



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2023; 12(7): 3722-3725  
© 2023 TPI

[www.thepharmajournal.com](http://www.thepharmajournal.com)

Received: 25-04-2023

Accepted: 02-06-2023

**Ujjwal Swarnkar**  
M.Sc. Scholar, Department of  
Forestry, IGKV, Raipur,  
Chhattisgarh, India

**Dr. RK Prajapati**  
Professor, Department of  
Forestry, Indira Gandhi Krishi  
Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Dr. Vijay Jain**  
Senior Scientist and Head, Krishi  
Vigyan Kendra, Pahanda, Durg,  
Chhattisgarh, India

**Sarita Bodalkar**  
Scientist, Department of  
Forestry, IGKV, Raipur,  
Chhattisgarh, India

**Shivam Bhardwaj**  
M.Sc. Scholar, Department of  
Forestry, IGKV, Raipur,  
Chhattisgarh, India

**Akunuri Supriya**  
M.Sc. Scholar, Department of  
Forestry, Indira Gandhi Krishi  
Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Rashmi Verma**  
M.Sc. Scholar, Department of  
Forestry, Indira Gandhi Krishi  
Vishwavidyalaya, Raipur,  
Chhattisgarh, India

**Corresponding Author:**  
**Ujjwal Swarnkar**  
M.Sc. Scholar, Department of  
Forestry, IGKV, Raipur,  
Chhattisgarh, India

## Performance of coriander (Variety Chhattisgarh Shri Chandrahasini Dhaniya-2) intercropped under bamboo based agroforestry system

**Ujjwal Swarnkar, Dr. RK Prajapati, Dr. Vijay Jain, Sarita Bodalkar, Shivam Bhardwaj, Akunuri Supriya and Rashmi Verma**

### Abstract

A field experiment was conducted Krishi Vigyan Kendra, Pahanda Durg (C.G.) during *Rabi* season of 2022-23 to study the influence of organic and inorganic fertilizers (NPK) on seed-yield under bamboo-based agroforestry system as well as in open field. There were seven treatments *viz.*, T<sub>1</sub>-R.D.F. [N:P:K. (60:60:30)], T<sub>2</sub>-F.Y.M. 100%, T<sub>3</sub>-F.Y.M. 75% +15:60:30 (N:P:K), T<sub>4</sub>-F.Y.M. 50%+30:60:30 (N:P:K), T<sub>5</sub>-Vermicompost 100%, T<sub>6</sub>-Vermicompost 75%+15:60:30 (N:P:K), and T<sub>7</sub>-Vermicompost 50%+30:60:30 (N:P:K) replicated three times in randomized block design for both agroforestry system and open field. The result showed that the biomass and seed yield was observed maximum for T<sub>4</sub> treatment [F.Y.M. 50%+30:60:30 (N: P: K)], while minimum seed yield was recorded in T<sub>5</sub> where 100% vermicompost (2.5 t/ha) in the Bamboo-based agroforestry system. As a sole crop open field, the result showed that the biomass and seed yield was observed to be maximum in treatment T<sub>7</sub> [Vermicompost 50%+30:60:30 (N: P: K)], and minimum was recorded in T<sub>2</sub> [100% F.Y.M (5 t/ha)]. The result obtained for comparison of yield in Bamboo-based agroforestry system and as sole crop of *Coriandrum sativum L.* has been found that more economic return was obtained in the Agroforestry system. However, the seed yield was higher under sole crop but overall economic value calculated was higher as compared to sole crop.

**Keywords:** Coriander, FYM, vermicompost, R.B.D., organic and inorganic fertilizers

### Introduction

The international scientific community began to seriously investigate food crop production in agroforestry systems during the 1970s as a result of their grave concerns about issues of deforestation. At the same time, serious research on hunger, environmental degradation, and agroforestry systems was also beginning. This is regarded as an attempt to address some food and environmental challenges as well as to enhance farmers' standard of living. Despite the fact that agroforestry is a long-standing practise, the International Council of Research in Agroforestry (ICRAF) was founded to create a comprehensive programme for better land use practises and systems in the tropics.

The diversity of bamboo species is particularly abundant in the North-eastern region, the Western Ghats, the Madhya Pradesh-Bastar region of Chhattisgarh, and the Andaman and Nicobar Islands. 66% of the country's bamboo is grown in the north-eastern states, with the remaining 34% occurring in other areas. Agroforestry is projected to cover 25.32 million ha, or 8.2%, of India's total land area (Dhyani *et al.*, 2013) [1].

One of the most essential crops for making spices is coriander, commonly known as cilantro or Chinese parsley. It is an annual plant of the Apiaceae family. The fresh leaves and dried seeds are the ones that are most frequently used in recipes, even though the entire plant can be eaten. It is frequently called "Dhania" or "Dhana". It is believed to have its origins in the Mediterranean and the Near East. The self-pollinated crop flowers in 30 to 50 days and matures in 110 to 120 days. The coriander fruit has a pleasant fragrant flavour and perfume because of the linalool-containing essential oil, which is composed of hydrocarbons and oxygenated molecules. Coriandrol (C<sub>10</sub>H<sub>17</sub>OH), a terpenetiary alcohol, is the primary oxygenated component. Chemical analysis of coriander seeds revealed that they include 11.2% moisture, 4.4% mineral matter, 14.1% protein, 21.6% carbohydrate, and 16.1% fatty oil (Bhati and Rathore, 2000) [2].

India is the world's largest producer, consumer, and exporter of coriander since it is mostly grown in the states of Rajasthan, Gujarat, Andhra Pradesh, Madhya Pradesh, Tamil Nadu,

Orissa, Karnataka, and Telangana. In India, coriander is cultivated on 5.32 lakh hectares of land, yielding 7.1 Mt with an average of 1.33 Mt/ha. The key producing states were Gujarat, Rajasthan, and Madhya Pradesh. Gujarat produced 1.16 lakh Mt of coriander over 75,000 hectares in the 2017–18 financial years. (Anonymous 2018)

### Materials and Methods

The experiment was conducted in the research field of KVK, Pahanda, Durg (C.G.) during in month November to March (2022-23). The experimental site is situated in the South Eastern part of Chhattisgarh. The experiment was done under bamboo (*Bambusa balcooa* and *Bambusa vulgaris*) based agroforestry system and as sole crop.

The majority of the soil in the research region is black soil, locally known as Kanhar, and it belongs to the Vertisols order.

The treatments applied were T<sub>1</sub> {R.D.F. [N.P.K. (60:60:30)]}, T<sub>2</sub> {F.Y.M. 100%}, T<sub>3</sub> {F.Y.M. 75% + 15:60:30 (N:P:K)}, T<sub>4</sub> {F.Y.M. 50% + 30:60:30 (N:P:K)}, T<sub>5</sub> {Vermicompost 100%}, T<sub>6</sub> {Vermicompost 75% + 15:60:30 (N:P:K)} and T<sub>7</sub> {Vermicompost 50% + 30:60:30 (N:P:K)}.

The experiment was set up using a randomized block design (RBD), with one variety of coriander was sown with three replications with seven treatments under bamboo based agroforestry system and as a sole-crop open field.

Seeds were sown manually with spacing of 10 cm × 30 cm and crop observations were recorded by measuring the fresh and dry weight of coriander plants and seeds after harvesting.

### Results and Discussion

The application of NPK, FYM and Vermicompost and their different combination increased the biomass and seed yield. After harvesting in the open field, seed yield (q. ha<sup>-1</sup>) was obtained maximum of 14.64 q. ha<sup>-1</sup> in T<sub>7</sub> [Vermicompost 50%+30:60:30 (N:P:K)] followed by T<sub>3</sub> [F.Y.M. 75%+15:60:30 (N:P:K)] of 13.95 q. ha<sup>-1</sup> while minimum seed yield (qt. ha<sup>-1</sup>) was noted in T<sub>2</sub> (F.Y.M. 100%) 8.89 q. ha<sup>-1</sup>.

Significantly higher fresh weight per plant that is of 18.67 g and dry weight of 5.77 g was recorded under T<sub>7</sub> [Vermicompost 50%+30:60:30 (N:P:K)] followed by T<sub>1</sub>

[R.D.F. 100% [N.P.K. (60:60:30)] of 17.50 g and 5.50 g respectively. While, T<sub>2</sub> (F.Y.M. 100%) produced the lowest fresh weight and dry weight per plant 13.37 g and 3.97 g respectively.

In the Agroforestry system, maximum seed yield (q. ha<sup>-1</sup>) was obtain maximum for T<sub>4</sub> [F.Y.M. 50%+30:60:30 (N:P:K)] that is 6.03 q. ha<sup>-1</sup> followed by T<sub>6</sub> [Vermicompost 75%+15:60:30 (N:P:K)] of 5.74 q. ha<sup>-1</sup> while minimum seed yield of 3.59 qt. ha<sup>-1</sup> was noted in T<sub>5</sub> (Vermicompost 100%).

Significantly higher fresh and dry weight of coriander per plant was recorded under T<sub>4</sub> [F.Y.M.50%+30:60:30(N:P:K)] of 13.00 g and 4.23 g respectively, followed T<sub>6</sub> [Vermicompost 75%+15:60:30 (N:P:K)] of 12.40 g and 4.03. While, T<sub>5</sub> (Vermicompost 100%) produced the lowest fresh and dry weight of coriander per plant that is 10.03 g and 3.03 g respectively.

In the open field, biomass and seed yield was obtained maximum in T<sub>7</sub> [Vermicompost 50%+30:60:30 (N:P:K)]. While under bamboo-based agroforestry system, T<sub>4</sub> produces the highest amount of biomass and seed-yield with the treatment of F.Y.M. 50% + 30:60:90 N:P:K. being applied. This may be due to the continuous supply of nutrients and micronutrients through fertilizer which results in higher seed yield under bamboo. The lowest yield produced under the bamboo-based agroforestry system may be attributed to the shade effect, the allelopathic effect of the bamboo leaves increase the level of soil pH due to decomposed leaves add in soil, the inhibition of plant growth, the production of green biomass, or both. Lokhande *et al.*, (2015) [5], Agarawal *et al.*, (2016) [6], Sarker *et al.*, (2013) [7], Dhanyashri *et al.* (2020) [4], Singh, M. (2012) [8] reported as similar result.

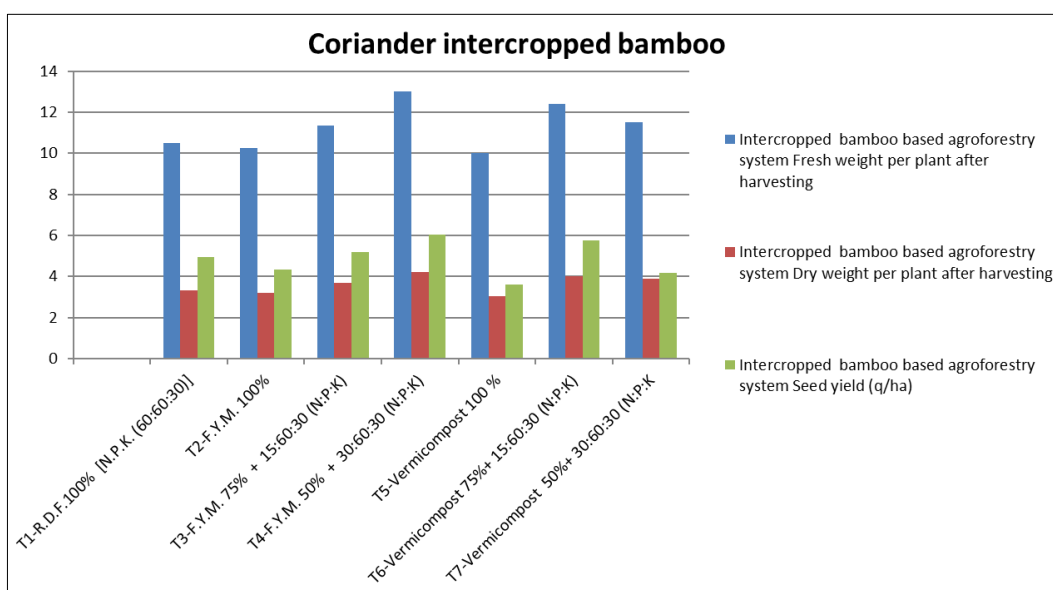
The intercropping of coriander under bamboo plants yields the highest economic return because, after bamboo matures after four years, it provided the farmer with a good return or income up to 2 lac Rs./ha/yr. This means that the income from bamboo is higher than the income from agricultural crops. In the current study, we discovered that when the canopy becomes closer and the shade effect rises, we must switch to shade-loving crops in order to maximize the benefits of intercropping as an agroforestry practice. (Shubbanna *et al.*, 2018) [10].

**Table 1:** Effect of organic and inorganic fertilizer on fresh weight and dry weight and seed yield q/ha of Coriander (variety Shri Chandrashini Dhaniya 2) as sole crop and as intercrop under bamboo- based agroforestry system.

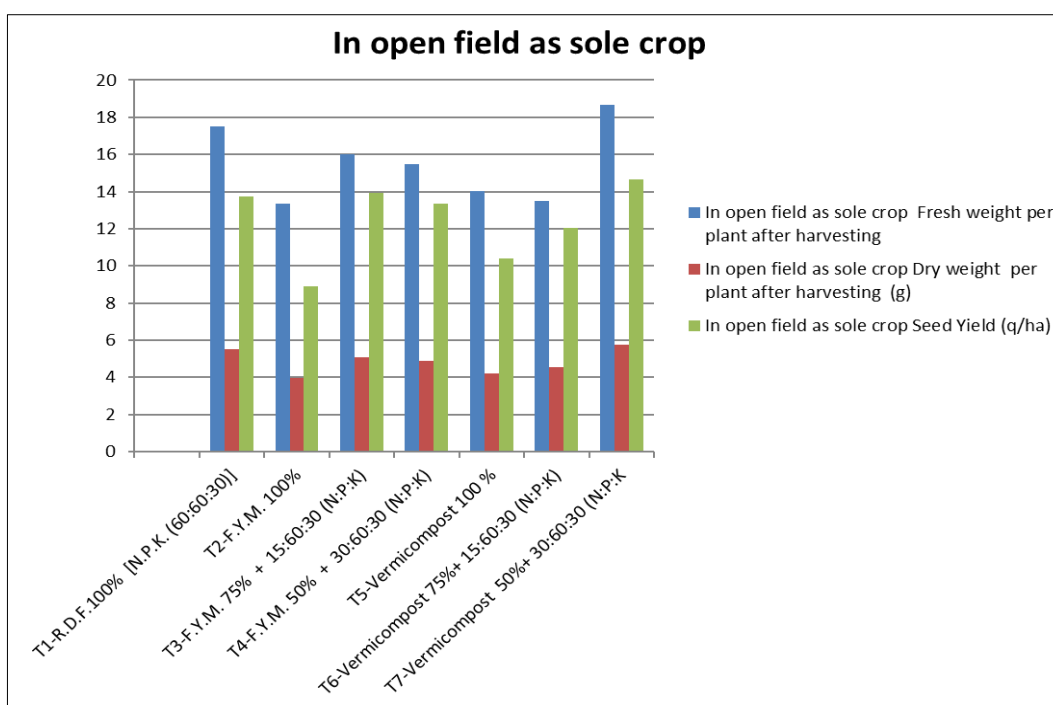
Treatments	Intercropped bamboo based agroforestry system		
	Fresh weight per plant after harvesting (g)	Dry weight per plant after harvesting (g)	Seed yield (q/ha)
T <sub>1</sub> -R.D.F.100% [N.P.K. (60:60:30)]	10.5	3.33	4.95
T <sub>2</sub> -F.Y.M. 100%	10.27	3.2	4.33
T <sub>3</sub> -F.Y.M. 75% + 15:60:30 (N:P:K)	11.37	3.67	5.19
T <sub>4</sub> -F.Y.M. 50% + 30:60:30 (N:P:K)	13	4.23	6.03
T <sub>5</sub> -Vermicompost 100%	10.03	3.03	3.59
T <sub>6</sub> -Vermicompost 75%+ 15:60:30 (N:P:K)	12.4	4.03	5.74
T <sub>7</sub> -Vermicompost 50%+ 30:60:30 (N:P:K)	11.53	3.9	4.17
SEm (±)	0.27	0.09	0.46
CD (P=0.05)	0.83	0.27	1.43
Significance	S	S	S

**Table 2:** Effect of organic and inorganic fertilizer on fresh weight and dry weight and seed yield q/ha of Coriander (variety Shri Chandrahashini Dhaniya 2) in open as sole crop.

Treatments	In open field as sole crop		
	Fresh weight per plant after harvesting (g)	Dry weight per plant after harvesting (g)	Seed Yield (q/ha)
T <sub>1</sub> -R.D.F.100% [N:P:K. (60:60:30)]	17.50	5.50	13.75
T <sub>2</sub> -F.Y.M. 100%	13.37	3.97	8.89
T <sub>3</sub> -F.Y.M. 75% + 15:60:30 (N:P:K)	16.00	5.07	13.95
T <sub>4</sub> -F.Y.M. 50% + 30:60:30 (N:P:K)	15.50	4.90	13.33
T <sub>5</sub> -Vermicompost 100%	14.03	4.23	10.40
T <sub>6</sub> -Vermicompost 75%+ 15:60:30 (N:P:K)	13.50	4.53	12.02
T <sub>7</sub> -Vermicompost 50%+ 30:60:30 (N:P:K)	18.67	5.77	14.64
SEm (±)	0.49	0.09	1.27
CD (P=0.05)	1.50	0.28	3.92
Significance	S	S	S



**Fig 1:** Effect of organic and inorganic fertilizer on fresh weight and dry weight and seed yield q/ha of Coriander (variety Shri Chandrahashini Dhaniya 2) intercrop under bamboo- based agroforestry system.



**Fig 2:** Effect of organic and inorganic fertilizer on fresh weight and dry weight and seed yield q/ha of Coriander (variety Shri Chandrahashini Dhaniya 2) as open field as sole crop.



**Fig 3:** Photograph during observation

### Conclusion

- In bamboo based agroforestry system maximum Coriander yield was recorded in T<sub>4</sub> (6.03q/ha) where F.Y.M. 50% + 30:60:30 (N:P:K) was applied and the minimum yield was recorded in T<sub>5</sub> (3.59 q/ha) where Vermicompost 100% was applied.
- In sole crop (open field) Coriander yield was recorded maximum in T<sub>7</sub> (14.64 q/ha) and the minimum yield was recorded in T<sub>2</sub> (8.89 q/ha) whereas treatment was Vermicompost 50% + 30:60:30 (N:P:K ) and F.Y.M. 100% respectively.
- The overall income of agroforestry is more than the single sole crop. In agroforestry system first crop is agricultural crop for short and 2<sup>nd</sup> crop is bamboo for long term this combination give maximum return after 4 year onward as compare single crop in same land.

### References

1. Dhyani SK, Handa AK. Area under agroforestry in India: An assessment for present status and future perspective. *Indian Journal of Agroforestry*. 2013;15(1):1-11.
2. Rathore AC, Saroj PL, Lal H, Sharma NK, Jayaprakash J, Chaturvedi OP, *et al.* Performance of mango based agri-horticultural models under rainfed situation of Western Himalaya, India. *Agroforestry systems*. 2013;87:1389-1404.
3. ISFR. Indian State of Forest Report. Forest Survey of India, Dehradun; c2017.
4. Dhanyashri PV, Malik MS, Shashikumar MC, Agarwal YK, Sahu S, Jadegowda M. Studies on Effect of Intercrops on Initial Growth Stages of Bamboo under Spices–Bamboo Based Agroforestry System in Tropical Regions of Jharkhand. *Journal homepage: http://www.ijemas.com*, 2020;9(7).
5. Lokhande SN, Jogdande ND, Thakare SS. Effect of varying levels of nitrogen and phosphorus on growth and seed yield of coriander (*Coriandrum sativum*). *Plant Archives*. 2015;15(1):57-9.
6. Agarwal YK, Kumar H. Effect of organic fertilizers on growth and yield of coriander (*Coriandrum sativum*) under subabul (*Leucaena leucocephala*) alley cropping system. *International Journal of Farm Sciences*. 2016;6(4):104-8.
7. Sarker P, Islam MM, Roy I, Rahman GM. Performance of radish and coriander under six years old lohakat tree. *J. Agro. Environ*. 2014;8(1):63-6.
8. Singh M. Effect of vermicompost and chemical fertilizers on growth, yield and quality of coriander (*Coriandrum sativum* L.) in a semi-arid tropical climate. *Journal of Spices and Aromatic crops*. 2012 Apr 5;20(1).
9. Diederichsen A, Banniza S, Armstrong-Cho C, Sander T. *Coriandrum sativum* L.–Coriander. *Medicinal, Aromatic and Stimulant Plants*; c2020. p. 265-281.
10. Subbanna S, Viswanath S. Economic analysis of cultivation of bamboo (*Bambusa balcooa* Roxb. and *Dendrocalamus stocksii* Munro.) in Konkan belt of Maharashtra, India. *Journal of Bamboo & Rattan (Kerala Forest Research Institute)*. 2018 Apr 1;17(2).