Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

J P P Journal of Pharmacognosy and Phytochemistry

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2015; 4(2): 307-310
Received: 17-05-2015
Accepted: 19-06-2015

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Varietal evaluation of different turmeric (*Curcuma longa* L.) varieties for Eastern Uttar Pradesh

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Abstract
Turmeric is native to Asia and India. India has dominated in turmeric production at world level. Five On-farm trails per year were conducted with three varieties of turmeric during kharif season from 2012-13 to 2013-14 in 05 selected farmers field at different blocks of Varanasi district of Uttar Pradesh. The experimentation was carried with variety Narendra Haldi-1, Narendra Haldi 2, Narendra Haldi-3 and local variety of farmers (control) and found that Narendra Haldi-1 was performed best in terms of yield followed by Narendra Haldi-3 and Narendra Haldi-2 in Varanasi district of Uttar Pradesh. The cost of cultivation and net return of all varieties are calculated and it was found that Narendra Haldi varieties are gave better net return in comparison to local variety. An average net profit of Rs. 2, 35680 was recorded under recommended practice while it was Rs. 1,37,400/- under farmers' practice. Benefit/ Cost ratio range 3.52 under demonstration while it was found 2.64 under control plots The sowing method/ distance, recommended dose of fertilizer, IPM technique also influence the yield production. The study of On-farm trails (OFT) of this technology, it could be shown that famers could get optimum yields, good returns with less production costs from turmeric cultivation.

Keywords: Turmeric, Production, Varietal evaluation, Yield, Economic, B: C Ratio.

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 [2], 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, Helicobacter pylori (H. pylori) infection, stomach ulcers, irritable bowel syndrome (IBS), gallbladder disorders, high cholesterol, a skin condition called lichen planus, skin inflammation from radiation treatment, and fatigue. It is also used for headaches, bronchitis, colds, lung infections, hay fever, fibromyalgia, leprosy, fever, cancers, menstrual

problems, recovery after surgery.

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 factor that greatly influences the yield contributing characters and eventually effects the yield of turmeric to great extent (Aiyadural, 1966; Purseglove *et al*., 1981) [13, 14].

Materials and Methods:

Krishi Vigyan Kendra, Varanasi, Narendra Dev University of Agriculture and Technology, Kumarganj, Faizabad carried out On-farm trails (Five per year) for three consecutive years from 2012-13 to 2014-15 to disseminate the technology to farmers. The average area under each demonstration was 0.2 ha with 15 (5 per year) beneficiaries Through surveys, field & diagnostic visits and farmer meetings, the factors that contribute to low productivity like varietal issues, unavailability of quality planting material, gaps in cultivation practices and plant protection measures were identified. Site and farmer selection, layout of demonstration, farmers' participation etc. were followed as suggested by Choudhary (1999) [4]. In case of local check (control plots), no change was made in the existing cultural practices of improper use of organic and inorganic fertilizers and limited or no application of fungicides and pesticides. Before the On-farm trails, we conducted trainings, exposure visits to KVK demonstration plots to acquaint the farmers to the technology. Data regarding yield, cost of cultivation, net income and benefit/cost ratio were collected from demonstration plots and control (Existing farmers practice). Table-2.

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. Three turmeric varieties Narendra haldi -1, Narendra haldi -2 and Narendra haldi -3 verities were sown in farmers field to evaluate the yield. The sowing was done on raised bed in the month of Ist week of May with the spacing 20 X 20 cm plant to plant and 45 X 45 cm between row to row. After selection of quality seed rhizomes, they were treated with 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.

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: Level of use and gap in adoption of turmeric technologies in study area

Crop operations	Improved package of practices	Farmers practices	Gap
Variety	High yielding varieties (NDH-1, NDH-2, NDH-3	Unknown local variety	Full gap
Soil testing	Have done in all locations	Not in practice	
Seed rate	18 qt/ha	20 qt/ha	Partial gap
Seed treatment	Seed was treated by mancozeb @ 3% (3 gm/litter water), soaked for 30 minutes and dried in shade for 4 hours.	Not in practice	Full gap
Transplanting method	Transplanting in raised bed distance Row to Row 45 cm & Plant to Plant 20 cm	Flat bed transplanting Row to Row 30 cm & Plant to Plant 15 cm	Partial gap
sowing time	May	July	Partial gap
Fertilizer dose	250 qt, ha decomposed organic manure with Fertilizer @ 150 Kg N, 80 Kg P_2O_5 and 80 Kg K_2O/ha	Without recommendation	Partial gap
Weed dose	By hand weeding, natural methods/05 weeding	Hand weeding/03 weeding	Partial gap

Table 2: Yield Table

Year	Technology demonstrated	No. of trial	Interventions	Yield (qt/ha)	% increase in yield
2012-13	HYV seed + sowing distance of 20 X 20 cm plant to plant and 45 X 45 cm between row to row + seed treatment by mancozeb @ 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	05	T_1= Local variety	198.00	-
			T_2= NDH-1	256.40	29.29
			T_3= NDH-2	227.60	14.94
			T_4= NDH-3	234.80	18.58
2013-14	HYV seed + sowing distance of 20 X 20 cm plant to plant and 45 X 45 cm between row to row + seed treatment by mancozeb @ 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	05	T_1= Local variety	18950	-
			T_2= NDH-1	253.60	33.50
			T_3= NDH-2	232.50	22.69
			T_4= NDH-3	239.80	26.54
2014-15	HYV seed + sowing distance of 20 X 20 cm plant to plant and 45 X 45 cm between row to row + seed treatment by mancozeb @ 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	05	T_1= Local variety	187.60	-
			T_2= NDH-1	249.50	32.99
			T_3= NDH-2	222.70	18.71
			T_4= NDH-3	240.80	28.35
2012-13 to 2014-15	Average (Three Years)		T_1= Local variety	191.70	-
			T_2= NDH-1	253.16	32.06
			T_3= NDH-2	227.60	18.72
			T_4= NDH-3	238.46	24.39

Table 3: Comparative economics of turmeric under OFT and farmers practice

Year	Cost of Cultivation (Rs./ha)		Gross return (Rs./ha)		Net Returns (Rs./ha)		B:C Ratio	
	OFT	Control*	OFT	Control*	OFT	Control*	OFT	Control*
2012-13	68000	52000	307680	189400	235680	137400	3.52	2.64

Control*= Farmers practice use as control

Results and Discussion

Yield:

The data revealed from Table -1 indicate that due to on farm trial on 04 Turmeric variety

The variety Narendra Haldi-1 gave highest average yield 253.16 qt/ha followed Narendra Haldi-3 and Narendra Haldi-2 with 238.46 qt/ha and 227.60 qt/ha respectively as compare to farmers practice plots 191.70 qt/ha. This results clearly indicated that the higher average yield in demonstration plots over the years compare to farmers practice due to knowledge and adoption of full package of practices i.e. use of bio fertilizer enriched FYM, recommended dose of fertilizers, us of high yielding variety, Sowing method and distance, mulching, and timely application of plant protection chemicals.

The average yield of Turmeric variety Narendra Haldi-1 is increased by 32.06 per cen followed by Narendra Haldi-3 and Narendra Haldi-2 with 24.32 and 18.72 percent respectively over the control plot. The yield of different tested Turmeric variety of was increased over the yield obtained under farmers practices (lack of knowledge on use of bio fertilizers, no use of the balanced dose of fertilizer, no IPM practices). Similarly yield enhancement in turmeric were documented by Subbarayadu *et al.* (1976) [10], Jalgoankar *et al.* (1988) [8], Cholke, S. M. (1993) and Kurian, and Valsala (1995) [9].

The increment in yield of Tested Turmeric variety of ranged between 24.39 to 32.06 per cent. The percent increase in yield over farmers practice was highest (32.06%) in Narendra Haldi-1 followed by Narendra Haldi-3 and Narendra Haldi-2. However variations in the yield of different tested Turmeric variety was in different years might be due to the variations in soil moisture availability, rainfall, and change in the location of ON Farm Trial every year.

Economic returns: In order to found the economic feasibility of thetested technologies over and above the control, some economic indicators like cost of cultivation, net return and B:C ratio was worked out. The economic viability of improved tested technology over farmers practice was calculated depending on prevailing price of inputs and outputs cost and represented in the term of B:C ratio (Table 3). It was found that the cost of production of tested Turmeric varieties under trial was Rs. 68000 in comparison of farmers practice to Rs. 52000/ ha. The additional cost increased in demonstration was mainly due to more cost involved in balanced fertilizer, procurement of improved HYV seed and IPM practices. Girja Devi and Wahib (2007) [15] and Bhuva *et al.* (1998) [16] also work on economics based intercropping systems.

The variety Narendra Haldi-1 gave higher net return of Rs. 2,35,68/ha which was lower Rs. 1,37,400/ha in farmer's practices. The benefit cost ratio of Tested technology was 3.52 in comparison to in farmer's practice (2.64) plots. This may be due to higher yield obtained and quality production of turmeric over to local check (farmers practice). This finding is similar with the findings of Singh *et al*, (2011). Similar findings are also reported by Chapke (2012) in case of jute.

The B:C ratio was recorded to be higher under trial against control during all the years of study. Scientific method of Turmeric cultivation can reduce the technology gap to a considerable extent, thus leading to increased productivity of Turmeric in Varanasi district which in term will improve the economic condition of the growers. Moreover, extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better Turmeric production in the Eastern Uttar Pradesh. These findings are similar to Lokesh and Chandrakanth (2003) [11] and Singh *et al* (2014) [17]

Conclusion

The Turmeric varieties tested in On Farm Trial for three conductive years in Varanasi district showed that The Variety Narendra Haldi-1 gave better performance in comparison to other tested and farmers practice 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 local horticulture departments of district and Agriculture universities come forward to extent this technology for more spices production in terms of yield and economy. The productivity gain under OFT (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

References

1. Angles S, Sundar A, Chinnadurai M. Impact of globalization on production and export of turmeric in India – An economic analysis. Agricultural Economics Research Review. 2011; 24:301-308.
2. Anonymous, Spicesboard bulletin, 2012, (www.indianspices.com)
3. Statistics of spices, Spice board India, Ministry of Commerce & Industry, Govt. of India, available at http://www.Indianspices.com.
4. Choudhary BN. Krishi Vigyan Kendra - a guide for KVK managers. Publication Division of Agricultural Extension, ICAR. 1999, 73-78.
5. Kurian A, Valsala PA. Evaluation of turmeric germplasm for yield and quality. Indian J. Gen. Res. 1996; 9:327-329.
6. Nirmal SV, Yamgar VT. Variability in morphological and yield characters of turmeric (Curcuma longa L.) cultivars. Adv. Plant Sci. 1998; 11:161-164.
7. Cholke SM. Performance of turmeric (Curcuma longa L.) genotype, Msc. Thesis, University of Agricultural Sciences, Dharwad, 1994.
8. Jalgoankar R, Patel MM, Rajput JC. Performance of different varieties of turmeric (Curcuma longa L.) under Konkan conditions of Maharastra. Proceeding, National Semminar on Chillies, Ginger and Turmeric: Andhra Pradesh Agriculture University, Hydrabad, 1988, 102-105.
9. Kurian A, Valsala PA. Evaluation of tuemeric types for yield and quality. J Tropical Agri. Culture. 1995; 33:75-76.
10. Subbarayadu B, Ravindram PN, George JK. Studies on varietal performance of turmeric. Andhra Aric. J. 1976; 23:195-198.
11. Lokesh GB, Chandraprakash MG. Economics of production marketing and processing of turmeric in Karnataka. Indian J. Arecanut spices & Medic. Plants. 2003; 5(2):55-60.
12. Chaudhary AS, Sachan1 SK, Singh RL. Studies on varietal performance of turmeric (Curcuma longa L.). Ind. J. Crop Sci, 2006; 1(1, 2):189-190.
13. Aiyadural SG. A Review of Research on Spices and Cashewnut in India. Indian Council of Agricultural Research, India, 1966, 228.
14. Purseglove JW, Brown EG, Green CL, Robbins SR. Spices. 2nd Edn., Longman Group Limited, New York, 1981, 537-539.
15. Girja Devi, Wahib K. Economics analysis of coconut based cropping systems. J Plantn. Crops. 2007; 38:80-83.
16. Bhuva HP, Katrodia JS, Patel GL, Chundawat BS. Response of intercropping in economics and effect on main crop of mango under South Gulrat condition. Acta. Hort. 1988; 231:316-320.
17. Singh SK, Raghuvanshi M, Singh PK, Prasad J. Performance of vegetable crops as intercrops with guava plantation. Res. Environ. Life Sci. 2014; 7(4):259-262.