Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP1: 889-890

KC Bhanumurthy
Scientist, Krish Vigyan Kendra, Pandirimamidi, Rampachodavaram, East Godavari, Andhra Pradesh, India

N Srividya Rani
Scientist, Scientist, Krish Vigyan Kendra, Pandirimamidi, Rampachodavaram, East Godavari, Andhra Pradesh, India

A Srinivas
Sr. Scientist & Head, Scientist, Krish Vigyan Kendra, Pandirimamidi, Rampachodavaram, East Godavari, Andhra Pradesh, India

P Rajasekhar
Scientist, Scientist, Krish Vigyan Kendra, Pandirimamidi, Rampachodavaram, East Godavari, Andhra Pradesh, India

S Adarsha
Scientist, Scientist, Krish Vigyan Kendra, Pandirimamidi, Rampachodavaram, East Godavari, Andhra Pradesh, India

RVSK Reddy
Director of Extension, Dr. Y.S.R. Horticultural University, V.R. Gudem, West Godavari, Andhra Pradesh, India

Correspondence
KC Bhanumurthy
Scientist, Krish Vigyan Kendra, Pandirimamidi, Rampachodavaram, East Godavari, Andhra Pradesh, India

Impact of on-farm trail on protray raised seedlings from single node cuttings in turmeric variety JTS-6 in agency area of east Godavari district

KC Bhanumurthy, N Srividya Rani, A Srinivas, P Rajasekhar, S Adarsha and RVSK Reddy

Abstract
Six On-farm trailsper year were conducted from 2015-16 to 2017-18 in different agency villages of Rampachodavaram division, East Godavari district of Andhra Pradesh to disseminate the technology of production of portray raised seedlings from single node cuttings of turmeric variety JTS-6. This is a high yielding variety and tolerant to rhizome rot. This method of production needs 1/3rd of seed when compared to conventional method (1000 kg/acre). Field diagnostic visits, regular surveys, farmer scientist interactions and training programmes ensured application of balanced and optimum dose of nutrients and timely plant protection measures. These activities ensured optimum yield (14.6 t/ha) as in JTS-6 with less production cost compared to conventional method of cultivation in local variety. An average net profit of Rs. 2,32,760- was recorded under recommended practice while it was Rs. 2,13,413/- under farmers' practice. Benefit/ Cost ratio ranged from 2.81 to 3.57 under demonstration while it ranged from 1.98 to 2.51 under check plots. With 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: single node cuttings, protray method, on-farm trail, turmeric Var. JTS-6, benefit/cost ratio

Introduction
Turmeric (*Curcuma longa* L.) belongs to family *Zingiberaceae*. India is a leading producer and exporter of turmeric in the world. Andhra Pradesh, Tamil Nadu, Orissa, Karnataka, West Bengal, Gujarat, Meghalaya, Maharashtra, Assam are some of the important states cultivating turmeric, of which Andhra Pradesh alone occupies 38.00 per cent of the area and 58.50 per cent of production. It has the potentiality to play a vital role in the economy of the tribal farmers of Andhra Pradesh who grow this crop traditionally without adequate knowledge on the variety, optimum plant spacing and size of rhizomes used as planting material.

Turmeric is commonly propagated through rhizomes. So, large quantity of rhizomes arerequired because of the low efficiency of vegetative propagation. The availability of quality planting material is also low during the cropping season (June - September). Rhizome rot incited by *Pythium aphanidermatum* is the destructive disease causing considerable damage and reduces yield and quality of rhizomes. There is scarcity in the availability of disease free quality planting material of turmeric (Malhotra *et al.,* 2016). In order to overcome these problems, a technology on rapid multiplication of turmeric using single node cuttings of rhizome in protrays was introduced and assessed in variety JTS-6 (Jegityal Turmeric Selection-6). The plants are vigorous with good yield potential, rich in curcumin content (4.62 %) and tolerant to Rhizome rot compared to local variety. In this protray method of turmeric seedlings production, planting material requirement will be reduced to 1/3rd of total planting material required. As rhizome is cut and used for the preparation of planting material, the diseased rhizome can be eliminated. So, it helps to produce uniform stand, quality and disease free turmeric seedlings (Neeraja *et al.,* 2017).

This production of turmeric seedlings using single node cuttings from rhizome in protray method helps in enhancing the turmeric production and income level of the farming community. Technology transfer is thus paramount to spread new ideas from originating sources to the users (Prasad *et al.,* 1987). With an objective to disseminate the new technology to farmers, On-farm trail was attempted by KVK from 2015-16 to 2017-18 in East Godavari District of Andhra Pradesh.

Material and Methods

Krishi Vigyan Kendra, Pandirimamidi, East Godavari carried out On-farm trails (six per year) to disseminate the technology to farmers. The average area under each demonstration was 0.2 ha with 18 (6 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. Improved method of seedlings production technology with recommended management practices were applied as an intervention to manage these problems. The recommended practices included treatment of JTS-6 rhizomes with Ridomil (2.5 g/l) for 40 min before sowing as prophylactic measure for rhizome rot, mean while protrays were filled with cocopeat and treated. Complete rhizomes were cut into pieces, with each rhizome piece having one single node. Such single node cut rhizomes are planted in the field when they become 30 days old seedlings. Application of well rotten cow dung @ 25 tons/ha followed by RDF i.e., N:P:K @ 120:90:90 kg/ha. Site and farmer selection, layout of demonstration, farmers' participation etc. were followed as suggested by Choudhary (1999). 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 andcontrol (Local check).

Results and Discussion

Performance of protray raised seedlings through single node cuttings in turmeric var.JTS-6in agency area of East Godavari district was found to be good in the demonstration plots ascompared to control (Local check) during all the demonstration years (Table 1). The yield recorded in On-farm trails were 169.8 and 175.3 q/ ha was on-par with yields in Local check during 2015-16 and 2017-18, whereas in 2016-17,demonstration plot yields 5-10% more than local check with low production cost. Fluctuations in yield and cost of cultivation varies from year-to-year can be explained based on variations in microclimatic conditions and market price. Tiwari & Saxena (2001) and Mukherjee (2003) reported that depending on identification and use of farming situation specific interventions may have greater implications in enhancing systems productivity. The data in Table 1 revealed that the net returns from the demonstration plots were higher than control plots during all the years. An average net return of Rs. 2,32,760/- was observed in demonstration plots compared to control plot *i.e.,* Rs. 2,13,413/-. Economic analysis indicated that benefit/cost ratio in demonstration plots was comparatively higher than control plots. The highest benefit cost ratio (3.57) was observed in the year 2016-17 followed by 3.38 in the year 2017- 18. The variation in B:C ratio could be due to price variation during the study years. The average B:C ratio of demonstration and control plots was 3.25 and 2.31 respectively. Enhanced B:C ratio proved the economic viability of the intervention made under On-farm trail compared to farmers practice. Similar findings were reported by Neeraja *et al.,* (2017) and Malhotra *et al.,* (2016) in turmeric.

Table 1: Yield performance and economic indicators of On-farm trail on protray raised seedlings from single node cuttings in turmeric variety JTS-6

Year	Yield (Q/ha)		Gross expenditure (Rs/ha)		Gross Returns		Net Returns (Rs/ha)		BC Ratio	
	FP	RP	FP	RP	FP	RP	FP	RP	FP	RP
2015-16	139.8	134.1	93550	70340	279600	268200	186050	197860	1.98	2.81
2016-17	151.2	160.5	90320	71810	317520	337050	227200	256430	2.51	3.57
2017-18	145.3	143.7	92670	72150	319660	316140	226990	243990	2.44	3.38
Mean	145.4	146.1	92180	71433	305593	307130	213413	232760	2.31	3.25

FP-Farmers practice, RP-Recommended Practice

Conclusion

The outcome of On-farm trail showed that protray raised seedlings from single node rhizome cuttings of turmeric varietyJTS-6 yields on-par with the local check with low cost of cultivation. More benefit/cost ratio in recommended practices indicates the economic viability of the demonstration. This technology is suitable for producing quality and disease free planting material in turmeric with less seed material. As the climate in agency area of East Godavari district is feasible for turmeric cultivation, farmers has to adopt the technology to enhance their production and returns with less production cost.

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