



Effect of Organic and Inorganic Fertilizer on Growth of Linseed (*Linum Usitatissimum* L.) Under Poplar Based Agroforestry System.

Gyan Shri Kaushal* and Rajiv Umrao and R. Vijaykumar

¹⁻³Department of Silviculture and Agroforestry, SHUATS Prayagraj (U.P.) 211007

E-mail: gyanshri7@gmail.com

DOI: 10.5958/2455-7129.2019.00008.6

ABSTRACT

A field experiment was conducted with linseed under Poplar during Rabi season of 2018 at crop Research Farm, Department of Silviculture and Agroforestry, SHUATS, Prayagraj, (U.P.). The treatment comprised of FYM 100%, NPK 100%, Control, VC 100%, NPK 50%, FYM 50%, VC 50%, NPK 75%, FYM 75%, VC 75%, NPK 125%, FYM 125%, VC 125% under Poplar based Agroforestry. The experiment was laid out in Randomized Block Design (RBD). The result Showed that maximum plant height (cm), plant diameter (cm²) recorded at 30, 60, 90 and 120 DAT, capsule per plant, seed per capsule were recorded. The treatment (T₁₁) with application of (FYM 125%) showed the significant superiority in giving the maximum plant height (58.41cm at 120 days), plant diameter (4.43cm² at 120 days), capsule per plant (48.93 at 120 days), seed per capsule 9.33. The treatment (T₂) with application of (NPK 100%) showed the significant. These parameters were significantly influenced by different sources and doses of organic and inorganic fertilizer. However, Poplar based Agroforestry system could be rank based on economic performance of linseed also recorded in treatment T₁₁(FYM 125%).

Key Words:

FYM, Growth analysis, Linseed, NPK, Poplar, Vermicompost

INTRODUCTION

Agroforestry is centered on sustainability in terms of economics (productivity and profitability), ecology (environmental and resource conservation) and social issues (food security, health and safety) that make it an unparallel land use system (Pandey 2007). Linseed (*Linum usitatissimum* L.) belongs to the order *Malpighiales*, the family *Linaceae*, and the tribe *Lineae*. It is the second most important Rabi oilseed crop and stands next to rapeseed-mustard

in area of cultivation and seed production in India. The genus *Linum* is composed of approximately 230 species but cultivated linseed is the only species of economic importance in the genus (Tadesse et al. 2010) and is one of the oldest plants cultivated for fibre and oil. The flaxseed growing is in production of seed for food industry and technical purposes and fibre for textile industry. Other technical use of flax is about its possibility in the field of paper production. Flaxseed is rich in oil (41%), protein (20%), dietary fiber (28%), contains

7.7% moisture and 3.3% ashes. It has a high percentage of essential fatty acids, 75% polyunsaturated fatty acids, 57% alpha-linolenic acid, which is an omega-3 fatty acid, and 16% linoleic acid, which is an omega-6 fatty acid (Morris 2005).

The world area cultivated with flaxseed is 3016940 ha with an annual average seed yield of 852 kg ha⁻¹. Canada, India, China, and the USA are the main world producers. Canada and the USA have 93% of the total exported volume. After extraction of fibre from stalk, the woody core of the stem and short fibres are used as raw pulp for making high grade paper. To increase the quality of the paper more than 20% strong virgin wood fibre must be add to the pulp. This extra strong fibre which is to be add to the pulp is called as pulp sweeteners. As flax fibres are stronger and longer than any other virgin wood fibre, a small quantity of flax fibre can be use in place of virgin wood fibres. This pulp can be utilized for the manufacture of paper used for currency notes, air mail, parchment paper, good writing paper, cigarette paper and straw boards of all grades of economic value (Dash et al. 2017).

Vermicompost is one of the recent organic practices to generate stable bio-fertilizer i.e. vermicompost. Use of vermicompost for crop growth is in focus in recent researches, but the response to the application of vermicompost had been specific to each plant species and the stage of growth .Use of soil micro-organisms which can either fix atmospheric nitrogen, solubilize phosphate, synthesis of growth promoting substances or by enhancing the decomposition of plant residues to release vital nutrients and increase humid content of soils, will be environmentally begin approach for nutrient management and ecosystem function (Wu et al. 2005).

The objective of the paper was to find out the effect of organic and inorganic fertilizer on linseed grown under poplar based agroforestry system.

MATERIAL AND METHODS

The field experiment was carried out at College of Forestry Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj U.P. India during Rabi season of 2018-19 experimental field is sandy clay loam. The maximum temperature in summer may reach up to 50 °C and minimum temperature in winter may fall up to 6°C. The ten year old plantation of Poplar tree at 9x3 m spacing inter-cropped. The experiment was laid out in Randomized block design with 3 replications and 12 treatments. The organic manure FYM, N: P: K, and Vermicompost. Linseed was sown on 05 Nov 2019 at a rows spacing of 30 cm. The full dose of N was added at the time of sowing to the crop. The source of nitrogen was urea, FYM and Vermicompost. Farmyard manure was applied @20 ton/ha to all the plots uniformly and was incorporated into the soil at the time of land preparation. The treatment comprised of T₁ (FYM 100%), T₂ (NPK 100%, Control), T₃ (VC 100%, Control), T₄ (NPK 50%), T₅ (FYM 50%), T₆ (VC 50%), T₇ (NPK 75%), T₈ (FYM 75%), T₉ (VC 75%), T₁₀ (NPK 125%), T₁₁ (FYM 125%), T₁₂ VC (125%)

RESULTS AND DISCUSSION

Plant height

At 30 DAS, The maximum plant height was found in treatment T₁₁ FYM with 14.32 cm. The minimum plant height was found in treatment T₃ VC with 7.48 cm. The result found was found significant. At 60 DAS, The maximum plant height was found in treatment T₁₁ FYM with 29.00 cm. The minimum plant height was found in treatment T₃ VC with 23.00 cm. The result obtained was found significant. At 90 DAS, The maximum plant height was found in treatment T₆ FYM with 44.76 cm. The minimum plant height was found in treatment T₈ VC with 38.04 cm. The result obtained was found significant. At 120 DAS, The maximum plant height was found in treatment T₆ FYM with 58.41. The minimum plant height was found in treatment T₈ VC with 54.22. The result obtained was found significant (Table 1).

Plant diameter (cm²)

At 30 DAS, The maximum Plant diameter was found in treatment T₁₁ FYM with 0.82. The minimum Plant diameter was found in treatment T₃ VC with 0.53. The result obtained was found significant. At 60 DAS, The maximum Plant diameter was found in treatment T₁₁ FYM with 1.30. The minimum Plant diameter was found in treatment T₃ VC with 1.08. The result obtained was

found significant. At 90 DAS, The maximum Plant diameter was found in treatment T₁₁ FYM with 2.94. The minimum Plant diameter was found in treatment T₃ VC with 2.01. The result obtained was found significant. At 120 DAS, The maximum Plant diameter was found in treatment T₁₁ FYM with 4.43. The minimum Plant diameter was found in treatment T₃ VC with 3.33. The result obtained was found significant (Table 1).

Table 1. Effect of different types of organic manure on growth of Linseed under Poplar based Agroforestry system at 120 DAS.

Treatment	Plant height	Plant diameter	Number of capsules per plant	Number of seeds per capsule
T1	57.27	3.46	26.33	7.66
T2	55.34	3.54	40.00	9.06
T3	54.22	3.33	24.80	7.60
T4	58.19	4.03	35.20	8.66
T5	57.97	3.71	40.00	8.06
T6	56.43	3.53	39.53	7.73
T7	58.32	4.38	28.33	7.80
T8	57.06	3.49	31.93	8.13
T9	55.66	3.51	27.20	7.80
T10	55.34	3.92	43.06	9.06
T11	58.41	4.43	48.93	9.33
T12	59.08	3.39	41.93	8.20

Capsule per plant

At 120 DAS, The maximum capsule per plant was found in treatment T₁₁ FYM with 26.20. The minimum capsule per plant was found in treatment T₃ VC with 13.40. The result obtained was found significant (Table 1).

Seed per capsule

At 120 DAS, The maximum seed per capsule was found in treatment T₁₁ FYM 9.33 The minimum seed per capsule was found in treatment T₃ 7.06 (VC 100% (Control) under Poplar based Agroforestry system respectively. The result obtained was found significant throughout the seed per capsule (Table 1).

CONCLUSION

In view of the findings and results presented above, it is concluded that among all the

nine different treatments, the treatment FYM had emerge the best on the growth parameter like plant height, Plant diameter, capsule per plant, seed per capsule. T₁₁ FYM emerged best for the growth attributes of Linseed (*Linum usitatissimum*) and as well as for Poplar based to Agroforestry system. Trials in Utter Pradesh India, found that Linseed (*Linum usitatissimum*) could be grown successfully between lines of Poplar tree spaced 3.0 meters apart. The linseed (*Linum usitatissimum*) was planted in the dry season with limited irrigation, when there was no leaf cover from the Poplar. It was found that this system helped with weed control of the plantation and that the growth of intercropped Poplar was better, however science this is based on one-year experiment, further trails may be needed to substantiate the results.

REFERENCES

- Anjum Arshiya, Aswathanarayana Dash.S. and Ajithkumar K. 2017. Management of Linseed Powdery Mildew Caused By *Leveillula Taurica* (Lev.) Arn. International Journal of Agriculture Sciences, 32(9): 4479-4481.
- Anonymous 2012. Economic survey of India, Economic Division Ministry of Finance Govt. of India.
- Dash Janakinath, Bhima Sen Naik and Uma Ballav Mohapatra 2017. Linseed: a valuable crop plant. International Journal of Advanced Research, 5(3):1428-1442.
- Kohl L., van der Heijden M G A. 2016. Arbuscular mycorrhizal fungal species differ in their effect on nutrient leaching. Soil Biology and Biochemistry, 94:191-199.
- Lebrun G., Couture A. And Laperriere L. 2013. Tensile and Impregnation Behavior of Unidirectional Hemp/paper/epoxy and Flax/paper/epoxy Composites. *Composite Structures*, 103:151-60.
- Morris D. 2005. Flax - A health and nutrition Primer. Flax Council of Canada. Available at <http://www.flaxcouncil.ca/english/index.php?p=primer&mp=nutrition>.
- Pandey D.N. 2007. Multifunctional agroforestry systems in India. Current Science, 92: 455-463.
- Tadesse T., Parven A., Singh H. and Weyessa B. 2010. Estimates of variability and heritability in linseed germplasm. International Journal of Sustainable Crop Production, 5 (3): 8-16.
- Thevathasan N.V., Gordon A.M., Simpson J.A., Reynolds P.E., Price G.W., Zhang P 2004. Biophysical and ecological interactions in a temperate tree-based intercropping system. J. Crop Improv.12 (1-2):339-363.
- Sarker Uttam Kumer, Md. Romij Uddin., Md. Abdur Rahman Sarkar., Md. Abdus Salam Ahmed Garrett H.E., Rietveld W.J., Fisher R.F., Kral D.M., Viney M.K.(Eds.), 2000. North American Agroforestry: An Integrated Science and Practices. American Society of Agronomy, Madison, Wisconsin.
- Wu S. C., Cao Z. H., Li Z. G. and Cheung K. C. 2005. Effect of biofertilizer containing N-fixer, P and K solubilizers and AM fungi on maize growth: a greenhouse trial. Geoderma. 125: 155- 166.