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Effect of different liquid organic manures on growth and yield of Chickpea (*Cicer arietinum* L.)

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Abstract

A field experiment was conducted at College Farm, Agricultural College, Mahanandi Campus of Acharya N. G. Ranga Agricultural University, Andhra Pradesh with the objective of evaluating the effect of different liquid organic manures on the growth and yield of chickpea during *rabi*, 2025-26. The experiment consisted of 11 treatments replicated thrice and laid out in a randomized block design. Among the different nutrient management practices evaluated, higher growth attributes (plant height, number of branches plant⁻¹, drymatter production), seed and stover yield were registered with application of 100% RDF. However, among the different natural farming practices evaluated, higher growth attributes (plant height, number of branches plant⁻¹, drymatter production), seed and stover yield were recorded with the foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod initiation stage. Whereas, lower plant height, number of branches plant⁻¹, drymatter production, seed and stover yield of chickpea were registered with the absolute control.

Keywords: Chickpea, foliar application, panchagavya, vermiwash

Introduction

Pulses play an important role in Indian agriculture and India is largest producer and consumer of pulses in the world. In India, pulses account for 20.14% (277 lakh hectares) of total area under food grain production (1375 lakh hectares) (www.indiastat.in, 2024-25). Chickpea is a key legume with nutritious seeds. (Chouhan and Khan, 2024) Chickpea is a quantitative long-day legume crop of the fabaceae family and faboideae subfamily, chickpeas are grown during the chilly season. (Sridhara *et al.*, 2024) [5]. Nutritional composition of chickpea is 38 to 59 per cent carbohydrates, 22 to 24 per cent protein, 3 per cent fiber, 4.8 to 5.5 per cent oil, 3 per cent ash, 0.2 per cent calcium and 0.3 per cent phosphorus (www.fao.in).). In India, chickpea is cultivated under an area of 9.12 million hectares with a production of 11.11 million tonnes of seed. In India, average chickpea productivity is 1218 kg ha⁻¹ (www.indiastat.in, 2024-25). Hazards like soil salinization, soil erosion, reduction in the groundwater levels and desertification have increased rapidly over the last four decades with continuous practice of intensive farming techniques, whose eye is primarily on increasing production with the least focus on sustainability (Kumar *et al.*, 2024) [1]. Hence, there is a need to improve productivity under the organic production system by enhancing soil fertility and productivity with increasing soil organic carbon, soil moisture storage capacity of crops at different stages. Organic soil conditioners rich in N, P, and K, calcium, magnesium, chloride, sulphates, growth hormones, and a sufficient load of microbial mobilizers and solubilizers are cattle-based products such as cow urine and panchagavya. Foliar spraying involves the application of nutrient-rich liquid solutions directly onto plant leaves, enabling the absorption of essential nutrients through foliar tissues. This method significantly reduces nutrient losses typically associated with soil application, such as absorption and leaching under conventional moisture conditions (Rathika *et al.*, 2025) [2]. Organic foliar sprays supply growth-promoting substances, micronutrients, and beneficial microbes that enhance germination, growth, photosynthesis, and yield, while also improving stress tolerance and reducing dependence on chemicals. Hence the present study was carried to evaluate the effect of liquid organic manures

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on growth and yield of chickpea.

Materials and Methods

A field experiment was conducted at College Farm, Agricultural college, Mahanandi of Acharya N. G. Ranga Agricultural University which is geographically situated at 15.51 °N latitude, 78.61°E longitude with an altitude of 233 meters above the mean sea level which comes under Scarce Rainfall Zone of Andhra Pradesh and according to Troll's classification, it falls under Semi-Arid Tropics (SAT). The soil was sandy loam in texture with pH of 7.5, low organic carbon content (0.44%), low in nitrogen (144.5 kg ha⁻¹), medium in available phosphorus (22.4 kg ha⁻¹) and high in available potassium (550.4 kg ha⁻¹). The experiment was carried out with eleven treatments replicated thrice in randomized block design. The treatments evaluated in the experiment are foliar application of panchagavya @ 3% during pre-flowering and pod initiation stage (T₁), foliar application of panchagavya @ 5% during pre-flowering and pod initiation stage (T₂), foliar application of panchagavya @ 3% + cow urine @ 10% during pre-flowering and pod initiation stage (T₃), foliar application of panchagavya @ 3% + vermiwash @ 10% during pre-flowering and pod initiation stage (T₄), foliar application of panchagavya @ 5% + cow urine @ 10% during pre-flowering and pod initiation stage (T₅), foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod initiation stage (T₆), foliar application of panchagavya @ 5% + cow urine @ 20% during pre-flowering and pod initiation stage (T₇) foliar application of panchagavya @ 5% + vermiwash @ 20% during pre-flowering and pod initiation stage (T₈), foliar application of jeevamrutham @ 5% during vegetative stage + @ 7.5% during flowering stage + @ 10% pod development stage (T₉), absolute control (T₁₀), 100% RDF (T₁₁). In natural farming treatmental plots, soil application of ghanajeevamrutham @ 1000 kg ha⁻¹ in two splits was done at basal and @ 25 DAS. Soil application of dravajeevamrutham @ 500 L ha⁻¹ was done once in three week @ 3, 6 and 9 WAS. Observations on plant height, drymatter production, number of branches plant⁻¹ at 30, 60 DAS and at harvest. seed and stover yield were recorded at harvest stage.

Results and Discussion

Initial and final plant population

During the present investigation, the impact of different nutrient management practices evaluated was found to be non-significant on initial and final plant population (Table 1). This might be due to the crop was sown under optimum soil moisture content, which creates congenial environment for better germination and crop establishment.

Plant height

Among the different nutrient management practices evaluated, significantly higher plant height was registered with application of 100% RDF (T₁₁) at all growth stages of chickpea. However, among the different natural farming practices tried, higher plant stature at 30, 60 DAS and at harvest was recorded with the foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod initiation stage (T₆), which was statistically comparable with the foliar application of panchagavya @ 5% + vermiwash @ 20% during pre-flowering and pod initiation stage (T₈), foliar application of panchagavya @ 5% + cow urine @ 20% during pre-flowering and pod initiation stage (T₇), foliar application of panchagavya @ 5% + cow urine @ 10% during pre-flowering and pod initiation stage (T₅) foliar application of panchagavya @ 3% + vermiwash @ 10% during pre-flowering

and pod initiation stage (T₄) and foliar application of panchagavya @ 3% + cow urine @ 10% during pre-flowering and pod initiation stage (T₃) (Table 1 and Fig.1). This could be attributable to the IAA and GA present in panchagavya when applied as foliar spray create stimuli in the plant system and increase the production of growth regulators in the cell system and the action of growth regulators in plant system ultimately stimulated the necessary growth and development (Yogendra *et al.*, 2024) [8]. However lower plant height at all the growth stages was recorded with the absolute control (T₁₀).

Number of branches plant⁻¹

Among the different nutrient management practices investigated, higher number of branches plant⁻¹ at 30, 60 DAS and at harvest was recorded with the application of 100% RDF (T₁₁). Among the different natural farming practices evaluated, foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod initiation stage (T₆) registered higher no. of branches plant⁻¹ during 30, 60 DAS and at harvest and this was on a par with the foliar application of panchagavya @ 5% + vermiwash @ 20% during pre-flowering and pod initiation stage (T₈) and foliar application of panchagavya @ 5% + cow urine @ 20% during pre-flowering and pod initiation stage (T₇). This may be ascribed to the synergistic effect of vermiwash and panchagavya, both rich in beneficial microbes, growth hormones and micro nutrients appears to have enhanced nutrient absorption and photosynthetic efficiency (Sharma *et al.*, 2024) [3]. These results are corroborated with those of Yuvarani *et al.*, (2025) [9]. However, the lower number of branches per plant were recorded with absolute control (T₁₀) at all growth stages of crop (Table 2).

Drymatter production

During the present investigation based on different nutrient management practices, higher dry matter production was recorded with the application of 100% RDF (T₁₁) at all growth stages of crop (Table 2 and Fig.2). Among the different natural farming practices tried, foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod initiation stage (T₆) recorded higher drymatter accumulation at 30, 60 DAS and at harvest which was statistically on a par with the foliar application of panchagavya @ 5% + vermiwash @ 20% during pre-flowering and pod initiation stage (T₈). The increase in the drymatter accumulation in natural farming practices could be attributed to the inoculation of panchagavya supplied the plant with enough macro nutrients and micronutrient that are required for overall plant growth and development thus the application of panchagavya increased the drymatter production in plant (Sharma *et al.*, 2024 b) [4]. The larger portion of nitrogen in vermiwash in organic fractions and presence of various salts that are rich in N, P, K, S and micro nutrients in plant available form might have increased the nutrient availability to the plants. The results are in parity with the findings of Yogendra *et al.* (2024) [8] and Yuvarani *et al.* (2024) [9].

Seed and Stover yield

During the present study, seed and stover yield of chickpea were significantly influenced by the different nutrient management practices. Significantly higher seed and stover yield were recorded with the application of 100% RDF. Among the different natural farming practices evaluated, higher seed and stover yield were recorded with the foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod initiation stage (T₆), however, which was statistically on a par with the application of 100% RDF and foliar application of panchagavya

@ 5% + vermiwash @ 20% during pre-flowering and pod initiation stage (T₈). The increase in the seed and stover yield in the different natural farming practices may be attributed to the combined application of vermiwash and panchagavya effectively supplied essential macro and micro nutrients and bioactive

compounds, which promoted better pod formation and seed development. The improved dry matter partitioning towards reproductive organs led to the better grain yield (Yuvarani *et al.*, 2025) [9]. Whereas, the lower seed and stover yield was registered with the absolute control (T₁₀) (Table 3 and Fig.3).

Table 1: Effect of different nutrient management practices on plant population and plant height in chickpea during *rabi*, 2025-26

Treatments	Plant Population		Plant height (cm)		
	Initial	Final	30 DAS	60 DAS	Harvest
T ₁ : Foliar application of panchagavya @ 3% during pre-flowering and pod formation stage	32.0	31.8	16.9	33.1	35.2
T ₂ : Foliar application of panchagavya @ 5% during pre-flowering and pod formation stage	32.6	32.1	17.4	33.7	35.9
T ₃ : Foliar application of panchagavya @ 3% + cow urine @ 10% during pre-flowering and pod formation stage	32.9	32.6	18.4	34.8	36.9
T ₄ : Foliar application of panchagavya @ 3% + vermiwash @ 10% during pre-flowering and pod formation stage	32.0	31.8	18.9	35.4	37.4
T ₅ : Foliar application of panchagavya @ 5% + cow urine @ 10% during pre-flowering and pod formation stage	31.9	31.6	19.2	36.0	38.2
T ₆ : Foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod formation stage	32.5	32.3	20.1	37.2	39.6
T ₇ : Foliar application of panchagavya @ 5%+ cow urine @ 20% during pre-flowering and pod formation stage	32.3	32.0	19.5	36.4	38.7
T ₈ : Foliar application of panchagavya @ 5% + vermiwash @ 20% during pre-flowering and pod formation stage	32.5	32.1	20.0	36.9	39.1
T ₉ : Foliar application of jeevamrutham @ 5% at vegetative stage +@ 7.5% at flowering stage + @ 10% at pod formation stage	32.7	32.7	17.9	34.2	36.2
T ₁₀ : Absolute control	31.9	31.4	14.6	29.2	31.1
T ₁₁ : 100% RDF (20-50-0 N,P ₂ O ₅ ,K ₂ O kg ha ⁻¹)	33.0	32.6	22.5	41.0	44.7
SEm±	0.54	0.48	0.61	1.20	1.29
CD(P=0.05)	NS	NS	1.9	3.5	3.8

Table 2: Effect of different nutrient management practices on number of branches plant⁻¹ and drymatter production in chickpea during *rabi*, 2025-26

Treatments	Number of branches plant ⁻¹			Drymatter production (kg ha ⁻¹)		
	30 DAS	60 DAS	harvest	30 DAS	60 DAS	harvest
T ₁ : Foliar application of panchagavya @ 3% during pre-flowering and pod formation stage	3.5	6.1	8.3	172	1031	2251
T ₂ : Foliar application of panchagavya @ 5% during pre-flowering and pod formation stage	3.9	6.5	8.6	189	1102	2347
T ₃ : Foliar application of panchagavya @ 3% + cow urine @ 10% during pre-flowering and pod formation stage	4.3	6.9	9.2	248	1288	2614
T ₄ : Foliar application of panchagavya @ 3% + vermiwash @ 10% during pre-flowering and pod formation stage	4.6	7.2	9.7	271	1357	2756
T ₅ : Foliar application of panchagavya @ 5% + cow urine @ 10% during pre-flowering and pod formation stage	4.7	7.6	10.1	294	1476	2871
T ₆ : Foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod formation stage	5.0	8.9	11.4	356	1729	3327
T ₇ : Foliar application of panchagavya @ 5%+ cow urine @ 20% during pre-flowering and pod formation stage	4.7	8.1	10.5	311	1512	2957
T ₈ : Foliar application of panchagavya @ 5% + vermiwash @ 20% during pre-flowering and pod formation stage	4.9	8.7	10.9	341	1694	3128
T ₉ : Foliar application of jeevamrutham @ 5% at vegetative stage +@ 7.5% at flowering stage + @ 10% at pod formation stage	4.1	6.6	8.9	221	1210	2547
T ₁₀ : Absolute control	3.0	5.0	6.9	144	836	1946
T ₁₁ : 100% RDF (20-50-0 N,P ₂ O ₅ ,K ₂ O kg ha ⁻¹)	5.5	10.1	12.5	384	1872	3890
SEm±	0.14	0.28	0.35	8.80	45.7	98.9
CD(P=0.05)	0.4	0.8	1.0	26	135	292

Table 3: Effect of different nutrient management practices on seed and stover yield of chickpea during *rabi*, 2025-26

Treatments	Seed yield (kg ha ⁻¹)	Stover yield (kg ha ⁻¹)
T ₁ : Foliar application of panchagavya @ 3% during pre-flowering and pod formation stage	1021	1597
T ₂ : Foliar application of panchagavya @ 5% during pre-flowering and pod formation stage	1044	1610
T ₃ : Foliar application of panchagavya @ 3% + cow urine @ 10% during pre-flowering and pod formation stage	1057	1631
T ₄ : Foliar application of panchagavya @ 3% + vermiwash @ 10% during pre-flowering and pod formation stage	1064	1644
T ₅ : Foliar application of panchagavya @ 5% + cow urine @ 10% during pre-flowering and pod formation stage	1184	1845
T ₆ : Foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod formation stage	1341	2065
T ₇ : Foliar application of panchagavya @ 5%+ cow urine @ 20% during pre-flowering and pod formation stage	1196	1861
T ₈ : Foliar application of panchagavya @ 5% + vermiwash @ 20% during pre-flowering and pod formation stage	1320	2054
T ₉ : Foliar application of jeevamrutham @ 5% at vegetative stage +@ 7.5% at flowering stage + @ 10% at pod formation stage	1049	1620
T ₁₀ : Absolute control	861	1401
T ₁₁ : 100% RDF (20-50-0 N,P ₂ O ₅ ,K ₂ O kg ha ⁻¹)	1496	2266
SEm±	39.8	62.1
CD(P=0.05)	118	183

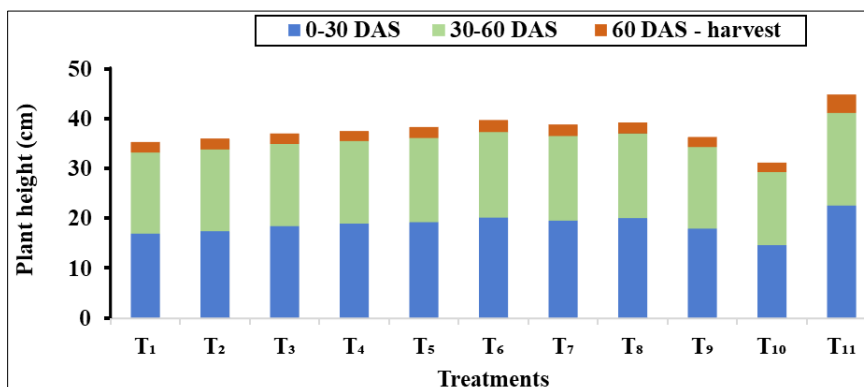


Fig 1: Effect of different nutrient management practices on plant height (cm) of chickpea

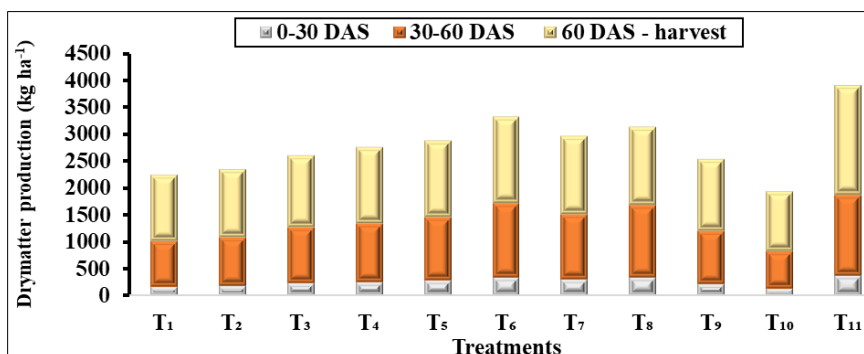


Fig 2: Effect of different nutrient management practices on drymatter production in chickpea

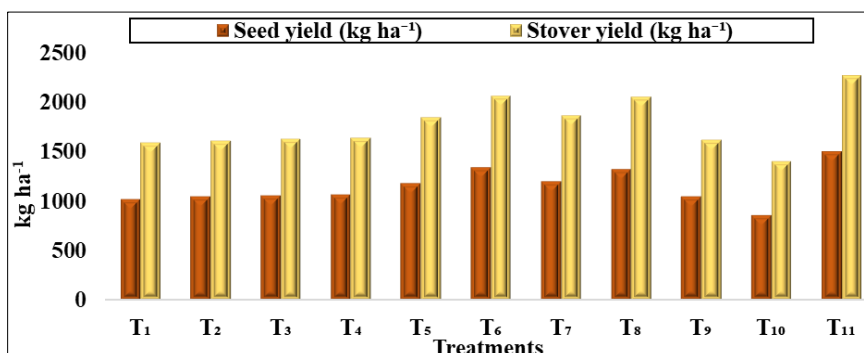


Fig 3: Effect of different nutrient management practices on seed and stover yield (kg ha⁻¹) of chickpea

Conclusion

The present study clearly revealed that, among the different nutrient management practices, higher growth attributes, drymatter production, seed and stover yield of chickpea were registered with application of 100% RDF. However, among the different liquid organic manures evaluated, higher growth attributes, drymatter production, seed and stover yield of chickpea were obtained with foliar application of panchagavya @ 5% + vermiwash @ 10% during pre-flowering and pod initiation stage.

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