

# Effect of Organic Manures and Inorganic Fertilizers on Growth and Yield of Chickpea (*Cicer Arietinum L.*) under Moringa Agroforestry System

Thogaru Joy Phinehas<sup>1\*</sup>, Neelam Khare<sup>2</sup>, Rohit Gowtham Paruchuri<sup>3</sup>, R Vijaykumar<sup>4</sup>

Department of Silviculture and Agroforestry, College of Forestry, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P-211007

\*Corresponding Author

Received:- 08 August 2022/ Revised:- 15 August 2022/ Accepted:- 21 August 2022/ Published: 31-08-2022

Copyright © 2022 International Journal of Environmental and Agriculture Research

This is an Open-Access article distributed under the terms of the Creative Commons Attribution

Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted

Non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Abstract**— The field experiment was conducted in Rabi season during November 2021- March 2022 to find out the effect of organic and inorganic manure on growth and yield of Chickpea (*Cicer arietinum L.*) at research field of College of Forestry, SHUATS, Prayagraj, UP. The experiment is laid out in Randomized Block Design (RBD) consisting of 9 treatments replicated thrice. Various treatments. Result revealed that at 30 DAS interval maximum plant height (19.44cm), at 60 DAS interval maximum plant height (50.65cm), at 90 DAS interval maximum plant height (56.51cm), at 30 DAS maximum number of branch (4.73), at 60 DAS maximum number of highest number of branch (9.87) and at 90 DAS maximum number of branches (12.27), at 70 DAS the highest 50% flowering% (77.87), at 70 DAS highest number of pods per plant (no.) (41.13), at 70 DAS the highest number of seeds per pod (no.) (2.73), after harvesting the highest test weight (100 seed, hundred-seed weight) (gm) (31.33), after harvesting highest grain yield q/ha (20.67). after harvesting highest straw yield q/ha (19.33), after harvesting the highest harvest index % (48.67) and maximum benefit cost ratio 1:70. While maximum gross return (121847.5) and maximum net return (76,828). The highest recorded in the Treatment T9 (NPK 100% + FYM 100%).

**Keywords**— Chickpea, NPK, Farm Yard Manure, Growth, Yield.

## I. INTRODUCTION

Cultivating agricultural crops and trees together is an ancient practice world-wide. Agroforestry refers to the sustainable land use systems involving trees combined with arable crops or animals on the same unit of land in some form of spatial arrangement or temporal sequence. Agroforestry is recognized as one of the supreme strategies to attain ideal multiple benefits, through interactive and intentional land use system and technologies where trees are deliberately planted with agricultural crops or with animals. In India, it has been a traditional practice and has received greater emphasis in recent years as a sustainable land use option of high potential. In agroforestry systems there are both ecological and economical interactions between the different components (Lundgren and Raintree, 1982). Agroforestry systems have been designed to fulfill the economic, social and cultural needs of the local population, while keeping an eye on the ecological balance. To increase the economic importance of the tree component, the multipurpose tree species (MPTS) have been introduced in agroforestry systems. The multipurpose trees are those trees and shrubs having more than one preferred use, product and/or service.

Moringa oleifera is a fast-growing, drought-resistant tree of the family Moringaceae, native to the Indian subcontinent. Common names include moringa, drumstick tree It is widely cultivated for its young seed pods and leaves, used as vegetables and for traditional herbal medicine. It is also used for water purification. Although listed as an invasive species in several countries, M. oleifera has "not been observed invading intact habitats or displacing native flora", so "should be regarded at present as a widely cultivated species with low invasive potential.

Chickpea (*Cicer arietinum L.*) It is an important pulse crop with synonym Bengal gram, garbanzo (Spanish), chana (Hindi) and chanaka (Sanskrit). It is the largest produced food legume in South Asia and the third largest produced food legume globally, after the common bean (*Phaseolus vulgaris L.*) and field pea (*Pisum sativum L.*). India is the largest chickpea producing country accounting for 64% of the global chickpea production. The other major chickpea producing countries include Pakistan, Turkey, Iran, Myanmar, Australia, Ethiopia, Canada, Mexico and Iraq. It is grown in an about 30% of the

national pulse acre which contributes to about 38% of national pulse production in India. The total production of this crop has increased from 3.65 million tonnes in 1950-51 to 5.77 million tonnes in 2003-04 registering a quite low growth rate of 0.58% annually in the area under cultivation (a decline from 7.57 to 7.29 million hectares) with an increased productivity from 482 to 792 kg/ha, the global chickpea area was about 11.0 m ha with a production of 8.8 m tons and average yield of nearly 800 kg ha<sup>-1</sup> (Gaur et al., 2010). Pulses occupy a very important place in Indian diet because they constitute the major source of protein to the predominantly vegetarian population. Nutritionally, Chickpea is relatively free from various anti nutritional factors, has a high protein digestibility, and is richer in phosphorus and calcium than other pulses. Because of its higher fat content and better fiber digestibility, chickpea holds good promise as a protein and calorie source for animal feed. Chickpea straw also has a forage value. Because of these diversified uses of the crop and its ability to grow better with low inputs under harsh edaphic factors, it is an important component of the cropping system of subsistence farmers in the Indian subcontinent.

## II. MATERIAL AND METHODS

The materials, methodology and techniques adopted during the course of the investigation entitled, "Effect of Organic manures and Inorganic fertilizers on Growth and Yield of Chickpea (*Cicer arietinum L.*) Under Moringa (*Moringa oleifera*) based Agroforestry System", Location: The experiment was carried out during *Rabi* season of 2021 at Crop Research Farm, Department of Silviculture & Agroforestry, College of Forestry SHUATS, Prayagraj (U.P.) which is located at geographical coordinates of 25° 24' 42" N latitude, 81° 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Prayagraj. Prayagraj is situated at an elevation of 25.26° N, 81.54 E, and 98 m above the mean sea level. It is located in the south-eastern part of Uttar Pradesh and has a tropical to sub-tropical climate with extremes of summer and winter. During winter month especially Dec- Jan temperature drops down to as low as 5° C while in summer, temperature reaches above 45° C. Hot scorching winds (commonly known as Loo) is regular feature during the summer whereas there may be an occasional spell of frost during the winter. The annual rainfall is about 1100 mm mostly during the monsoon autumn i.e. July- Nov with a few occasional showers during winter months. Soil texture was sandy loam.

## III. RESULTS AND DISCUSSION

### 3.1 Growth attributes

Growth parameters are Plant height, Number of branches, Days to 50% flowering. The analysis of data revealed that significant difference was found in plant height at 30, 60 and 90 DAS. The data maximum plant height at 30 DAS was recorded in T9 (19.44) followed by T8 (19.12) similarly, and minimum plant height was recorded in T1 (17.01) and at 60 DAS the minimum plant height was recorded in T9 (50.65) followed by T8 (49.49) similarly, and minimum plant height was recorded in T1 (46.59) significant and at 90 DAS the maximum plant was recorded in T9 (56.51) followed by T8 (56.17) similarly, and minimum plant height was recorded in T1 (52.95) data similarly significant. That significant difference was found in Number of branches at 30, 60 and 90 DAS. The data maximum Number of branches at 30 DAS was recorded in T9 (4.73) followed by T8 (4.53) similarly, and minimum Number of branches was recorded in T1 (2.93) and at 60 DAS the maximum Number of branches was recorded in T9 (9.87) followed by T8 (9.67) similarly, and minimum Number of branches was recorded in T1 (7.67) significant and at 90 DAS the maximum Number of branches was recorded in T9 (12.27) followed by T8 (12.07) similarly, and minimum Number of branches was recorded in T1 (10.27) data similarly significant. Days to 50% Flowering at 70 DAS have presented in table no 4.3 and fig 4.3 the analysis of data revealed that significant difference was found in Days to 50% Flowering. The data maximum Days to 50% Flowering was recorded in T9 (71.87) followed by T8 (73.07) similarly, and minimum Days to 50% Flowering was recorded in T1 (76.87) data similarly significant.

### 3.2 Yield attributes:

All yield parameters are Number of Pods per Plant, Number of Seeds per Pod, Test weight, Grain yield, Straw yield. Number of Pods per Plant at 70 DAS the analysis of data revealed that significant difference was found in Number of Pods per Plant. The data maximum Number of Pods per Plant was recorded in T9 (41.13) followed by T8 (40.80) similarly, and minimum Number of Pods per Plant was recorded in T1 (37.80) data similarly significant. That significant difference was found in Number of Seeds per Pod. The data maximum Number of Seeds per Pod was recorded in T9 (2.73) followed by T8 (2.47) similarly, and minimum Number of Seeds per Pod was recorded in T1 (1.07) data similarly significant. Test weight (100 seed, Hundred-Seed Weight) (No). The data maximum Test weight (100 seed, Hundred-Seed Weight) (No) was recorded in T9 (31.33) followed by T8 (30.67) similarly, and minimum Test weight (100 seed, Hundred-Seed Weight) (No) was recorded in T1 (27.00) data similarly significant. Grain Yield. q/ha. The data maximum Grain Yield. q/ha was recorded in T9 (18.33) followed by T8

(17.67) similarly, and minimum Grain Yield. q/ha was recorded In T1 (14.00) data similarly Significant. Straw Yield. q/ha. The data maximum Straw Yield. q/ha was Recorded in T9 (19.33) followed by T8 (19.00) similarly, and minimum Straw Yield. q/ha was recorded In T1 (15.00) data similarly Significant.

TABLE 1

**EFFECT OF ORGANIC MANURE AND INORGANIC FERTILIZERS ON GROWTH ATTRIBUTES OF CHICKPEA (AT 90 DAYS) UNDER MORINGA AGROFORESTRY SYSTEM**

	Treatment Combinations	Plant height	Number of branches	Days to 50% flowering
T1	NPK 0% + FYM 0% (control)	52.95	10.27	76.87
T2	NPK 0% + FYM 50%	53.82	10.6	76.07
T3	NPK 0% + FYM 100%	54.2	10.87	75.53
T4	NPK 50% + FYM 0%	54.49	11.2	75.2
T5	NPK 50 % + FYM 50%	54.99	11.6	74.53
T6	NPK 50% + FYM 100%	55.66	11.8	73.8
T7	NPK 100% + FYM 0%	54.63	11.4	74.93
T8	NPK 100% + FYM 50%	56.17	12.07	73.07
T9	NPK 100% + FYM 100%	56.51	12.27	71.87
	<b>F. test</b>	S	S	S
	C.D	1.22	0.2	1.17
	SE(m)	0.41	0.07	0.39

TABLE 2

**EFFECT OF ORGANIC MANURE AND INORGANIC FERTILIZERS ON YIELD ATTRIBUTES OF CHICKPEA UNDER MORINGA AGROFORESTRY SYSTEM**

	Treatment Combinations	Number of Pods per Plant	Number of Seeds per Pod	Test weight	Grain Yield. q/ha.	Straw Yield.	Harvest Index %
						q/ha.	
T1	NPK 0% + FYM 0% (control)	37.8	1.07	27	14	15	47.07
T2	NPK 0% + FYM 50%	38.27	1.27	27.67	14.33	16	47.24
T3	NPK 0% + FYM 100%	38.6	1.47	28	14.67	16.67	46.79
T4	NPK 50% + FYM 0%	38.87	1.67	28.33	15.33	17	47.51
T5	NPK 50 % + FYM 50%	40	1.73	29.33	16.67	18	47.98
T6	NPK 50% + FYM 100%	40.33	2.07	30	17.33	18.33	48.24
T7	NPK 100% + FYM 0%	39.6	2.27	29	15.67	17.67	47
T8	NPK 100% + FYM 50%	40.8	2.47	31.33	17.46	19	48.14
T9	NPK 100% + FYM 100%	41.13	2.73	31.33	20.67	19.33	48.67
	<b>F. test</b>	S	S	S	S	S	NS
	C.D	0.63	0.2	2.13	2.44	2.2	5.93
	SE(m)	0.21	0.07	0.71	0.81	0.73	1.98

#### IV. CONCLUSION

The study entitled “Effect OF Organic Manures and Inorganic fertilizers on growth and yield of Chickpea (*Cicer arietinum L.*) under Moringa based agroforestry system” it was concluded that the treatment combination T9 (NPK 100% + FYM 100%) was found to best in term of Growth and Yield. (Treatment 9) recorded significantly higher Gran yield (kg/ha). It could be recommended for cultivation of Chickpea.

#### REFERENCES

- [1] Abbas, G., Khattak, J.Z.K., Mir. A. Ishaque, M., Hussain, M., Wahedi, H.M., Ahmed, M.S and Ullah, A. 2012. Effect of organic manures with recommended dose of NPK in the performance of (*Triticum aestivum L.*). *The Journal of Animal & Plant Sciences* 22(3): 683-687.
- [2] Gujrat, India. Europe Journal of Agronomy, 1(2): 45-50. Arif, M., Tasneem, M., Bashir, F., Yaseen, G. and Iqbal, R.M. 2014. Effect of integrated use of organic manures and inorganic fertilizers on yield and yield components of rice. *Journal of Agricultural Research* 52(2): 197- 206.
- [3] Bajracharya, S.K. and Suresh, K.R. 2009. Study on the Effects of vermicompost on the nodulation and the yield of chickpea, *Nepal Agriculture Research Journal* 9(1): 49
- [4] Devi, P. B., Darvhankar, M. S., Prakash, A. and Banik, D. (2019) Effect of different doses of nitrogen on growth and yield of chickpea (*cicer arietinum L.*), *Plant Archives Vol. 19, Supplement 1, pp. 458-460.*
- [5] Gadi, P., Dawson, J. and Shanker, M. 2017. Effect of different organic manures, inorganic fertilizers and growth regulator on yield attributes and yield of greengram *International Journal of Current Research* 9(6): 52385-52389.
- [6] T. J., Gaur, P. M., Gowda, C. L., Krishnamurthy, L., Samineni, S., Siddique, K. H., & Colmer, T. D. (2010). Salt sensitivity in chickpea. *Plant, cell & environment*, 33(4), 490-509.
- [7] Yadav, J.K., Sharma, M., Yadav, RN, Yadav, SK and Yadav, S. (2017) Effect of different Plant and Soil J., 85:267-277 organic and inorganic on growth and yield of chickpea (*Cicer arietinum L.*). E-ISSN: 2278-4136 P-ISSN: 2349-8234 *JPP* 2017; 6(5): 1857-1860 *Journal of Applied and Natural Science* 8 (2): 545-549 (2016)
- [8] Guriqbal, S., Sekhon, H. S., & Harpreet, K. (2012). Effect of farmyard manure, vermicompost and chemical nutrients on growth and yield of chickpea (*Cicer arietinum L.*). *International Journal of Agricultural Research*, 7(2), 93-99.
- [9] Shukla, M., Patel, R. H., Verma, R., Deewan, P., & Dotaniya, M. L. (2013). Effect of bio-organics and chemical fertilizers on growth and yield of chickpea (*Cicer arietinum L.*) under middle Gujarat conditions.
- [10] Patil, S. V., Halikatti, S. I., Hiremath, S. M., Babalad, H. B., Sreenivasa, M. N., Hebsur, N. S., & Somanagouda, G. (2012). Effect of organics on growth and yield of chickpea (*Cicer arietinum L.*) in vertisols. *Karnataka Journal of Agricultural Sciences*, 25(3), 326-331.