International Journal of Farm Sciences **6(4):** 104-108, 2016

Effect of organic fertilizers on growth and yield of coriander (*Coriandram sativum*) under subabul (*Leucaena leucocephala*) alley cropping system

YOGESH KUMAR AGARWAL, RAMCHANDRA and HEMANT KUMAR

School of Forestry and Environment
Sam Higginbottom Institute of Agriculture, Technology and Sciences
Allahabad 211007 Uttar Pradesh, India
Email for correspondence: agrawaly332@gmail.com

ABSTRACT

The experiment was conducted to estimate the effect of different organic fertilizer levels on growth and yield of coriander, *Coriandram sativum* L under subabul, *Leucaena leucocephala* (Lam) de Wit alley cropping system. Coriander crop was grown under four to five years old existing tree species of subabul-based alley cropping system. The experiment was laid out in randomized block design (RBD) with three replications and 8 treatments. The treatments used were T_0: control, T_1: 100% recommended dose of fertilizer (RDF) through vermicompost (VC), T_2: 100% RDF through neem cake (NC), T_3: 100% RDF through farmyard manure (FYM), T_4: 50% RDF through VC + 50% RDF through NC, T_5: 50% RDF through NC + 50% RDF through FYM, T_6: 50% RDF through VC + 50% RDF through FYM and T_7: 50% RDF VC + 25% RDF NC + 25% RDF FYM. Results revealed that the T_7 emerged superior in respect of growth attributes as well as yield of coriander and gave maximum seed yield (19.76 q/ha) followed by treatment T_4 with 16.06 q/ha seed yield while minimum was recorded in control. Therefore a systematic coriander cropping with sufficient management practices is more beneficial for livelihood on a sustainable basis.

Keyword: Coriander; basal application; subabul; yield; alley cropping

INTRODUCTION

In agroforestry system there are different components and interactions between ecological and economic factors. In other words agroforestry is combination of agricultural technology and foresting in order to maintain variety, productivity, health and sustainability of land (Shamekhi 2007). In agroforestry the potentially higher productivity and microbial activity could be due to the capture of more growth resources eg light or water or due to improved soil fertility (Pathak et al 2016). In all agroforestry systems exist in three main groups which are managed by human viz woody cover (trees and shrubs), herbaceous plants (crops) and livestock. Some reasons that justify agroforestry system are reduction of forests in the

country, increase in population, need for food, reduction in pastures, increase in cattle grazing, need for crops and forest products, prevention from destruction of forest and optimum usage of the land (Swinkels et al 1997). Agroforestry system has emerged as an alternative to ameliorate the soil health. The development and enhancement of bamboo-based agroforestry model can promote economic and environmental growth, mitigate deforestation and illegal logging, prevent soil degradation and restore degraded lands in both village as well as urban areas (Pathak et al 2016). Several studies in different parts of the country suggest that agroforestry is more profitable to farmers than agriculture or forestry for a particular area of land (Toky 1997, Samra et al 1999).

Alley cropping also known as hedgerow intercropping involves managing rows of closely planted (within row) woody plants with annual crops planted in alleys in between hedges. The primary purpose of alley cropping is to maintain or increase crop yields by improvement of the soils and microclimate and weed control. The leaves of subabul are highly nutritious for ruminants and many excellent animal production data have been published confirming the fodder value of leucaena. Leucaena can be used in cropping systems. It can also be used for parquet flooring and small furniture as well as for paper pulp. Leucaena poles are useful for posts, props and frames for various climbing crops. It is not tolerant to even light frosts which cause leaves to be shed. Heavy frosts kill all above ground growth though the crowns survive and grow vigorously in the following summer with multiple branches.

Coriander (*Coriandrum sativum* L) fruit is an annual herb and India is the biggest producer, consumer and exporter of coriander in the world. Area, production and productivity of coriander in India are 5.30 lakh ha 4.82 lakh MT and 0.9 MT per ha respectively (Anon 2011a). Rajasthan (54%) and Madhya Pradesh (17%) are the two largest coriander producing states in the country contributing over two-third to the country's total production. In Chhattisgarh coriander covers an area of 4090 ha and production is about 1010 tonnes (Anon 2011b).

In India about 528171 hectare area is under organic farming (including certified and area under organic conversion) with 44926 number of certified organic farms. This accounts for about 0.3 per cent of total agricultural land (Ramesh et al 2010). The locally available resources are used mostly by the majority of small farmers in India. As such in many marginal areas of India organic farming is at present not by choice but by default. Vermicompost is the product or process of composting using various worms usually red wigglers, white worms and other earthworms to create a heterogeneous mixture of decomposing vegetable or food waste, bedding materials

and vermicast. Vermicast also called worm castings, worm humus or worm manure is the end-product of the breakdown of organic matter by an earthworm. These castings contain reduced levels of contaminants and a higher saturation of nutrients than do organic materials before vermicomposting. Neem cake is organic manure and is the by-product obtained in the process of cold pressing of neem tree fruits and kernels. The solvent extraction process for neem oil cake also reduces alkalinity in soil as it produces organic acids on decomposition. Being totally natural it is compatible with soil microbes, improves rhizosphere microflora and hence ensures fertility of the soil. Farm yard manure is prepared basically using cow dung, cow urine, waste straw and other dairy wastes. It is rich in nutrients. When cow dung and urine are mixed a balanced nutrition is made available to the plants.

MATERIAL and METHODS

The field experiment was conducted at experimental field of forestry nursery of School of Forestry and Environment, Department of Agroforestry, SHIATS, Allahabad, UP during Rabi season of 2015-2016. The soil characteristics of the experimental area are shown in Table 1. The experiment was conducted in under randomized block design (RBD) with 8 treatments and 3 replications. The treatments used were T_0: control, T_1: 100% recommended dose of fertilizer (RDF) through vermicompost (VC), T_2: 100% RDF through neem cake (NC), T_3: 100% RDF through farmyard manure (FYM), T_4: 50% RDF through VC + 50% RDF through NC, T_5: 50% RDF through NC + 50% RDF through FYM, T_6: 50% RDF through VC + 50% RDF through FYM and T_7: 50% RDF VC + 25% RDF NC + 25% RDF FYM. The plot size of the experimental plot was 2.0 x 2.0 m and coriander seed was sown with spacing of 15 x 10 cm. Observations on different growth and yield parameters were recorded on randomly selected 5 plants.The data obtained were analyzed statistically.

Table 1. Soil characteristics of the experimental site

Sand (%)	Silt (%)	Clay (%)	Textural class	OC (%)	Nitrogen (kg/ha)	Phosphorus (kg/ha)	Potassium (kg/ha)	Soil pH	EC (dS/m)
58	24	18	Sandy loam	0.45	221	22.5	358	7.8	0.48

RESULTS and DISCUSSION

Growth and yield

The plant height was significantly increased with all organic treatments as compared to control (Table 2). Among the treatments recommended dose of organic fertilizer, T_7 recorded the highest plant height (63.10 cm) followed by T_4 with plant height of 60.87 cm while minimum plant height

Table 2. Effect of different treatments on growth and yield of coriander

Treatment	Plant height (cm)	# branches /plant	# umbels /plant	# umbelets /umbel	# seeds /umbelet	Test weight (1000-seed weight) (g)	Seed yield /plot (g)	Seed yield (q/ha)
T_0 (Control)	47.66	10.27	29.73	7.73	10.87	1.94	330.53	6.76
T_1 (100% RDF through VC)	51.35	12.40	39.80	10.87	11.80	3.20	385.50	9.26
T_2 (100% RDF through neem cake)	53.30	12.60	41.60	11.33	11.87	3.27	435.43	10.09
T_3 (100% RDF through FYM)	50.53	12.07	39.07	10.00	11.60	2.58	370.10	8.85
T_4 (50% RDF through VC + 50% RDF through NC)	60.87	14.00	47.80	12.60	13.67	3.80	642.20	14.06
T_5 (50% RDF through NC + 50% RDF through FYM)	59.99	13.00	45.93	12.07	12.87	3.53	526.93	13.17
T_6 (50% RDF through VC + 50% RDF through FYM)	54.96	12.73	43.73	11.73	12.33	3.40	454.02	12.60
T_7 (50% RDF VC + 25% RDF NC + 25% RDF FYM)	63.10	14.80	50.13	13.07	12.33	3.93	690.40	16.26

(47.66 cm) was recorded in control. Plant height is an important yield attribute in coriander and the soluble fertilizers applied through drip showed superior performance for plant height of coriander. Similar results were reported by Hnamte et al (2013).

The maximum number of branches per plant was recorded in T_7 (14.80) followed by T_4 and minimum (10.27) in T_0 (control). The finding is supported by the work reported by Sahu et al (2014). The highest number of umbels (50.13/ plant), umbellets (13.07/umbel) and seeds (14.27/ umbellet) was also found in T_7 whereas minimum number of umbels (29.73/plant) and seeds (10.87/umbellet) was recorded in T_0 (control).

The yield was maximum (19.76 q/ha) in T_7 followed by T_4 where it was 16.06 q/ha. The minimum yield (5.76 q/ha) was recorded in T_0 (control). Vermicompost, neem cake and FYM increase the soil organic matter and improve the soil structure and biological activity of the soil. This might have enhanced the plant growth and thus the seed yield. Similar results were obtained in coriander by Godara et al (2014) and Sahu et al (2014).

CONCLUSION

From the experimental findings it may be concluded that among eight treatment combinations. Treatment T_7 (50% RDF VC + 25% RDF NC + 25% RDF FYM) was found to be the most suitable in terms of seed yield. Therefore application of vermicompost, neem cake and farmyard manure in the given ratio with a systematic and sufficient management practices will be more beneficial towards the high profit and open up more opportunity for livelihood on a sustainable basis.

REFERENCES

Anonymous 2011. Annual report. National Horticulture Mission, Government of Chhattisgarh, Raipur, Chhattisgarh, India.

Anonymous 2011. Indian horticulture database 2010. National Horticulture Board, Ministry of Agriculture, Government of India, Gurgaon, India.

Godara AS, Gupta US, Lal G and Singh R 2014. Influence of organic and inorganic source of fertilizers on growth, yield and economics of coriander (*Coriandrum sativum* L). International Journal of Seed Spices **4(2):** 77-80.

Hnamte V, Chaterjee R and Tania C 2013. Growth, flowering, fruit setting and maturity behavior of coriander (*Coriandrum sativum* L) with organics including bio-fertilizers and inorganics. The Bioscan **8(3):** 791-793.

Pathak PK, Kumar H, Kumari G and Bilyaminu H 2016. Biomass production potential in different species of bamboo in central Uttar Pradesh. The Ecoscan **10(1-2):** 41-43.

Ramesh P, Panwar NR, Singh AB, Ramana S, Yadav SK, Shrivastava R and Subba Rao A 2010. Status of organic farming in India. Current Science India **98(9):** 1190-1194.

Sahu RL, Sahu H and Kumar S 2014. Effect of application of inorganic fertilizers and biofertilizers on growth components and yield traits of coriander (*Coriandrum sativum* L). International Journal of Agricultural Sciences **10(1):** 433-436.

Samra JS, Dhyani BL and Sharma AR 1999. Problem and prospects of natural resource management in Indian Himalayas- a base paper. Hill and Mountain Agro-ecosystem Directorate, NATP, CSWCRTI, Dehradun, Uttarakhand, 146p.

Shamekhi T 2007. Agroforestry. University of Tehran Press, Tehran, 260p.

Swinkels RA, Franzel S, Shepherd KD, Ohlsson E, Ndufa JK 1997. The economics of short rotation improved fallows: evidence from areas of high population density in western Kenya. Agricultural Systems **55:** 99-121.

Toky OP 1997. Poplar an economy booster and eco-friendly agroforestry tree. Agroforestry Newsletter (National Research Centre for Agroforestry) **9:** 2-3.

Received: 2.9.2016 ***Accepted: 14.11.2016***