Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(6): 809-811
Received: 28-09-2019
Accepted: 30-10-2019

Gyan Shri Kaushal
Department of Silviculture and Agroforestry, SHUATS, Prayagraj, Uttar Pradesh, India

Dr. Rajiv Umrao
Department of Silviculture and Agroforestry, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Gyan Shri Kaushal
Department of Silviculture and Agroforestry, SHUATS, Prayagraj, Uttar Pradesh, India

Effect of organic and inorganic fertilizer on yield of linseed (*Linum usitatissimum* L.) under poplar based agroforestry system

Gyan Shri Kaushal and Dr. Rajiv Umrao

Abstract
A field experiment was conducted with linseed under Poplar during Rabi season of 2018 at crop Research Farm, Department of Silviculture & Agroforestry, SHUATS, Prayagraj, (U.P.). An approach to land use that incorporates trees into farming systems, and allows for the production of trees and crops or livestock from the same piece of land in order to obtain economic, ecological, environmental and cultural benefits. Fast growing energy plant and trees such as poplar are characterized by short-term growth and weight gain significantly exceeding the average growth of other plant during the growing period. 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. Such as unbalance continuous application of limited fertilizers both in the amount and type may aggravate the depletion of other important nutrients such as K, Mg, Ca, S and micro-nutrients not supplied by the chemical fertilizer and may also lead to chemical soil degradation. The treatment comprised of FYM 100%, NPK 100%, 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 dry per plant weight, 1000 Fruit weight (g), Grain yield, straw yield were recorded at harvesting. The treatment (T_{11}) with application of (FYM 125%) showed the significant superiority in giving. 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 T_{11} (FYM 125%).

Keywords: Linseed, yield, poplar, FYM, VC, NPK

Introduction
Flax or linseed (*Linum usitatissimum* L.) belongs to the Linaceae family that consists of 9 genus and 150 species. It is the only species in this family that has economic as agronomic values (Copur *et al.*, 2006) [2]. Flax seed is used for oil production and also in food industries because of its nutritional merits, essential polyunsaturated fatty acids, such as a–linolenic acid, and rich supply of soluble dietary fiber (Mohammadi *et al.*, 2010) [6].

Agroforestry gives more income to the farmer per unit area of land than pure agriculture or forestry (Ralhan *et al*., 1992; Current *et al*., 1995; Hoekstra, 1990) [10, 1, 4].

Poplar which is multipurpose fast growing valuable timber species has emerged as one of the most suitable tree species for agrisilviculture system. Poplar based Agroforestry systems are economically viable and sustainable than many other crop rotations prevalent in North India (Singh and Sharma, 2006) [8]. A lot of tree-crop combinations are practised by the farmers in poplar based Agroforestry system. Poplar provides remarkable production of biomass on a short rotation basis and recycles soil nutrients periodically by adding leaf litter through its leaf shed in winter season. In an Agroforestry system, biomass production from trees adequately compensates the crop reduction due to competition with tree. Land equivalent ratio of Agroforestry land use is comparable or even better than Mono-cropping systems indicating the suitability of this system (Pratap Narain *et al*., 1998) [9]. A process related to composting which can improve the beneficial utilization of organic wastes is Vermicomposting. It is a Non-thermophilic process by which organic materials are converted by earthworms and Micro-organisms into rich soil amendments with greatly increased microbial activity and nutrient availability. Vermicomposts have excellent chemical and physical properties that compare favorably to traditional composts (Paoletti, 1991) [7]. The use of organic matter such as animal manures, human waste, food wastes, yard wastes, sewage sludge and composts has long been recognized in agriculture as beneficial for plant growth, yield and the maintenance of soil fertility. The new approaches to the use of organic amendments in farming have proven to be effective means of improving soil structure, enhancing soil fertility and increasing crop yields.

Organic agriculture has been recognized to aid in increasing crop production and ensuring quality harvest. It involves the use of farm wastes, urban wastes and industrial wastes as a source of nutrients for crops being raised. Traditional composting of organic matter wastes has been known for many years but new methods of thermophilic composting have become much more popular in organic waste treatment recently since they eliminate some of the detrimentally effects of organic wastes in the soil. Composting has been recognizing as a low cost and environmentally sound process for treatment of many organic wastes (Hoitink, 1993) [5].

The most common fertilizers used in Ethiopia are diammonium phosphate (DAP) and urea. Such as unbalanced continuous application of limited fertilizers both in the amount and type may aggravate the depletion of other important nutrients such as K, Mg, Ca, S and micro-nutrients not supplied by the chemical fertilizers and may also lead to chemical soil degradation (Dibabe *et al*., 2007) [3].

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 50^0C and minimum temperature in winter may fall up to 6^0 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 treatment. The organic manure FYM, N: P: K, and Vermicompost. Linseed was shown 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 T_1 (FYM 100%), T_2 (NPK 100%), T_3 (VC 100%), T_4 (NPK 50%), T_5 (FYM 50%), T_6 (VC 50%), T_7 (NPK 75%), T_8 (FYM 75%), T_9 (VC 75%), T_{10} (NPK 125%), T_{11} (FYM 125%), T_{12} VC (125%).

Results and Discussion

Dry plant weight (g)

Data presented in table 1 indicated that highest the Dry plant weight (g) at was observed in treatment T_{11} 2.98 g (FYM 125%) and the lowest value for the Dry plant weight (g) was observed in treatment T_3 1.96 g (NPK 100%) under Poplar based Agroforestry system respectively. The result obtained was found significant throughout the dry plant weight (g).

1000 Seed weight (g)

Data presented in table 1 indicated that highest the 1000 Seed weight (g) at was observed in treatment T_{11} 6.60 g (FYM 125%) and the lowest value for the 1000 Seed weight (g) was observed in treatment T_3 6.45 g (NPK 100%) under Poplar based Agroforestry system respectively. The result obtained was found significant throughout the 1000 seed weight (g).

Table 1: Effect of Organic and In-organic Fertilizer on Yield of Linseed under poplar based Agroforestry system

Treatment	Dry plant weight (g/plant)	1000 Seed weight (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})	Harvest Index (%)
T_1	2.94	7.30	1.36	1.96	39.27
T_2	2.33	7.00	1.39	1.73	40.21
T_3	1.96	5.30	1.22	1.32	38.05
T_4	2.12	6.40	1.30	2.08	42.70
T_5	2.10	6.00	1.26	1.37	41.67
T_6	2.01	6.80	1.37	1.46	38.30
T_7	2.24	7.10	1.23	1.73	49.14
T_8	2.00	6.55	1.30	1.36	52.72
T_9	2.18	6.60	1.27	1.70	48.77
T_{10}	2.50	6.20	1.38	1.46	48.53
T_{11}	2.98	7.50	1.42	2.09	49.93
T_{12}	2.60	6.50	1.28	1.73	46.16

Grain yield (t ha^{-1})

Data presented in table 1 indicated that highest the Grain yield (t ha^{-1}) at was observed in treatment T_{11} 2.98 t ha^{-1} (FYM 125%) and the lowest value for the Grain yield (q ha^{-1}) was observed in treatment T_3 1.22 t ha^{-1} (VC 100%). under Poplar based Agroforestry system respectively. The result obtained was found significant throughout the grain yield.

Straw yield (t ha^{-1})

Data presented in table 1 indicated that highest the Straw yield (t ha^{-1}) at was observed in treatment T_{11} 2.09 t ha^{-1} (FYM 125%) and the lowest value for the Straw yield (t ha^{-1}) was observed in treatment T_3 1.32 t ha^{-1} (NPK 100%) under Poplar based Agroforestry system respectively. The result obtained was found significant throughout the straw yield.

Harvest index (%)

Data presented in table 1 indicated that highest the Harvest Index at was observed in treatment T_{11} 10.00 t ha^{-1} (FYM 75%) and the lowest value for the Harvest Index was observed in treatment T_3 5.97 t ha^{-1} (VC 100%). under Poplar based Agroforestry system respectively. The result obtained was found significant throughout the harvest index (%).

Reference

1. Current D, Lutz E, Schenr S. Costs, benefit and farmer adoption of Agroforestry project experience in Central America and the Caribbean. A CATTE- IFPRI world Bank Project Funded by UNDP. World Bank Environmental. 1995; 14:194-203.
2. Copur O, Gur M., Karakus M, Demirel U. Determination of correlation and path analysis among yield components and seed yield in oil flax varieties (*Linum usitatissimum* L.). J Biol Sci. 2006; 6:738-743.
3. Dibabe A, Bekele T, Ahmed RV. The status of micronutrients in Nitisols, Vertisols, Cambisols and Fluvisols in majore Maize, wheat, tef and citrus growing areas of Ethiopia. Ethiopian Institute of Agricultural Research, Addis Ababa, Ethiopia, 2007, 77-96.
4. Hoekstra DA. Economics of Agroforestry. In: MacDickan KG, Vergara NT, editors. Agroforestry:

classification and management. New York: John Wiley, 1990, 310-331.
5. Hoitink, Harry AJ, Harold M Keener. Science and Engineering of composting: Design, Environmental, Microbiological and utilization Aspects, 1993, 728.
6. Mohammadi AA, Saeidi G, Arzani A. Genetic analysis of some agronomic traits in flax (*Linum usitatissimum* L.). Aust J Crop Sci. 2010; 4:343-352.
7. Paoletti MG. Sustainable Agro systems in Western Europe. In: Land use systems. An international workshop, Rodale Research Center, Kutztown, USA, 1991, 159-166.
8. Singh B, Sharma KN. Tree growth and nutrient status of soil in a poplar based Agroforestry system in Punjab, India. Agroforestry Systems. 2006; 70:125-134.
9. Pratap Narain, Singh RK, Sindhwal NS, Joshie P. Agroforestry for soil and water conservation in the western Himalayan valley region of India. Agroforestry Syst. 1998; 39:192-197.
10. Ralhan PK, Singh A, Dhanda RS. Performance of wheat as intercrop under Poplar (*Populus deltoides* Bartr.) plantations in Punjab (India). Agroforestry Syst. 1992; 19:217-222.