

ORIGINAL ARTICLE

Effect of Different Level of Organic Manure on Coriander (*Coriandrum sativum L.*) Intercropping with Citrus Based Agroforestry System

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ABSTRACT

The experiment was conducted at Forest Nursery and Research Centre College of Forestry, Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj, (Uttar Pradesh) India, during February to April 2019, to study the "effect of different level of organic manure on growth and yield of coriander (*Coriandrum sativum L.*) intercropping with Citrus based agroforestry system". Coriander crop was grown under four to five years old existing tree species of Citrus-based alley cropping system. The experiment was laid out in randomized block design (RBD) with three replications and 8 treatments. The treatments used were T₀ : control, T₁ : 100% recommended dose of fertilizer (RDF) through poultry manure (PM), T₂ : 100% RDF through neem cake (NC), T₃ : 100% RDF through farmyard manure (FYM), T₄ : 50% RDF through PM + 50% RDF through NC, T₅ : 50% RDF through NC + 50% RDF through FYM, T₆ : 50% RDF through PM + 50% RDF through FYM and T₇ : 50% RDF PM + 25% RDF NC + 25% RDF FYM. Results revealed that the T₇ emerged superior in respect of growth attributes as well as yield of coriander and gave maximum leaf yield (3.0 t/ha) followed by treatment T₄ with 2.50 t/ha leaf yield while minimum was recorded in control.

Keywords: Agroforestry, coriander, intercropping, organic manure, citrus, yield.

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INTRODUCTION

Coriander is a well known spice crop grown throughout the world and botanically names as *Coriandrum sativum* Linn. It belongs to the family Apiaceae. Coriander is an annual herbaceous plant and the name of coriander is derived from the Greek word 'koris' meaning –bad bug|| because of the unpleasant odour of green and unripened fruits. It is quite popular for its peculiar sweet fragrance in leaves and fruits and is recognized well as good source of vitamins and minerals. Among the spices, it's has been known to mankind since time immemorial. It is mainly cultivated for its leaves as well as seeds. Coriander is grown as a field crop for its seeds commonly known as –Dhania||, It is used as condiment in the preparation of curry powder, pickles, sausages and seasonings. Seeds are also used in the preparation of confectionary and liquors. Coriander is classified into two groups based on its usage viz., leafy and grain type, the latter again subdivided into small and big grain types. The big seed type is less aromatic and has a lower oil content than the small seed types. Due to its pleasant aroma, tender shoots and leaves are used in chutney, soups and salads. Besides condiment, coriander also has medicinal values. The dry seeds are said to have carminative, diuretic, stomachic and aphrodisiac properties. On steam distillation, coriander seeds yield 0.2 to 1.2 % essential oil. The major components of essential oil are linalool (67.7%) followed by 1-pinene (10.5%) and 1-terpinin (9.0%), geranyl acetate (4.0%) and geraniol (1.9%). Minor components in the oil are 1-pinene, camphene, myrcene, limonene, p-cymol, dipentene, 1- terpinene, n-

decylaldehyde, beornol and acetic acid esters [10]. It helps in skin disorders and reducing cough, blood pressure, Diarrhea and cholesterol levels in blood. It requires low temperature during early stage for better vegetative growth, while a dry and relatively high temperature favours better ripening and high seed production. It does not tolerate any frost. Coriander performs well at a temperature range of 20 to 300 C. Best season to grow coriander is June to July and October to November. Coriander grows well in drained loamy soils. The soil pH range of 6 to 8.5 is best suited for its cultivation. Seed rate for one hectare is 15 to 25 kg ha⁻¹. When it used as leafy green, the young plants of coriander crop are uprooted and are tied in bundles to be sold. The cultivation practice needs sequential sowing of seeds 2 frequently, throughout the year. In some varieties, instead of uprooting the whole plant 2 to 3 cuttings are practiced. However, the most common method is to pull out the whole plant and sell in bundles in the market. Further, since these crops are cultivated throughout the year, the seed requirement is very high. Coriander is an annual herb and according to climatic conditions is cultivated as a summer or winter annual crop. Since the farmers of Maharashtra cultivate the local varieties under poor management conditions, the productivity is very low compared with the national average. Despite being an economically important plant, the crop has received little or no concerted efforts for its improvement. Since almost all the economic characters including yield and quality in nature are highly influenced by environment.

Coriander is native to regions of Mediterranean and eastern. It is more common in Middle Eastern, Central Asian, Mediterranean, Indian, South Asian, Mexican, Texan, Latin American, Chinese, African and Southeast Asian regions [11]. The main coriander growing states are Rajasthan, Andhra Pradesh, Chhattisgarh, Tamilnadu, Gujarat, Madhya Pradesh and to a limited extent in Karnataka, Uttar Pradesh, Bihar, Odisha and Punjab. Rajasthan is major coriander growing and producing state.

Mixed farming system has been a remarkable feature of our traditional agriculture. The production of ample quantity of farm yard manure has great potential for supplementing the chemical fertilizers. Besides being a source of plant nutrients, it may have wonderful effect on the physical, chemical and biological properties of the soil. The limitations associated with its copious use in agriculture lie in its unavailability, bulkiness and prior microbial decomposition requiring time to release nutrients. On the other hand, the synthetic source of nitrogen (eg. Urea) is water soluble and gives immediate greening effect on the crops luring the farmers to blindly apply urea as soon as symptoms of chlorosis appear. Rampant overuse may be a serious cause for concern. Use of bio-fertilizers can have a great complementary impact in increasing fertilizer use efficiency. Inoculation of seeds with Azospirillum and PSB cultures can provide N or P equivalent to application of 30 kg nutrient per hectare [8]. Organic fertilizer including farmyard manure, poultry manure and compost are used for several decades ago. And the use of these manure before those inorganic fertilizer, which is the most recent development as compared to those of organic. Especially, poultry manure supplies more Nitrogen and Phosphorus to the plants as compare to other organic fertilizer [5]. Farmyard manure (FYM) is the traditional organic manure and is most readily available to the farmers. Neem cake (NC) is rich in nitrogen and also contain phosphorus and potash. Because of low C/N ratio (3:15), It's decomposition rate is faster than cereal residues and other bulky organic manures. The green manure crop supplies organic matter enriching soil fertility, acts as a supplement for nutrients, improves soil structure, prevents soil erosion and aids in controlling weeds. Poultry manure has been recognized as most desirable of the natural fertilizer because of its high nitrogen content. It decomposes in the soil releasing nutrients for crop uptake. It provide the essential nutrients to the plants and also improve the soil structure and are considered as one of the most important part of sustainable agriculture because of having more phosphorus and nitrogen content that plays a vital building blocks for plant proteins and thus contributive to plant growth . Its application registered over 53% increases of N level in the soil, from 0.09% to 0.14% and exchangeable cations increase with manure application [2].

Organic manures constitute a dependable source of macro and micro nutrients and are helpful in improving physical, chemical and biological health of soil, reduces nutrient losses, increases nutrient availability and uptake leading to sustainable production devoid of harmful residues, beside improving quality of vegetables [9]. It has been observed that soil application of organic manures or inorganic fertilizers are not able to sustain the soil fertility and crop productivity. However their integration has proved superior to individual component with respect to yield, quality and nutrient uptake.

Vegetables play an important role in human nutrition. During recent years, the interest in organic vegetable production has assumed greater importance as a result of increased health awareness. Organically produced vegetables have good taste and quality and since, coriander is mostly consumed as salad, quality is an important factor.

MATERIAL AND METHODS

The present investigation entitled “Effect of different level of organic manure on Coriander (*Coriandrum sativum* L.) Inter-cropped with Citrus based agroforestry system” was conducted during February to April 2019. The experiment was laid out in a Randomized Block Design with 8 treatments and 3 replications in Prayagraj agro climatic condition at the experimental field Forest Nursery and Research Centre, College of Forestry, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj. The experiment was conducted to study the effect of different level of organic manure on coriander under citrus based agroforestry system. The spacing of existing citrus orchard is 10 m x 10 m, the age was 5 years with the total number of citrus trees 100 per ha. The treatments used were T₀ : control, T₁ : 100% recommended dose of fertilizer (RDF) through poultry manure (PM), T₂ : 100% RDF through neem cake (NC), T₃ : 100% RDF through farmyard manure (FYM), T₄ : 50% RDF through PM + 50% RDF through NC, T₅ : 50% RDF through NC + 50% RDF through FYM, T₆ : 50% RDF through PM + 50% RDF through FYM and T₇ : 50% RDF PM + 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.

RESULT AND DISCUSSION

Growth and Yield

The plant height was significantly increased with all organic treatments as compared to control (Table 1). Among the treatments recommended dose of organic fertilizer, T₇ recorded the highest plant height (58.00 cm) followed by T₄ with plant height of 56.67 cm while minimum plant height (44.75 cm) was recorded in control. The present findings are in conformity to [1] in coriander, reported that application of Poultry manure @ 5 t ha⁻¹ and 100 % RDF were found to be significant in terms of plant height, due to the interaction of both the nutrient sources.

The maximum number of primary branches per plant was recorded in T₇ (4.52) followed by T₄ (4.40) and minimum (4.10) in T₀ (control). These results resemble with the findings of [4] which confirmed that the poultry manure was not only a rich source of nutrients, but it also helped to make available those nutrients to the plants which were already present in the soil. The maximum length of secondary branches was recorded in T₇ (11.90cm) followed by T₄ (11.43cm) while minimum length of secondary branches (9.02cm) was recorded in control. Similar result has also been reported by [7].

The maximum number of leaves per plant was recorded in T₇ (60.67) followed by T₄ (57.67) and minimum (44.50) in T₀ (control). [3] reported that poultry manure has been found to enhance the number of leaves by providing sufficient amount of nutrients that accelerate the growth of leaves.

The yield was maximum (3.00 t/ha) in T₇ followed by T₄ where it was 2.50 t/ha. The minimum yield (1.00 t/ha) was recorded in T₀ (control). The findings are similar to the results of [6] reported that high yield was observed due to the vigorous vegetative growth of plants.

Table 1. Effect of different treatments on growth and yield of coriander

Treatments	Plant height (cm)	Number of primary branches	Length of secondary branches (cm)	Number of leaves per plants	Total yield (t/ha)
T ₀ Control	44.75	4.10	9.02	44.50	1.00
T ₁ 100% RDF through Poultry manure(PM)	48.00	4.22	10.02	49.67	1.63
T ₂ 100% RDF through Neem Cake (NC)	49.87	4.27	10.23	52.67	1.75
T ₃ 100% RDF through Farmyard manure (FYM)	47.23	4.17	9.50	47.00	1.38
T ₄ 50% RDF through PM + 50% RDF through NC	56.67	4.40	11.43	57.67	2.50
T ₅ 50% RDF through NC + 50% RDF through FYM	55.32	4.33	11.00	56.00	2.25
T ₆ 50% RDF through PM + 50% RDF through FYM	54.67	4.30	10.55	54.67	2.19
T ₇ 50% RDF PM+25% RDF NC+25% RDF FYM	58.00	4.52	11.90	60.67	3.00

CONCLUSION

It is concluded that the treatment T₇ (50% RDF PM+25% RDF NC+25% RDF FYM) was recorded the best among in all treatment combination of organic fertilizers in term of growth and yield attributes and it has no effect to the plant by dividing the space (10m×10m) between citrus and planting of coriander. Hence above dose is recommended to farmer for better yield and returns under Citrus based agroforestry system.

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