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Effect of planting distance on yield Performance of Turmeric Varieties Intercropped with Guava Plantation

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Mono-cropping style production has significant problems and that there exists a sufficient justification for studying intercropping approaches. Intercropping provide insurance against risk and give stable returns even under unfavorable weather conditions The most common advantage of intercropping is the production of greater yield on a given piece of land by making more efficient use of the available growth resources using a mixture of crops of different rooting ability, canopy structure height and nutrient requirements based on the complementary utilization of growth resources by the component crops.. Turmeric is native to Asia and India. India has dominated in turmeric production at world level and Guava is also important fruit crops of India. The study was conducted to assess the potential of different turmeric verities as intercrop with guava at different planting spacing (10, 20 and 30 cm). The result showed that turmeric yield was higher when grown with 20 X 20 cm planting distance. The overall performance of Narendra Haldi-1 was better than the other two varieties (NDH-2 and NDH-3) in terms of yield when it intercrops with guava plantations. The study emphasizes that guava plantation may be intercrop with turmeric to harvest the maximum potential of resources.

Keyword: Turmeric, Production, Guava intercropping, Yield

1. Introduction

Turmeric (*Curcuma longa* L.) is a native of Tropical south Asia and its cultivation mostly confined to South East Asian countries such as India, Sri Lanka, China, Indonesia, Australia, Africa, Peru and the West Indies. It is one of the important spice and medicinal crop and plays a vital role in Indian economy. India is popularly known as the "Spice Bowl of the World" as a wide variety of spices with premium quality is grown in the country since ancient times. In Vedas, as early as 6000 BC, scruples evidences are available regarding various spices, their properties and utility (Angles, 2001).

Turmeric (*Curcuma longa* L.) is one of the most important spices crops of India and belongs to the family Zingiberaceae. It has diversified uses. The peoples of India are usually used in all carry preparation for its typical color and flavor. Besides, it is used in medicine and cosmetics and as dye in textile industries (Pruthi, 1976). It contents about 69.43 carbohydrates, 6.30 proteins, 5.10 oil and 3.50 % mineral and other important element in dry turmeric (Shakur, 2000). It is intensively grown in the highland with sandy loam soil. Turmeric is always propagated by finger or rhizomes and large quantities of seeds are required for planting one hectare of land. The

quantity of seeds to be used depends on the spacing at which they are planted.

India is apparently the largest producer, consumer and exporter of turmeric in the world. Turmeric is the third largest spice produced in the country and it accounts for about 80% of the World's production and 14% of total spices produced in India. In 2015-16 Turmeric was exported quantity of 88,500 Tonnes with cost of Rs. 92,165 Lakhs. In 2015-16 Turmeric was imported quantity of 15,330 Tonnes with cost of Rs. 14,634 Lakhs. Anonymous, 2012, Spicesboard bulletin, 2012.

The root of turmeric is also used widely to make medicine. It contains a yellow-colored chemical called curcumin, which is often used to color foods and cosmetics. Turmeric is used for arthritis, heartburn (dyspepsia), joint pain, stomach pain, Crohn's disease and ulcerative colitis, bypass surgery, hemorrhage, diarrhea, intestinal gas, stomach bloating, loss of appetite, jaundice, liver problems,

Farmers of India are growing turmeric following indigenous methods Due to lack of knowledge of popular high yielding variety and method of production practices followed by the local growers is the main causes of such low yield. The yield of turmeric can be increased by adopting improve high yielding varieties and production technology like mulching, recommended dose of fertilizer, integrated pest and disease methods and proper plant spacing. Spacing is one of the factors that greatly influences the yield contributing characters and eventually affects the yield of turmeric to great extent (Aiyadural, 1966; Purseglove *et al*., 1981) [3, 16].

Materials and Methods

Krishi Vigyan Kendra, Varanasi, Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad carried out Frontline demonstration to find out the potential of three varieties NDH-1, NDH-2 and NDH-3 as intercrop with guava plantations. The site of the experiment is situated at 25º .19' N latitude and 82º .59' E longitude with an elevation of 84 meters above mean sea level. The experiment was laid out in a randomized complete block with three replications. Planting design of turmeric was 45 cm between the rows of guava plantations. The ridge height was maintained at 20 cm. Turmeric rhizomes seed weight was about 30 gm each with 1-2 buds were planted at 10 cm depth. Before sowing the seed the seed was treated with 3 gm mancozeb 0.3% (3 grams/Liter of water) for 25 to 30 minutes. These treated rhizomes were dried under shade for 4 hours before planting in the field and mulching is done after sowing. Recommended dose of fertilizer were applied on every trial. 250 qt/ha decomposed compost were applied before last ploughing with 120 kg/ha nitrogen, 80 kg/ha Phosphorus and 80 kg/ ha Potash. The half dose of nitrogen and full dose of phosphorous and potash were given at time of sowing and rest nitrogen was give in two times after two and three months of sowing when weeding were done and apply of soil on raised bed.

The spacing between turmeric plants was 10, 20 and 30 cm. The rhizomes of turmeric were planted in a single row pattern. Three varieties (NDH-1, NDH-1 and NDH-3) were intercropped with guava (Lucknow-49) orchard. The guava orchard was pruned before seed sowing.

Irrigation was done after immediate sowing and the crop is covered by mulching of grass or paddy straw. Then 15-20 days in rainy season and once in a week in rest of months.

Seed selection is one of the key tasks for best turmeric growth and yield. As we know, seed of turmeric consists of rhizomes and care must be taken in the selection process. Both mother and finger rhizomes was used for propagation of the crop. The fingers were cut into pieces of 4 to 5 cm long with 1 to 2 buds. Mother rhizomes was planted as such or split into 2, each having one sound bud. Mother rhizomes were given preferred as they result in 40 to 50 % more yield along with good growth when compared to finger rhizome.

Table 1: Yield performance (q/ha) of three turmeric varieties grown as intercrops with guava plantations

Sl No.	Variety	Yield (q/ha)
1	NDH -1	226.66
2	NDH-2	200.23
3	NDH-3	210.26

Table 2: Growth yield performance (q/ha) of three varieties of turmeric grown as intercrop with guava plantations

Sl No.	Planting distance	Yield (q/ha)
1	10X 10 cm	205.33
2	20X20 cm	219.76
3	30X30cm	209.66

Mean yield (q/ha) of different turmeric varieties intercrop in guava plantations at three planting distances (10, 20 and 30 cm)

Sl No.	Planting distance	Variety	Yield (q/ha)
1	10X 10 cm	NDH-1	216.80
2		NDH-2	194.50
3		NDH-3	204.70
4	20 X 20 cm	NDH-1	235.60
5		NDH-2	207.40
6		NDH-3	216.30
7	30 X 30 cm	NDH-1	227.30
8		NDH-2	198.80
9		NDH-3	209.80

Results and Discussion

The performance of different turmeric varieties as intercrops in guava plantations was indicate the potential of these three varieties as intercrops.

The data revealed from Table -1 indicate that Narendra Haldi -1 gave highest yield (226.66 q/ha) as an intercrops followed by NDH-3 and NDH-2 with 210.26 and 200.23 respectively. The result also showed that that all varieties gave better performance at the planting distance of 20 cm (Table-2) followed by 30 and 10 cm respectively. The performance of turmeric varieties as intercrops depends on their growing duration, type and age of guava plantations. Willey (1979) [19] find intercropping increased crop yield. This can be depending on growth resources of component crops. This difference in nutrient requirement lessens the inter crop competition which maximizes the degree of complementarities between the component crops. Muralidharan (1980) [15] also reported growth and yield of turmeric is higher when planted under areca nut garden as compared in an open space.

Turmeric yield as an intercrop is governed by the adaption of different varieties to various shade levels. The variation in the performance of turmeric varieties may be attributed to their shade tolerance characters. The turmeric varieties show shade tolerance response when grown under shady plants (Purseglove *et al*. (1966). In present study NDH-1 and NDH-3 gave better performance as compared to NDH-2 as an intercrops with guava orchard.

The panting distance can also improve the yield of turmeric. Like other factors it greatly influences yield of turmeric. Similar result was also found by Choudhary (2000) [6] conducted an experiment with three spacing i.e. 50X20, 50X15 and 50X25 cm. It was found that closer spacing 50X15 cm gave higher yield of turmeric. In present study, seed rhizomes were planted at spacing distance of 10, 20 and 30 cm. Results reveals that maximum yields was obtained at plant spacing 20 cm (Table 2 and 3).

Intercropping can help the farmers by providing alternate source of income from same piece of land.

Conclusion

The three tested Turmeric varieties NDH-1, NDH-2 and NDH-3 tested in Varanasi district showed that yield of turmeric is intercropping with guava plantations are affected by planting distance of rhizomes and varieties. All three varieties of turmeric variably responded to planting distance (10, 20 and 30 cm)

The variety Narendra Haldi-1 gave better performance in comparison to other tested varieties in terms of yield and economy return produced. This study has significant positive result and provided an opportunity to demonstrate the productivity potential and profitability of the latest technology (intervention) under real farming situation. Therefore the study concludes that evaluation of three above tested Turmeric varieties Narendra Haldi-1 perform better in Varanasi district. Therefore, target oriented training programme on spices production technology along with multiple demonstration is required to enhance the level of knowledge and skills of growers which help in adoption of technology. The productivity gain under (Narendra Haldi) over existing practices varieties has created greater awareness and motivated other farmers to adopt the demonstrated technologies for turmeric production in the

district. This could helps to enhance the spices production, nutritional security and overall livelihood security of the districts of Eastern Uttar Pradesh.

Turmeric intercropping in guava mango orchard

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