁻¹ (14.55, 15.10 and 14.83, respectively) and remained at par with treatment N₂ (RDN through FYM) and N₅ (RDF) during individual years and in pooled analysis. Significantly higher dry matter accumulation plant⁻¹ (33.13 and 31.93 g plant⁻¹, respectively) was noted under treatment N₄ (RDN through ghanjeevamrit supplemented with jeevamrit 500 l ha⁻¹ at first irrigation) which remained at par with treatment N₅ (RDF) and N₂ (RDN through FYM) during the second year as well as in pooled findings.

Treatment N₄ combines a concentrated organic reservoir with a liquid microbial catalyst. This combination introduces a massive microbial load and natural growth promoting substances such as Indole Acetic Acid (IAA), gibberellins and cytokinins which trigger cell division, elongation (Plant height) and lateral bud primordial (branching). Furthermore, the enhanced chlorophyll synthesis driven by increased micronutrient availability leads to

substantial dry matter accumulation. Unlike solid phase manures like FYM (N₂) or biocompost (N₃), the liquid jeevamrit in treatment N₄ accelerates the decomposition of the solid organic fraction, providing a steady nutrient supply throughout the vegetative and reproductive phases.

Similar outcomes have also been noticed by Kumar *et al.* (2019) [8], Patel *et al.* (2022) [10], Shah *et al.* (2024) [13] and Dwivedi *et al.* (2025) [5] in gram.

3.2 Yield attributes

According to the results of Table 2 and fig.1, various treatments had a significant effect on the number of pods plant⁻¹ of gram. Though, application of RDN through ghanjeevamrit supplemented with jeevamrit 500 l ha⁻¹ at first irrigation (N₄) resulted in higher number of pods plant⁻¹ (51.20 and 50.05) and remained on par with treatment N₂ (RDN through FYM), N₃ (RDN through biocompost) and N₅ (RDF) during second year of investigation and in pooled analysis. While, treatment N₅ (RDF) resulted in significantly higher number of pods plant⁻¹ (49.45) at harvest and remained on par with treatment N₂ (RDN through FYM), N₃ (RDN through biocompost) and N₄ (RDN through ghanjeevamrit supplemented with jeevamrit 500 l ha⁻¹ at first irrigation) during first year of investigation only. While, treatment N₁ (control) had lower number of pods plant⁻¹ during individual years and in pooled results.

According to table 2 and fig.1, treatment N₄ (RDN through ghanjeevamrit supplemented with jeevamrit 500 l ha⁻¹ at first irrigation) resulted in significantly higher seed yield (2347 and 2201 kg ha⁻¹) of gram which remained at par with treatment N₂ (RDN through FYM) and N₅ (RDF) during second year of investigation and in pooled analysis. While, during the first year of investigation, it was noticed that treatment N₅ (RDF) resulted in significantly higher seed yield (2112 kg ha⁻¹) and it remained statistically at par with treatment N₄ (2055 kg ha⁻¹) and N₂ (1927 kg ha⁻¹). While, significantly lower seed yield was (1476, 1493 and 1484 kg ha⁻¹) observed under treatment N₁ (control) during individual years of investigation and in pooled findings, respectively. N₄ > N₅ > N₂ > N₃ > N₁ was the order in which different treatments influenced seed yield of gram. Increased branching and plant height expand the total leaf area (source), maximizing light interception and CO₂ assimilation. This leads to higher dry matter accumulation (31.93 g plant⁻¹ in N₄ vs. 23.97 g plant⁻¹ in control), providing a larger reservoir of photosynthates to be translocated to the developing seeds during the reproductive phase. Significantly higher stover yield (3315 kg ha⁻¹) was recorded with an application of RDF (N₅) which remained statistically at par with treatment N₄ (3247 kg ha⁻¹) and N₂ (2987 kg ha⁻¹) during first year of investigation. While, during second year of study, treatment N₄ (RDN through ghanjeevamrit alongwith jeevamrit 500 lit ha⁻¹ at first irrigation) resulted in significantly higher stover yield (3388 kg ha⁻¹) but it remained at par with N₅ (3327 kg ha⁻¹) and N₂ (3190 kg ha⁻¹). In case of pooled data, treatment N₅ (RDF) resulted in significantly higher stover yield of 3321 kg ha⁻¹ which remained statistically at par with N₄ (3318 kg ha⁻¹) and N₂ (3088 kg ha⁻¹). Conversely, lower stover yield was reported under treatment N₁ (control) during both the years of study and in pooled results.

The success of organic treatments like RDN through ghanjeevamrit alongwith jeevamrit 500 l ha⁻¹ at first irrigation (N₄) is justified by the improvement in soil properties. Treatment N₄ showed the lowest bulk density (1.357 g cc⁻¹), highest organic carbon (0.669%) and available NPK status after harvest. Organic amendments decrease soil bulk density and increase organic carbon, improving soil porosity and microbial activity. This

creates a favorable rhizosphere that enhances the mineralization of nutrients, making them steadily available throughout the crop's growth stages. These results were in accordance with those of Patel *et al.* (2022) ^[10], Shah *et al.* (2024) ^[13], Dwivedi *et al.* (2025) ^[5] and Saharan *et al.* (2025) ^[12] with respect to gram.

3.3 Economics

The data tabulated in Table 3 revealed that treatment N₅ (RDF) emerged as the most economically viable option. It secured the highest net monetary returns (₹ 1,09,901 ha⁻¹) and higher B:C ratio (1.97). It might be attributed that chemical fertilizers provide precise, water-soluble nutrients that the plant can absorb instantly during critical growth stages, leading to high yields with relatively low input costs compared to bulky organic manures. While, treatment N₄ (RDN through ghanjeevamrit alongwith jeevamrit 500 l ha⁻¹ at first irrigation) produced the highest gross monetary returns (₹ 1,68,988 ha⁻¹) due to superior seed and stover

yields, but its higher variable costs (labour & input costs) increase the total cost of cultivation which reduced its overall net profit compared to RDF (N₅).

Although, treatment N₃ (RDN through biocompost) had the lowest variable cost among the active nutrient treatments. While its gross returns were lower than N₄ and N₅, it maintained a healthy B:C ratio of 1.70. However, treatment N₂ (RDN through FYM) had the highest cost of cultivation (₹ 71,618 ha⁻¹), which significantly pulled down its B:C ratio to 1.22, making it less economically attractive than chemical and other organic alternatives. The lowest net realization of ₹62,592 was noted under the treatment N₁ (control) with BCR value of 1.19.

Similar results were also reported by Sharma *et al.* (2017) ^[15], Bhuva and Detroja (2018) ^[4] in chickpea, Sharma and Thakur (2022) ^[14] in French bean, Baldaniya *et al.* (2023) ^[3] in Indian bean, Kumar *et al.* (2023) ^[9] in vegetable Indian bean and Saharan *et al.* (2025) ^[12] in chickpea.

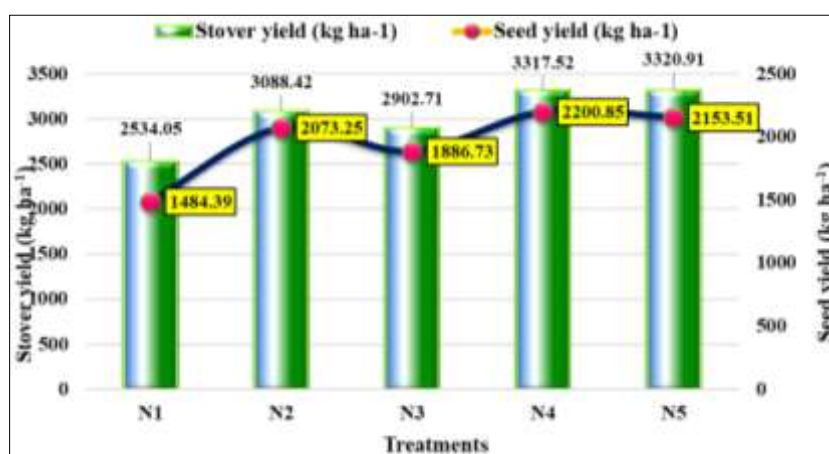


Fig 1: Seed and stover yield (kg ha⁻¹) of gram as influenced by different treatments

Table 1: Growth attributes of gram at harvest as influenced by different treatments

Treatments	Plant height (cm)			No of branches			Dry matter accumulation (g plant ⁻¹)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
N ₁ : Control	35.20	35.80	35.50	9.45	9.50	9.48	24.04	23.90	23.97
N ₂ : RDN through FYM	40.40	41.80	41.10	13.65	14.65	14.15	30.18	31.82	31.00
N ₃ : RDN through Biocompost	38.65	41.49	40.07	13.55	13.48	13.51	28.68	29.18	28.93
N ₄ : RDN through Ghan Jeevamrit + 500 lit ha ⁻¹ Jeevamrit (at 1 st Irrigation)	40.43	44.33	42.38	14.55	15.10	14.83	30.74	33.13	31.93
N ₅ : RDF	43.10	40.85	41.98	14.45	14.48	14.46	31.39	31.58	31.48
SEm±	1.61	1.72	1.18	0.63	0.51	0.41	1.33	1.40	0.97
CD (P=0.05)	4.95	5.30	3.43	1.96	1.57	1.19	4.09	4.32	2.82
CV (%)	8.12	8.42	8.27	9.67	7.61	8.67	9.16	9.36	9.27
Interaction (Y×T)									
SEm±	1.66			0.58			1.37		
CD(P=0.05)	NS			NS			NS		

Table 2: Yield attributes and yield of gram as influenced by different treatments

Treatments	No. of pods plant ⁻¹ (cm)			Seed yield (kg ha ⁻¹)			Stover yield (kg ha ⁻¹)		
	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled	2023-24	2024-25	Pooled
N ₁ : Control	41.00	42.35	41.68	1476	1493	1484	2520	2548	2534
N ₂ : RDN through FYM	48.40	50.25	49.33	1927	2219	2073	2987	3190	3088
N ₃ : RDN through Biocompost	46.75	49.20	47.98	1785	1988	1887	2892	2913	2903
N ₄ : RDN through Ghan Jeevamrit + 500 lit ha ⁻¹ Jeevamrit (at 1 st Irrigation)	48.90	51.20	50.05	2055	2347	2201	3247	3388	3318
N ₅ : RDF	49.45	50.25	49.85	2112	2195	2154	3315	3327	3321
SEm±	1.89	1.98	1.37	81.17	98.59	63.85	132.9	125.9	91.52
CD (P=0.05)	5.84	6.10	4.00	250	304	186	409	388	267
CV (%)	8.08	8.14	8.11	8.68	9.63	9.22	8.88	8.19	8.54
Interaction (Y×T)									
SEm±	1.94			90.30			1.24		
CD(P=0.05)	NS			NS			NS		

Table 3: Economics of gram as influenced by different treatments (Average of two years)

Treatments	Yield (kg ha ⁻¹)		Cost (₹ ha ⁻¹)		Cost of cultivation (₹ ha ⁻¹)	Gross monetary returns (₹ ha ⁻¹)	Net monetary returns (₹ ha ⁻¹)	B:C ratio
	Seed	Stover	Fixed	Variable				
N ₁ : Control	1484	2534	52719	0	52719	115311	62592	1.19
N ₂ : RDN through FYM	2073	3088	52719	18899	71618	159025	87408	1.22
N ₃ : RDN through Biocompost	1887	2903	52719	1098	53817	145134	91317	1.70
N ₄ : RDN through Ghan Jeevamrit + 500 lit ha ⁻¹ Jeevamrit (at 1 st Irrigation)	2201	3318	52719	14918	67637	168988	101351	1.50
N ₅ : RDF	2154	3321	52719	3070	55789	165690	109901	1.97
*Selling price of gram seed - ₹ 70 kg ⁻¹ , stover - ₹ 4.5 kg ⁻¹ , Cost of input: FYM - ₹ 3.50 kg ⁻¹ , biocompost - ₹ 0.80 kg ⁻¹ , Ghanjivamrut- ₹ 4.50 kg ⁻¹ , Urea - ₹ 5.64 kg ⁻¹ and SSP - ₹ 11.30 kg ⁻¹								

4. Conclusion

Two years of research have led to the conclusions that, the application of RDN through ghanjeevamrit along with jeevamrit 500 l ha⁻¹ at first irrigation was found to be beneficial for getting favourable growth, yield and economic returns from gram.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Ali W, Jan A, Hassan A, Abbas A, Hussain A, Ali M, *et al.* Residual effect of preceding legumes and nitrogen levels on subsequent maize. *Int J Agron Agric Res.* 2015;7(1):78-85.
- Anonymous. Agricultural statistics at a glance. New Delhi: Ministry of Agriculture and Farmers' Welfare, Directorate of Economics and Statistics, DAC&FW; 2021.
- Baldaniya BM, Patel VM, Rathwa MK. Effect of organic, inorganic fertilizer and foliar spray on quality, nutrient content, uptake and soil status of Indian bean (*Lablab purpureus* L.). *Pharma Innov J.* 2023;12(12):1848-1852.
- Bhuva HM, Detroja AC. Influence of nutrient management with organic manures on productivity, profitability and quality of pearl millet (*Pennisetum glaucum*)-chickpea (*Cicer arietinum*) sequence. *Indian J Agron.* 2018;63(3):300-306.
- Dwivedi A, Gangwar BJ, Kumar N. Effect of integrated nutrient management through organic sources on yield and economics of chickpea (*Cicer arietinum* L.) in Bundelkhand region. *Agric Sci Dig.* 2025;1-6.
- Fening JO, Adjei-Gyapong T, Yeboah E, Ampontuah EO, Quansah G, Danso SKA. Soil fertility status and potential organic inputs for improving smallholder crop production in the interior savanna zone of Ghana. *J Sustain Agric.* 2005;25(4):69-92.
- Gaur PM, Tripathi S, Gowda CLL, Ranga Rao GV, Sharma HC, Pande S, *et al.* Chickpea seed production manual. Patancheru (Andhra Pradesh): International Crops Research Institute for the Semi-Arid Tropics; 2010. p. 10.
- Kumar A, Kumar R, Kumar A, Kumar S, Bharti AK. Effect of integrated nutrient management on growth, yield and seed quality of chickpea (*Cicer arietinum* L.) under rainfed condition. *J Pharmacogn Phytochem.* 2019;8(3):2268-2270.
- Kumar SGV, Arvadiya LK, Vishwanatha VE, Bartwal D, Katara AR, Patel PM, *et al.* Effect of nutrient management practices on growth, yield and economics of vegetable Indian bean and its residual effects on fodder pearl millet under vegetable Indian bean-fodder pearl millet cropping system. *Int J Bio-Resour Stress Manag.* 2023;14(6):862-871.
- Patel A, Gangwar B, Pandey A, Singh RN. Effect of sowing methods and integrated nutrient management through FYM, VC and PM on growth of chickpea for organic farming in Bundelkhand. *Madras Agric J.* 2022;99(4-6):308-310.
- Rolaniya LK, Jat RL, Kumar N, Punia M, Choudhary RR. Effect of integrated nutrient management practices on growth and yield of chickpea under different chickpea-based cropping systems in western Rajasthan, India. *Int J Environ Clim Change.* 2023;13(12):1253-1259.
- Saharan S, Janardan S, Rahul S, Akashdeep S, Kunal N, Bharat BR, *et al.* Response of black gram (*Vigna mungo* L.) to organic nutrient sources and their effect on soil properties and yield attributes in Western Himalayan region of India. *Plant Sci Today.* 2025;12(4):1-7.
- Shah SN, Chaudhari VD, Shroff JC, Patel VJ, Patel AP. Nutrient management through organic sources in chickpea. *Legume Res.* 2024;1-4. doi:10.18805/LR-5165.
- Sharma R, Thakur I. Impact of bioorganic nutrients and chemical fertilizers on sustainable production of French bean and soil health. *J Environ Biol.* 2022;43(3):430-439.
- Sharma SK, Choudhary R, Trivedi A, Choudhary RS, Yadav SK. Response of organic nutrient management practices on soil properties and productivity of chickpea (*Cicer arietinum* L.). *Int J Bio-Resour Stress Manag.* 2017;8(2):196-200.
- Umadevi GD, Sunitha N, Reddi Ramu Y. Effect of various organic sources on soil microbial count and groundnut yield. *J Pharmacogn Phytochem.* 2018;7(3):1443-1445.
- Watson CA, Atkinson D, Gosling P, Jackson LR, Rayns FW. Managing soil fertility in organic farming systems. *Soil Use Manag.* 2002;18(3):239-247.