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Enhancing productivity and profitability of chickpea (*Cicer arietinum* L.) as influenced by enriched organic manures and liquid foliar management practices

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Abstract

During two successive *rabi* seasons of 2022-23 and 2023-24 at Regional Agricultural Research Station, Nandyal, Acharya N.G. Ranga Agricultural University, Andhra Pradesh, conducted a field experiment titled “Enhancing productivity and profitability of chickpea (*Cicer arietinum* L.) as influenced by enriched organic manures and liquid foliar feeder’s management practices”. The soil of the experimental field was clayey loam in texture, alkaline in soil reaction, low in organic carbon and available nitrogen, medium in phosphorus and high potassium. Sixteen treatments, consisting of four organic manures in main plots and four liquid foliar feeders in sub plots were evaluated using split plot design with three replications. Treatment receiving enriched poultry manure with silica (M₂) recorded higher plant height, number of branches plant⁻¹, pods plant⁻¹, seed and haulm yield at harvest were also higher in treatments receiving foliar application of panchagavya @ 3% (F₃) which is statistically at par with foliar application of compost tea @ 5% (F₄). The lowest growth and yield parameters were obtained with control treatment.

Keywords: Organic manures, liquid foliar feeders, growth and yield parameters

Introduction

Chickpea, is the most widely grown pulse crop in the world, second only to beans and peas. It is also known by other names, like Bengal gram or gram, and is called chana in many parts of the country. A quantitative long-day legume crop of the fabaceae family and faboideae subfamily, chickpeas are grown during the chilly season. With an area of 10.56 million hectares and a production of 11.17 million tonnes, India leads the globe in chickpea production, with a productivity of 1077 kg ha⁻¹ (Kumar *et al.*, 2019)^[15]. Among the major Bengal gram producing states, Andhra Pradesh ranks 8th in cultivation area with 2.8 lakh hectares and is estimated to produce 3.21 lakh tonnes, contributing 2.8% to India’s total production, with a productivity of 1061 kg ha⁻¹ in 2023-24 (DESAP, 2023)^[9]. The major Bengal gram growing districts in Andhra Pradesh, namely Y.S.R Kadapa, Ananthapuramu, Nandyal, Kurnool and Prakasam, hold 82.7 per cent of the cultivation area and contribute 75.1 per cent to the state’s total red gram production. Chickpea (*Cicer arietinum* L.) is a major pulse crop cultivated extensively in the semi-arid regions of India, where its productivity is often constrained by poor soil fertility, erratic rainfall, and limited nutrient availability. In the scarce rainfall zone of Andhra Pradesh, characterized by low and uneven precipitation, fragile soil structure, and low organic matter, resource-efficient nutrient management plays a crucial role in sustaining chickpea productivity. Conventional fertilizer use in these dryland systems is frequently ineffective due to reduced nutrient mobility and poor synchrony between nutrient release and crop demand. This necessitates the adoption of integrated, biologically driven nutrient strategies that enhance nutrient use efficiency while improving soil resilience. Enriched organic manures fortified with micronutrients or amendments such as silica are increasingly recognized for their ability to improve soil physical properties, stimulate microbial activity, and provide a slow and sustained nutrient release in moisture-limited environments. Their application in rainfed systems helps to enhance water retention, nutrient mineralization, and rhizosphere health, contributing to better

crop establishment and growth (Shinde and Hunje, 2020) [26]. Complementing soil applied organics with organic liquid foliar feeders such as panchagavya, compost tea, and other bio-stimulants offers an additional pathway to support plant nutrition during critical growth stages. Foliar feeding is particularly valuable under dryland conditions, where soil-mediated nutrient uptake is restricted by intermittent moisture stress. The combined use of enriched organic manures and organic foliar sprays has shown promise in improving nutrient uptake, physiological efficiency, and yield attributes in pulses. However, research evaluating their synergistic effects on chickpea performance under the scarce rainfall tracts of Andhra Pradesh remains limited. Generating evidence on these integrated organic nutrient strategies is vital for developing sustainable, climate resilient production systems suited to the state's rainfed agriculture. Hence, the present study investigates the influence of soil application of enriched organic manures along with regular foliar feeding of organic liquid formulations on growth, yield, and soil health in chickpea grown under the moisture stressed environment of the scarce rainfall zone of Andhra Pradesh.

Materials and Methods

An investigation undertaken during *rabi* seasons of 2022-23 and 2023-24 at Regional Agricultural Research Station, Nandyal, Acharya N.G. Ranga Agricultural University. The soil of the experimental field was clayey loam in texture, alkaline in soil reaction, low in organic carbon and available nitrogen, medium in phosphorus and high potassium. The experimental site was located at an altitude of 216 m above mean sea level at 15° 29' 19" N latitude and 78° 29' 11" E longitude and it was categorized in the Scarce rainfall Agro-climatic Zone of Andhra Pradesh. The experiment was conducted using split plot experimental design with three replications. There were sixteen treatment combinations, consisting of four enriched organic manures enriched FYM with silica (M₁), enriched poultry manure with silica (M₂), enriched vermicompost with silica (M₃) and control (M₄), four liquid foliar feeders viz., control (F₁), foliar application of jeavamrith @ 3% (F₂), panchagavya @ 3% (F₃) and compost tea @ 5% (F₄) under sub plots. The plots and channels laid out during *kharif* season were kept undisturbed for sowing during *rabi* season. Organic manures i.e. farmyard manure, poultry manure and vermicompost were calculated as per the requirements based on the nutrients contents (NPK) and enriched with silica as per the recommended dose @ 80 kg ha⁻¹ and applied on equal nitrogen basis. All the above organic manures were thoroughly incorporated in to the soil 15 days prior to sowing of the *kharif* crop and also required quantity of enriched organic manures with silica applied to *rabi* crop in the fixed treatmental plots as basal. Healthy kabuli seeds of chickpea (NBeG 119) of high germination percentage were used for sowing. The crop was grown with the residual moisture of monsoon rains without any protective irrigation. At physiological maturity of the crop, harvesting was done. The treatments consisting of net plot area was harvested up to ground level. The plants were tied together and kept under sun in order to remove moisture after harvesting. The grain was threshed with wooden sticks after it had dried completely under sun. The separated seeds were sorted for impurities, cleaned and seed and haulm yield were expressed in kg ha⁻¹. The harvest index of the crop was computed using Donald (1962) [10] formula. The yield parameters and other findings were documented from the net plots. Plant growth characteristics include plant height (cm), number of branches plant⁻¹, yield attributes and yield number of

pods plant⁻¹, Seed yield (kg ha⁻¹), haulm yield (kg ha⁻¹) and Harvest index were subjected to statistical analysis as reported by Panse and Sukhatme (1985) [18]. Statistical significance was tested with F test at 5 per cent level of probability and compared the treatment means with critical difference.

Results and Discussion

1. Plant height (cm)

Plant height of chickpea differed significantly due to enriched organic manures application and foliar feeders at harvest during both the years of study as well as in pooled mean, where the interaction effect between organic manures application and liquid foliar feeders was non-significant (Table 1). Plant height of chickpea increased progressively with the advance in age of the crop irrespective of the treatments imposed. Significantly higher plant height was obtained with enriched poultry manure with silica (M₂), which was statistically comparable with enriched vermicompost with silica (M₃) during both the years of study as well as in pooled mean. Increase in plant height of chickpea by enriched poultry manure is due to the supply of readily available nutrients that stimulate early vegetative growth, while added silica improves cell wall strength, water-use efficiency, and root activity. This combination enhances nutrient uptake and stress tolerance, resulting in greater plant height in chickpea. Similar results were documented by Seema Kumari *et al.* (2025) [23] and Reddy and Umesha (2022) [21]. The lowest stature of plant height was registered with enriched farmyard manure with silica (M₁) which was significantly lower than rest of organic management practices during both the years of study as well as in pooled mean. This might be due to inadequate supply of all the nutrients from the FYM that lead to poor root development, limiting the plant's ability to absorb water and other nutrients which are necessary for overall growth.

With regard to the liquid foliar feeders, higher plant height was obtained with foliar application of panchagavya @ 3% at 35 and 55 DAS (F₃), which was statistically comparable with foliar application of compost tea @ 5% at 35 and 55 DAS (F₄). The higher plant height recorded under foliar application of panchagavya can be attributed to its rich composition of biologically active compounds that stimulate vegetative growth. Panchagavya contains significant quantities of auxin, gibberellin and cytokinin like substances, which enhance cell elongation, internode expansion, and meristematic activity, thereby promoting increased plant stature. Its foliar application ensures rapid absorption of these growth-promoting substances through the leaf surface, leading to immediate physiological responses. In addition, panchagavya supplies readily available macro- and micro-nutrients, amino acids, vitamins, enzymes, and organic acids, which improve photosynthetic efficiency, chlorophyll synthesis, and overall metabolic activity, resulting in more vigorous vegetative growth. The presence of beneficial microorganisms further augments phytohormone production and nutrient assimilation. Collectively, these mechanisms contribute to enhanced shoot elongation and ultimately result in higher plant height in chickpea. Similar results were reported by Verma *et al.* (2025) [28], Sharma *et al.* (2024) [25], Prem Kumar *et al.* (2021) [20], Choudhary *et al.* (2017) [6] and Panchal *et al.* (2017) [17]. Foliar applied compost tea increases chickpea plant height because it supplies quickly absorbable nutrients and growth-promoting compounds (humic substances, auxin- and cytokinin-like metabolites) directly to the leaves, enhancing chlorophyll formation, photosynthesis, and cell elongation. Additionally, the microbial consortium present in compost tea improves nutrient assimilation and suppresses foliar pathogens, reducing stress and

allowing the plant to allocate more energy toward shoot elongation. As a result, chickpea plants develop taller and more vigorous canopies under compost-tea foliar feeding compared to untreated plants. The results are in agreement with Chaichi *et al.* (2018)^[7] and Kim *et al.* (2015)^[14]. The next best treatment in recording higher plant height was with foliar application of jeevamrith @ 3% at 35 and 55 DAS (F₂). This might be due to jeevamrith supplies a richer and more metabolically active consortium of beneficial microorganisms along with readily available nutrients, plant growth promoters, and enzymatic metabolites. Jeevamrith contains high populations of N-fixers, P-solubilizers, micronutrient-mobilizing bacteria, and lactobacilli, which rapidly colonize the phyllosphere and enhance nutrient assimilation efficiency. The microbial metabolites such as IAA, GA, cytokinins, amino acids, and organic acids stimulate cell elongation and meristematic activity, leading to increase of plant height. The results are in line with those of Siddappa *et al.* (2016)^[27] and Yogananda *et al.* (2015). The plant height of chickpea was significantly lower during both the years of study as well as in pooled mean throughout the crop growing period with control treatment (F₁), which might be due to the soil received no external nutrient inputs to support vigorous vegetative growth.

2. Number of branches plant⁻¹

Data pertaining to number of branches plant⁻¹ was significantly influenced by enriched organic manures and liquid foliar feeders as well as their interaction effect during both the years of study and in the pooled mean (Table. 1). During both the years of study as well as in pooled mean, application of enriched poultry manure with silica (M₂) produced significantly more number of branches at harvest. This might be presumably due to enriched manure supplies readily mineralizable nitrogen and phosphorus that stimulate shoot meristem activity and promote lateral bud differentiation. Silica further enhances this response by strengthening cell walls, improving water use efficiency and supporting stable turgor, all of which maintain continuous vegetative growth. The combined effect improves nutrient uptake, reduces physiological stress and creates conditions that favor sustained branching at successive growth stages. The next best treatment in recording more branches with enriched vermicompost with silica (M₃), which was superior to enriched farmyard manure with silica (M₁) and control treatment (M₄) which recorded the lowest number of branches of chickpea during both the years of study as well as in pooled mean. Vermicompost is able to supply nutrients and favourable microbes as well as enzymes for enhanced growth attributes like branches per plant. These findings corroborate with the results of Reddy and Umesha (2022)^[21], Shankar *et al.* (2022)^[24] and Verma *et al.* (2025)^[28]. This might be due to lack of external nutrient supply restricted early vegetative growth and meristem activity. Limited availability of nitrogen, phosphorus, and micronutrients reduces cell division and weakens the hormonal signals that promote lateral shoot initiation. As a result, the plant conserves resources for primary stem growth, leading to a simpler, less branched canopy.

Maximum number of branches was produced with foliar application of panchagavya @ 3% at 35 and 55 DAS (F₃) followed by foliar application of compost tea @ 5% at 35 and 55 DAS (F₄) at 30,60 DAS and at harvest and both were significantly superior to over other treatments. More number of branches in the above treatments might be due to foliar spray of panchagavya produced the highest number of branches in chickpea because its nutrient rich and hormone bearing

composition rapidly stimulates vegetative growth. The presence of auxins, cytokinins, enzymes, and microbial metabolites enhances cell division in axillary buds and supports efficient nutrient uptake through the leaves. This combined effect strengthens photosynthetic activity and promotes the formation of more lateral branches throughout the crop's growth period. Foliar application of compost tea stimulates branching because it delivers quick-acting nutrients and hormone-like compounds (especially cytokinin- and auxin-like substances) directly to the foliage, which activates axillary buds, reduces apical dominance, and promotes lateral shoot development. Beneficial microbes in the tea further enhance nutrient assimilation and vegetative growth, resulting in more branches per plant. The next best treatment in producing more number of branches were with foliar application of jeevamrith @ 3% (F₂) at 35 and 55 DAS during both the years of study as well as in pooled mean. This might be due to enhanced branching by supplying readily absorbable nutrients and microbial metabolites that stimulate cytokinin-mediated axillary bud initiation and improve overall vegetative vigor. The results are in line with those of Sharma *et al.* (2024)^[25], Vidhya *et al.* (2024)^[29] and Parmar *et al.* (2024)^[19]. The lower number of branches was observed with no liquid foliar spray (F₁) at all stages of the crop growth during the both years of study and in the pooled mean.

3. Number of pods plant⁻¹

Number of pods plant⁻¹ of chickpea varied conspicuously due to enriched organic manures and liquid foliar feeders, while their interaction effect was also significant during both the years of investigation as well as in pooled mean (Table 1). Application of enriched poultry manure with silica (M₂) recorded higher number of pods plant⁻¹ followed by application of enriched vermicompost with silica (M₃) and both were statistically at par with each other. The M₂ treatment supplied a balanced mix of nutrients from poultry manure along with silica driven improvements in plant vigor. This combination enhanced photosynthetic efficiency and strengthened plant structure, enabling better nutrient allocation to developing flowers and ultimately increasing pods per plant in chickpea. These results are in agreement with the findings of Verma *et al.* (2025)^[28], Vidhya *et al.* (2024)^[29], Reddy and Umesha (2022)^[21] and Kuotsu and Singh (2021)^[16]. Significantly, lower number of pods plant⁻¹ was noticed with control treatment (M₄) during both years of study and in the pooled mean.

In the different liquid foliar management practices evaluated, higher number of pods plant⁻¹ was observed with foliar application of panchagavya @ 3% at 35 and 55 DAS (F₃) statistically at par with foliar application of compost tea @ 5% at 35 and 55 DAS (F₄) during both years of study and in the pooled mean. The next best treatment in producing higher number of pods plant⁻¹ was with foliar application of jeevamrith @ 3% at 35 and 55 DAS (F₂) which is significantly superior to no liquid spray (F₁). Panchagavya or compost tea increases the number of pods plant⁻¹ in chickpea because these inputs contain physiologically active compounds such as indole-3-acetic acid (IAA), gibberellins, cytokinins, amino acids and essential micronutrients. These substances enhance cell division, promote efficient translocation of photosynthates to reproductive organs and improve pollen viability. The microbial consortia present in these formulations also improve rhizosphere nutrient mineralization, leading to better nitrogen and phosphorus availability during flowering and pod set. As a result, the crop exhibits improved floral retention and higher pod formation. The results are in agreement with Parmar *et al.* (2024)^[19], Hiremath

et al. (2023) [12] and Reddy *et al.* (2022) [22]. The lower number of pods plant⁻¹ was observed with no liquid foliar spray (F₁) at all stages of crop growth during the both years of study and in the pooled mean.

4. Seed yield (kg ha⁻¹)

Seed yield of chickpea differed significantly with enriched organic manures and liquid foliar feeders as well as their interaction with an unaltered trend during both instances of study and pooled mean (Fig. 1). Among the various enriched organic manures, significantly higher seed yield was recorded with enriched poultry manure with silica (M₂), which was superior to rest of the enriched organic manures. Significantly, higher seed yield of chickpea with enriched poultry manure supplemented with silica may be ascribed to improved nutrient availability, enhanced photosynthetic efficiency, and better assimilate translocation. Silica fortifies cell walls, augments stress tolerance, and facilitates efficient nutrient uptake, while poultry manure supplies essential macro and micronutrients, collectively enhancing reproductive efficiency and grain formation. This was in consonance with the findings of Verma *et al.* (2025) [28], Vidhya *et al.* (2024) [29], Reddy and Umesha (2022) [21] and Chhimpa and Sharma (2018) [5]. The next best enriched organic manure in recording higher seed yield was with enriched vermicompost with silica (M₃) which was followed by enriched farmyard manure with silica (M₁) during both the years of study as well as in pooled mean. This might be attributed to the integration of silica with enriched vermicompost enhances nutrient availability, root development, and stress tolerance, leading to improved photosynthesis and efficient translocation of assimilates, which ultimately results in higher grain yield of chickpea. These results are in conformity with the findings of Cathrine *et al.* (2023) [4], Kharte *et al.* (2022) [13]. The lowest seed yield of chickpea was recorded with control treatment (M₄) during both years of study and in the pooled mean. This might be due to lack of external supply of major and minor nutrients lead to poor growth and ultimately seed yield.

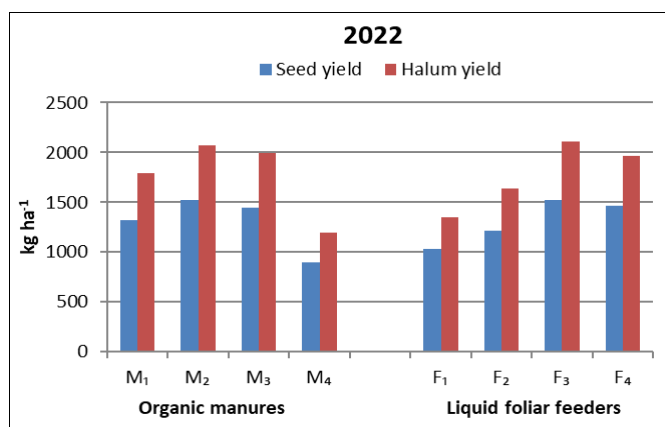
With respect to liquid foliar feeders, foliar application of panchagavya @ 3% at 35 and 55 DAS (F₃), which was statistically at par with foliar application of compost tea @ 5% at 35 and 55 DAS (F₄) in obtaining higher seed yield and both of them were significantly higher than rest of the enriched organic manures treatments. The comparable increase in seed yield under foliar application of panchagavya and compost tea is due to their rich composition of nutrients, beneficial microbes, and growth promoting substances that enhance photosynthesis, nutrient assimilation, and reproductive efficiency, leading to improved seed development and yield. The results corroborates with the findings of Amipara *et al.* (2023) [1], Hiremath *et al.* (2023) [12] and Bhawariya *et al.* (2022) [3]. The next best treatment in recording higher seed yield was with foliar application of jeevamrith @ 3% (F₂) at 35 and 55 DAS during both the years of experimentation as well as in pooled mean. The lowest seed yield was observed with control treatment (F₁), which was significantly lower than rest of the organic management practices. This might be due to reduced stature of yield attributes and non-availability of nutrients.

5. Haulm yield (kg ha⁻¹)

Enriched organic manures and liquid foliar feeders application exerted significance on haulm yield of chickpea and their interaction effect was not significant during both instances of

study and in the pooled mean (Fig.1). Significantly, higher haulm yield of chickpea recorded with application of enriched poultry manure with silica (M₂), which was superior to rest of the enriched organic manures. The next best enriched organic manure in recording higher haulm yield was with enriched vermicompost with silica (M₃). Application of enriched poultry manure with silica or enriched vermicompost with silica recorded higher haulm yield of chickpea because these amendments supply balanced and readily available nutrients along with silicon mediated physiological benefits. Poultry manure and vermicompost enrich the soil with macro and micronutrients, organic carbon, and beneficial microbes, which enhance nutrient uptake and improve plant vigor. The addition of silica strengthens cell walls, improves photosynthetic efficiency, and enhances tolerance to biotic and abiotic stresses, leading to better vegetative growth and accumulation of dry matter. Consequently, this results in increased haulm yield due to improved overall plant health and biomass production. Similar results were revealed earlier by Verma *et al.* (2025) [28], Vidhya *et al.* (2024) [29] and Cathrine *et al.* (2023) [4]. Application of enriched farmyard manure with silica (M₁) registered significantly lower haulm yield than rest of the organic manures application during both the consecutive years of study as well in pooled mean.

With respect to different foliar management practices, foliar application of panchagavya @ 3% at 35 and 55 DAS (F₃) recorded higher haulm yield, which was however comparable with foliar application of compost tea @ 5% at 35 and 55 DAS (F₄). The increased haulm yield with foliar application of panchagavya is attributed to its nutrient rich composition and bioactive compounds that enhance photosynthesis and vegetative growth, resulting in greater biomass production. Similar results were also reported by Bhargavi *et al.* (2023) [2], Amipara *et al.* (2023) [1] and Bhawariya *et al.* (2022) [3]. Foliar application of compost tea facilitates efficient nutrient uptake and boosts photosynthetic performance by supplying readily available nutrients and bioactive compounds directly to the foliage. These components promote enhanced metabolic activity and vigorous vegetative growth, leading to greater biomass production and ultimately higher haulm yield in chickpea. The results were in conformity with the findings of Debudut Manna (2021) [8]. The lowest haulm yield was observed with foliar application of jeevamrith @ 3% at 35 and 55 DAS (F₂), which is significantly superior to control treatment (F₁) during both the years of study as well in pooled mean. This might be due to decreased stature of growth resulting in lower haulm yield.



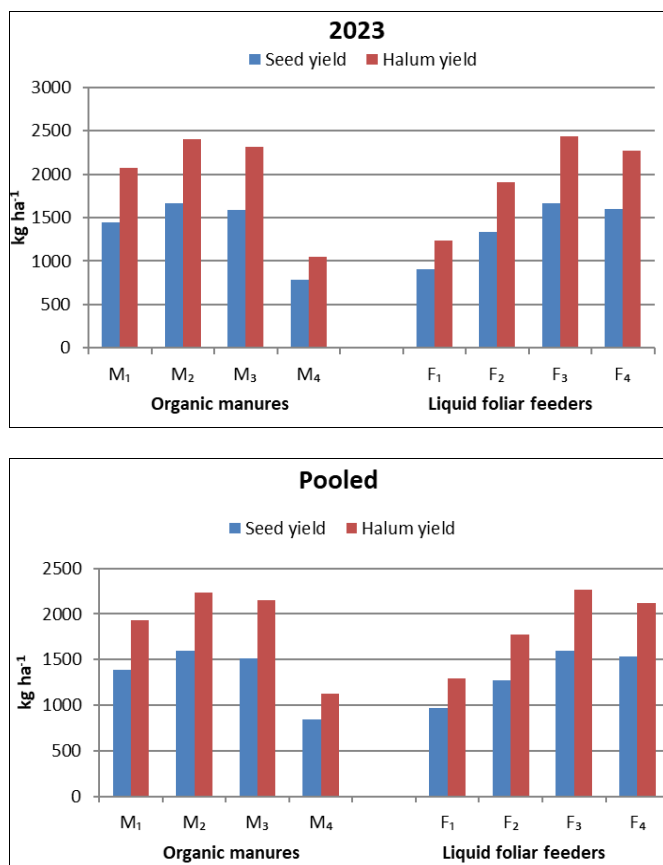


Fig 1: Effect of enriched organic manures and liquid foliar feeders on seed and haulm yield of chickpea

6. Harvest index (%)

Data pertaining to harvest index of chickpea was not significantly influenced by enriched organic manures and liquid foliar feeders as well as their interaction effect during both the years of investigation and in the pooled mean (Table 1). Numerically, higher harvest index was observed with enriched poultry manure with silica (M₂) followed by enriched

vermicompost with silica (M₃) which is numerically superior to enriched farmyard manure with silica (M₃) during both the years of study as well as in pooled mean. Higher harvest index with enriched poultry manure and silica might be due to improved nutrient availability and enhanced photosynthetic efficiency, which promoted better assimilate translocation and dry matter partitioning towards the economic yield compared to enriched vermicompost with silica. These findings were in close conformity with those reported by Verma *et al.* (2025) [28] and Vidhya *et al.* (2024) [29]. The lowest harvest index was recorded with enriched farmyard manure with silica (M₁) and control treatment (M₄), which was numerically lower than rest of the organic manures application during both years of study and in the pooled mean.

Among the liquid foliar feeders, foliar application of panchagavya @ 3% at 35 and 55 DAS (F₃) was numerically at par with foliar application of compost tea @ 5% at 35 and 55 DAS (F₄) in obtaining higher harvest index and both of them were numerically higher than rest of the foliar feeders application. The comparable performance of foliar application of panchagavya and compost tea in enhancing harvest index may be attributed to their ability to supply essential nutrients, phytohormones, and beneficial microbes that promote efficient photosynthesis and nutrient assimilation. This leads to improved translocation of assimilates toward reproductive organs, thereby enhancing the proportion of economic yield relative to total biomass. The current findings were in accordance with those of Parmar *et al.* (2024) [19], Bhawariya *et al.* (2022) [3] and Gowthamchand *et al.* (2019) [11]. The next best treatment in recording higher index was with foliar application of jeevamrith @ 3% (F₂) at 35 and 55 DAS during both the years of study as well as in pooled mean. The lowest harvest index was observed with control treatment (F₁), which was numerically lower than rest of the liquid foliar management practices. This might be due to reduced, seed yield as a result of severe competition from sowing to harvest leading to poor translocation of photosynthates from source to sink.

Table 1: Effect of enriched organic manures and liquid foliar feeders on plant height, number of branches plant⁻¹ and pods plant⁻¹ at harvest of chickpea

Treatments	Plant height (cm)			Number of branches plant ⁻¹			Number of pods plant ⁻¹			Harvest index (%)		
	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled
Main plots: Organic manures (4)												
M ₁ : Enriched FYM with silica	46.8	48.8	47.8	10.3	12.7	11.5	35.6	39.3	37.4	42.5	41.3	41.9
M ₂ : Enriched Poultry manure with silica	56.4	58.4	57.4	12.1	14.9	13.5	40.6	44.7	42.7	42.4	41.0	41.7
M ₃ : Enriched Vermicompost with silica	54.4	56.5	55.4	11.3	13.6	12.4	39.3	43.2	41.2	42.2	40.8	41.5
M ₄ : Control	28.6	26.3	27.4	7.9	6.5	7.2	26.2	24.8	25.5	42.8	42.3	42.6
S.Em ±	1.31	1.37	1.34	0.28	0.36	0.32	1.30	1.43	1.37	1.19	1.15	1.17
CD (P = 0.05)	4.5	4.7	4.6	0.9	1.2	1.1	4.5	4.9	4.7	NS	NS	NS
Sub plots: Liquid Foliar feeders (4)												
F ₁ : Control	33.2	30.6	31.9	8.6	7.4	8.0	29.5	27.4	28.4	42.7	42.9	42.7
F ₂ : Jeevamrith 3%	41.7	43.6	42.7	9.8	12.2	11.0	34.0	37.3	35.7	41.1	41.8	41.1
F ₃ : Panchagavya 3%	57.6	59.6	58.6	12.3	15.5	13.9	40.4	44.4	42.4	40.8	41.4	40.8
F ₄ : Compost Tea 5%	53.6	55.7	54.7	11.6	14.4	13.0	38.9	42.9	40.9	40.8	41.5	40.8
S.Em ±	1.27	1.33	1.30	0.29	0.37	0.33	0.53	0.58	0.55	1.27	1.29	1.27
CD (P = 0.05)	3.7	3.9	3.8	0.8	1.1	0.9	1.6	1.8	1.6	NS	NS	NS
Interaction												
Organic manures (M) × Liquid Foliar feeders (F)												
M at F												
S.Em ±	2.55	2.67	2.61	0.66	0.73	0.64	1.59	1.75	1.67	2.57	2.49	2.53
CD (P = 0.05)	NS	NS	NS	1.84	2.12	1.92	4.65	5.12	4.88	NS	NS	NS
F at M												
S.Em ±	2.53	2.65	2.59	0.65	0.72	0.63	1.06	1.16	1.11	2.62	2.54	2.58
CD (P = 0.05)	NS	NS	NS	1.85	2.13	1.93	3.09	3.39	3.24	NS	NS	NS

Conclusion

From the pooled results (2022-23 to 2023-24) it was concluded that application of enriched poultry manure with silica along with foliar application of panchagavya @ 3% (M_2F_3) which was statistically comparable with enriched poultry manure with silica along with foliar spray of compost tea @ 5% (M_2F_4) recorded significantly higher growth and yield parameters were recommended for chickpea growing areas of Scarce rainfall Agro-Climatic Zone of Andhra Pradesh.

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