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Effect of liquid organic sources on growth, yield and quality of chickpea [*Cicer arietinum* (L.)

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Abstract
Background: Chickpea (*Cicer arietinum* L.) is also known as gram, Bengal Gram, or Spanish Pea and is considered to be the third most important pulse crop of the world. It is an important source of protein in human diet. It plays a significant role in sustaining production of the subsistence farming. There is a growing demand for chickpea due to its nutritional value as seeds of chickpea containing 20-22% protein, 60-62% carbohydrate, 5% fat and is rich in calcium and iron. Jeevamrit promotes immense biological activity in soil and makes nutrient available to crop. The application of jeevamrit improved the physical, chemical and biological properties of soil, besides improving the efficiency of applied manure. Panchagavya an organic product is the potential source to play the role for promoting growth and providing immunity in plant system. It is a bio promoter with a combination of five products obtained from the cow viz. dung, urine, milk, curd and ghee. Panchagavya acts as growth promoter (75%) and immunity booster (25%) and exactly fills the missing link to sustain the organic farming without any yield loss. Keeping in view the importance of Panchagavya and jeevamrit for chickpea, the present investigation was conducted.
Methods: In the present work, experiment was laid out in randomized block design i.e. with nine treatments combinations soil application of jeevamrit @ 500 lit/ha, soil application of Panchagavya @ 500 lit/ha, foliar application of jeevaamrit @ 5%,7.5%, 10% and, foliar application Panchagavya @ 1%, 3% and 5% on chickpea variety RSG-896 at Research farm of Suresh Gyan Vihar University, Jaipur.
Results: On the basis of experimentation, it was concluded that foliar application of Panchagavya @ 3% and 5% found to be produced significantly higher plant height and dry matter accumulation at 50 DAS and at harvest, number of total and effective nodules plant^{-1} at 40 DAS, number of pods plant^{-1}, number of seeds pod^{-1}, seed yield, straw yield and biological yield, net return and B: C ratio as compared to rest of the treatments.

Keywords: Chickpea, Panchagavya, jeevamrit, liquid organic sources

Introduction
Chickpea (*Cicer arietinum* L.) is also known as gram, Bengal Gram, or Spanish pea and is considered to be the third most important pulse crop of the world. It is an important source of protein in human diet. It plays a significant role in sustaining production of the subsistence farming system (Gangwar *et al*., 2013) [2]. There is a growing demand for chickpea due to its nutritional value as seeds of chickpea containing 20-22% protein, 60-62% carbohydrate, 5% fat and is rich in calcium and iron. Chickpea benefits agricultural production by fixing atmosphere nitrogen and adding it to the soil. It benefits cereal crops in rotation by breaking up disease and insect cycles. Chickpea is classified based on seed size, shape and color. The types are common the small angular and colored seeds are classified as desi and the larger ram-head shaped and beige colored seed are called Kabuli. Chickpea is basically winter season crop which requires good moisture with optimum temperature from 24 to 30 ºC for well growth (Raheja, 2016) [4].
Jeevamrit promotes immense biological activity in soil and makes nutrient available to crop. It is described as one of four wheels of Zero Budget Natural Farming (Palekar, 2005) [5]. The application of jeevamrit improved the physical, chemical and biological properties of soil, besides improving the efficiency of applied manure (Manjunatha, 2009) [7]. It was also reported to be a catalytic agent to promote activity of microorganisms resulting in healthy and nutrient rich soil.

Panchgavya and Jeevamrit are other cheaper and eco-friendly organic preparations made by cow products namely dung, urine, milk, curd and ghee. The panchgavya is an efficient plant growth stimulant that enhances the biological efficiency of crops. It is used to activate soil and to protect the plants from diseases and also increases the nutritional quality of plant. It is used as foliar spray, as soil application along with irrigation water, seed or seedling treatment etc. Panchagavya an organic product is the potential source to play the role for promoting growth and providing immunity in plant system. It is a bio promoter with a combination of five products obtained from the cow viz. dung, urine, milk, curd and ghee. Panchagavya acts as growth promoter (75%) and immunity booster (25%) and exactly fills the missing link to sustain the organic farming without any yield loss (Vedivel, 2007) [9]. Biochemical properties of panchagavya revealed that it contains almost all the major nutrients like N, P, K and micronutrients necessary for plant and growth as well as the predominance of fermentative micro-organisms like yeast, Azotobacter, phosphobacteria and Lactobacillus (Selvaraj, 2003) [8].

In particular the use of liquid organic manures not only helps to achieve higher yield but also a low-cost production approach, thus helps to realize higher returns by the farmers (Devakumar *et al*., 2014) [1].

2. Materials and Methods

The experiment was conducted during *Rabi* 2023-24 at Research Farm, School of Agriculture, Suresh Gyan Vihar University, Jaipur (Rajasthan). Geographically, this region falls under agro-climatic zone III A of Rajasthan (Semi-arid Eastern Plain Zone) and this area is located at 75° 51'44" E longitude and 26°48'35'' N latitude and altitude of 432 m above mean sea level. The experiment was laid out in randomized block design with nine replications. The treatments combinations soil application of jeevamrit @ 500 lit/ha, soil application of Panchagavya @ 500 lit/ha, foliar application of jeevaamrit @ 5%,7.5%, 10% and, foliar application Panchagavya @ 1%, 3% and 5%. The seeds of chickpea variety RSG–896 were sown on 29th Oct, 2023. The sowing was done at row spacing of 30 x 10 cm using a seed rate of 80 kg ha^{-1} by "Kera" method with the help of desi plough. The seeds were dropped manually in furrow opened by plough at a depth of 20 cm. The soil samples were collected from 0-15 cm depth of soil profile with the help of screw auger before sowing. It was air dried in shade, grounded and analyzed for determination of physical and chemical properties of soil. Soils are loamy sand with 0.22% organic carbon, 136.74 kg ha^{-1} N, 20.09 kg ha^{-1} P_2O_5 and 237.34 kg ha^{-1} K_2O. The total rainfall received during the crop season was 25.7 mm.

3. Results and Discussion

The application of liquid organic sources has a considerable impact on the growth parameters of chickpea, as demonstrated by clear data. The foliar application of panchgavaya @ 3% ha^{-1} significantly increased the plant height at 60, 90 DAS and at harvest, and dry matter accumulation at 30, 60, 90 DAS and at harvest over control and foliar application of panchgavaya @ 5% ha^{-1} and remained at par with soil application of jeevamrit @ 500lit ha^{-1} (Table 1 and 1.1). Application Panchagavya and jeevamrut, possessed good amount of nutrients enriched with beneficial microorganism and growth promoting substances along with other enzymes (Gore and Sreenivasa, 2011) [3].

Table 1: Effect of liquid organic source on dry matter accumulation of chickpea

Treatment	Dry Matter Accumulation (G/Plant)			
	30 DAS	60 DAS	90 DAS	at harvest
T_1 Control	1.98	5.77	7.38	10.44
T_2 Soil application of Jeevamrit @ 500lit/ ha	2.19	6.77	11.75	17.43
T_3 Soil application of Panchagavya @ 500lit/ha	2.18	6.64	9.87	11.24
T_4 Foliar application of Jeevaamrit @ 5%	2.17	6.75	11.04	16.01
T_5 Foliar application of Jeevaamrit @ 7.5%	2.21	6.90	11.50	16.13
T_6 Foliar application of Jeevaamrit @ 10%	2.22	6.57	11.71	16.20
T_7 Foliar application of Panchagavya @ 1%	2.16	7.00	11.09	13.15
T_8 Foliar application of Panchgavya @ 3%	2.19	7.98	12.10	18.52
T_9 Foliar application of Panchgavya @ 5%	2.23	7.93	11.93	17.54
S.E.M.±	0.16	0.42	0.56	0.96
CD (P=0.05)	NS	1.26	1.66	2.55
CV (%)	8.35	10.58	8.85	10.94

Table 1.1: Effect of liquid organic sources on plant height of chickpea

Treatment	Plant Height(Cm)			
	30 DAS	60 DAS	90 DAS	At Harvest
T_1 Control	26.0	26.2	32.7	33.9
T_2 Soil application of Jeevamrit @ 500lit/ ha	27.6	28.4	42.2	46.7
T_3 Soil application of Panchagavya @ 500lit/ha	26.1	25.0	35.8	37.2
T_4 Foliar application of Jeevaamrit @ 5%	25.2	26.8	39.4	42.5
T_5 Foliar application of Jeevaamrit @ 7.5%	26.8	26.8	41.1	42.8
T_6 Foliar application of Jeevamrit @ 10%	26.7	26.7	39.4	44.7
T_7 Foliar application of Panchagavya @ 1%	27.3	26.1	35.6	37.4
T_8 Foliar application of Panchgavya @ 3%	28.7	31.1	42.8	46.5
T_9 Foliar application of Panchgavya @ 5%	28.4	29.1	42.4	44.7
S.E.M.±	1.21	1.54	1.91	1.65
CD (P=0.05)	NS	4.59	5.68	4.92
CV (%)	8.08	9.78	8.48	6.85

Table 2: Effect of liquid organic sources on seed, straw and biological yield and Harvest index of chickpea

Treatment	Seed Yield (Kg/ ha)	Straw yield (kg/ha)	Biological Yield (Kg ha^{-1})	Harvest index (%)
T_1 Control	1302	2534	3836	29.47
T_2 Soil application of Jeevamrit @ 500lit/ ha	1750	3205	4955	35.31
T_3 Soil application of Panchagavya @ 500lit/ha	1610	2623	4233	38.12
T_4 Foliar application of Jeevaamrit @ 5%	1644	3182	4826	34.51
T_5 Foliar application of Jeevaamrit @ 7.5%	1711	3345	5056	33.87
T_6 Foliar application of Jeevaamrit @ 10%	1760	3505	5265	33.52
T_7 Foliar application of Panchagavya @ 1%	1575	3090	4665	33.74
T_8 Foliar application of Panchagavya @ 3%	1903	3614	5517	36.32
T_9 Foliar application of Panchgavya @ 5%	1860	3554	5414	35.69
S.E.M.±	86.30	147	154	2.2
CD (P=0.05)	256	458	512	NS
CV (%)	8.90	8.4	6.19	11.13

It is probable to correlate the overall increase in crop growth caused by panchgavaya and jeevamrit application to improved root development and proliferation as well as higher nitrogen fixation in the soil, which raises the soil's nitrogen status. The experimental data demonstrated that liquid organic sources had a substantial influence on chickpea production characteristics and yield when compared to the control. The treatment foliar application of panchgavaya @ 3% ha^{-1} resulted in a considerably larger number of pods plant^{-1}, number of seeds pod^{-1}, seed yield, straw yield, and biological yield of chickpea (Table 2 and 2.1) over control and foliar application of panchgavaya @ 5% ha^{-1} and remained at par with soil application of jeevamrit @ 500lit ha^{-1}. The treatment of foliar application of panchgavaya @ 3% ha^{-1} resulted in a significant increase in seed, straw and biological yield as compared to control and rest of the treatments. (Table 2).

This could be attributed to the simultaneous rise in the quantity of pod plant^{-1} and seeds pod^{-1} under this treatment. This could be because surplus assimilates were retained in the leaves and then trans located into seeds during senescence, resulting in a larger seed production. Significant improvement in nutrient contents and/or their uptake due to application of organic sources were also observed by Gore and Sreenivasa, 2011 [3] and Patel *et al*., 2018 [3].

Table 2.1: Effect of liquid organic sources on number of pod plant^{-1}, number of seed pod^{-1} and test weight (g) of chickpea

Treatment	Number of pod plant^{-1}	Number of seed pod^{-1}	Test weight (g)
T_1 Control	22.2	1.19	22.6
T_2 Soil application of Jeevamrit @ 500lit/ ha	29.0	1.22	30.4
T_3 Soil application of Panchagavya @ 500lit/ha	24.7	1.22	24.2
T_4 Foliar application of Jeevaamrit @ 5%	28.6	1.24	28.6
T_5 Foliar application of Jeevaamrit @ 7.5%	29.0	1.18	29.9
T_6 Foliar application of Jeevaamrit @ 10%	29.1	1.14	29.5
T_7 Foliar application of Panchagavya @ 1%	24.5	1.15	24.8
T_8 Foliar application of Panchgavya @ 3%	30.2	1.12	31.5
T_9 Foliar application of Panchgavya @ 5%	29.4	1.15	31.2
S.E.M.±	1.50	0.06	2.07
CD (P=0.05)	4.48	NS	6.09
CV (%)	9.53	9.23	12.74

Table 3: Effect of liquid organic source on net return B:C ratio

Treatment	Net Return (₹ ha^{-1})	B:C Ratio
T_1 Control	34467	1.94
T_2 Soil application of Jeevamrit @ 500lit/ ha	50387	2.61
T_3 Soil application of Panchagavya @ 500lit/ha	43537	2.40
T_4 Foliar application of Jeevaamrit @ 5%	46754	2.45
T_5 Foliar application of Jeevaamrit @ 7.5%	48002	2.55
T_6 Foliar application of Jeevaamrit @ 10%	48582	2.62
T_7 Foliar application of Panchagavya @ 1%	41571	2.35
T_8 Foliar application of Panchgavya @ 3%	53432	2.83
T_9 Foliar application of Panchgavya @ 5%	50427	2.77
S.E.M.±	3451	0.13
CD (P=0.05)	10256	0.38
CV (%)	12.90	8.90

The analysis of chickpea economic data (Table 3) revealed that the use foliar application of panchgavaya @ 3% ha^{-1} had a substantial impact. The foliar application of panchgavaya @ 3% ha^{-1} resulted in significantly greater net returns and a B: C ratio over control and foliar application of panchgavaya @ 5% ha^{-1}, and remained at par with soil application of jeevamrit @ 500lit ha^{-1}. These findings are in agreement with Gore and Sreenivasa, 2011 [3] and Patel *et al*., 2018 [3].

4. Conclusion

On the basis of experimentation, it was concluded that foliar application of Panchagavya @ 3% found to be equally effective

in improving growth parameters, yield attributes, yields, quality parameters and economics of chickpea with that foliar application of Panchagavya @ 5% and soil application of Jeevaamrit @ 500lit ha^{-1} recorded significantly higher seed yield. These results are based on one year experimentation, and hence, only indicative and further experimentation is required to arrive at more consistent and definite conclusion for recommendation to the farmers.

5. References

1. Devakumar N, Lavanya G, Rao GE. Influence of jeevamrutha and panchagavya on beneficial soil microbial population and yield of organic field bean (*Dolichos lablab* L.). Mysore J Agric Sci. 2018;52(4):790-795.
2. Gangwar LS, Saran S, Kumar S. Integrated poultry-fish farming systems for sustainable rural livelihood security in Kumaon hills of Uttarakhand. Agric Econ Res Rev. 2013;26:181-188.
3. Gore NS, Sreenivasa MN. Influence of liquid organic manures on growth, nutrient content and yield of tomato (*Lycopersicon esculentum* Mill.) in sterilized soil. Karnataka J Agric Sci. 2011;24(2):153-157.
4. Raheja I. Management of grey mold (*Botrytis cinerea*) of chickpea (*Cicer arietinum* L.) by using chemicals. Synopsis on Dissertation Report. Lovely Professional University, 2016.
5. Palekar S. The philosophy of spiritual farming I. 2nd Ed. Amravati: Zero Budget Natural Farming Research, Development & Extension Movement, 2005.
6. Patel DM, Patel IM, Patel BT, Singh NK, Patel CM. Effect of Panchagavya and Jivamrut on yield, chemical and biological properties of soil and nutrients uptake by kharif groundnut (*Arachis hypogaea* L.). Int J Curr Sci. 2018;6(3):804-9.
7. Manjunatha GS, Upperi SN, Pujari BT, Yeledahalli NA, Kuligoda VB. Effect of farm yard manure treated with Jeevamrit on yield attributes and economics of sunflower (Helianthus annuus L.). Karnataka J Agric Sci. 2009;22(1):342-8.
8. Selvaraj N. Report on the work done on organic farming at Horticulture Research Station. Tamil Nadu Agricultural University, Ooty, 2003, p. 2-5.
9. Vedivel E. The theory and practical of panchagavya. Coimbatore: Directorate of Extension Education, Tamil Nadu Agricultural University, 2007, p. 9-14.