



Research Article

IMPACT OF FRONT-LINE DEMONSTRATION ON YIELD ENHANCEMENT OF TURMERIC THROUGH DRIP AND FERTIGATION IN TRIBAL BELT OF KOREA DISTRICT, CHHATTISGARH

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Abstract: A front line demonstration was conducted at five farmers field comprising of 0.20 ha each in Korea district of Chhattisgarh during *Kharif* 2015-16 to 2018-19 to demonstrate the improved package of practice of Turmeric (*Curcuma longa* L.). There were two treatments in which one was local check and second was cultivation of turmeric with full package of practice with drip and fertigation. Field diagnostic visits, regular surveys, farmer meetings and training programmes ensured application of balanced and optimum doses of nutrients through fertigation and timely plant protection measures. The result revealed that local check gives a yield of 10.34 t/ha. While turmeric cultivation with full package of practices along with drip and fertigation gives a yield of 24.59 t/ha. which shows that by adopting package of practices there were 138.09 % increase in turmeric yield. Similarly, net return was also calculated which shows that local check gives a net income of Rs. 186005/ ha with a B:C ratio of 1.06 against a net income of Rs. 523638/ha with B:C ratio of 1.56 in demonstration field. With frontline demonstration (FLD) of proven technology revealed that yield potential and net income from turmeric cultivation could be enhanced to a great extent resulting in higher income to the farming community.

Keywords: Turmeric, Drip irrigation, Fertigation, Water requirement, Yield

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Introduction

Spices are high-value export oriented crops, which play an important role in agricultural economy of the country. Among the spices, turmeric is one of the most important and popular spice. Turmeric, *Curcuma longa* L., which is a member in Zingiberaceae, was originated from South-east Asia. Turmeric is a nutrient loving plant and removes large amount of nutrients from soil, so sufficient quantities of nutrients have to be applied in order to meet its nutritional requirements and to obtain higher yields [1]. Turmeric requires assured water supply almost throughout the year (8 to 9 months). Drip irrigation system is a very efficient method of supplying water to plant [2]. Fertigation through drip irrigation facilitates precise application of fertilizers, as it delivers nutrients to the roots where it can be effectively utilized and results in greater uptake and nutrient use efficiency [3]. Though turmeric is grown on a commercial scale the information on fertigation scheduling in turmeric is lacking. With an objective to combat the causes of poor yield and low economic returns, dissemination of recommended technology through frontline demonstration was attempted in the Korea district of Chhattisgarh.

Material and methods

ICAR-Krishi Vigyan Kendra, Korea carried the technology to the farmers field through frontline demonstrations in the villages viz., Nagar, Umjher and Dudhaniya between 2015-16 and 2018-19. The average area under each demonstration was 0.20 ha with 5 beneficiaries in each demonstration. Through field diagnostic visits, surveys, farmer meetings etc the factors contributing to low productivity like varietal issues, faulty management practices, lack of irrigation, poor nutrient management, negligent plant protection measures were identified. The recommended practices included treatment of rhizomes with Ridomil (2.5 g/l) for 40 min before sowing as protection measure for rhizome rot. Application of well rotten cow dung @ 12 tons/ha at the time of field preparation, drip irrigation and

fertigation scheduling and foliar spray of Mancozeb 75 percent WP (2.5 g/l) at 15 days interval during June-Sept against leaf spot disease was done. The drip irrigation system was installed and operated daily except on rainy days to provide the sufficient moisture to the plants. The lateral lines were laid parallel to the crop rows and each lateral served two rows of crop. The laterals were provided with on line emitters of 4 lt hr⁻¹ discharge capacity. Emitters were fixed 0.3m apart to serve the irrigation water requirement of four plants. Inline drippers with a discharge rate of 4 lt hr⁻¹ was followed for all the plants spaced at 30x 15cm. Fertigation is done as per the recommended dose with 60:50:120 NPK kg of NPK/ha and is applied throughout the cropping period once in three days. Water soluble fertilizers like 19:19:19, 0: 0:50 and urea are used. The scheduling interval of fertigation was followed at weekly intervals for 13 weeks starting from 5th to 17th week after planting in the field. In case of local check (control plots) no change was made in the existing practices of imbalanced use of organic and inorganic fertilizers and little or no use of fungicides and pesticides. Well before the demonstrations training was imparted to the farmers and their exposure visits to the KVK instructional-cum demonstration farms were conducted. Visits of the farmers and the extension functionaries were also organized to demonstration plots to disseminate the message at large. Yield data were collected from the control and demonstration plots and cost of cultivation, net income and benefit/cost ratio were computed.

Results and discussion

Performance of Turmeric var Roma was found to be substantially higher under the demonstration plots than under control during all the demonstration years (Table 1). The yield under demonstrations was 23.86, 24.81, 25.12 and 24.56 t/ha during 2015-16, 2016-17, 2017-18 and 2018-17 respectively. [4,5,6] have shown similar trend of yield results in Turmeric.

Table-1 Yield performance and economic indicators of frontline demonstration of turmeric var. Roma

Year	Demonstrations (Nos.)	Yield (t/ha)		% increase over 1FP	Gross expenditure (Rs)/ha		Gross return (Rs)/ha		Net return (Rs)/ha		B:C ratio	
		RP	FP		RP	FP	RP	FP	RP	FP	RP	FP
2015-16	5	23.86	9.98	139.08	335400	173883	835100	349300	499700	175417	1.49	1.01
2016-17	5	24.81	10.98	125.96	336000	175383	868350	384300	532350	208917	1.58	1.19
2017-18	5	25.12	10.17	147	337500	177383	879200	355950	541700	178567	1.61	1.01
2018-19	5	24.56	10.22	140.31	338800	176583	859600	357700	520800	181117	1.54	1.03
Average	5	24.59	10.34	138.09	336925	175808	860563	361813	523638	186005	1.56	1.06

RP= Recommended practice, FP= Farmers practice, B:C ratio= Benefit/cost ratio

The yield enhancement due to technological intervention was to the tune of 139.08, 125.96, 147.00 and 140.31 percent over control. The cumulative effect of technological intervention over four years revealed an average yield of 24.59 t/ha i.e., 138.09 percent higher over local check. The year-to-year fluctuations in yield and cost of cultivation can be explained based on variations in microclimatic conditions and marketability price. Similar variations in results have been documented [7-12] in different crops. An average net return was observed to be Rs 523638 in comparison to control plot i.e Rs 186005. Thus, on an average additional income of Rs 505033 is attributed to the technological intervention provided in demonstration plots. The highest benefit cost ratio (1.61) was observed in the year 2017-18 followed by 1.58 in the year 2016-17. 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 1.56 and 1.06 respectively during the study period. Similar findings were reported [13-15] in turmeric.

Conclusion

The results of front-line demonstration convincingly proved that the yield of turmeric could be increased by 146.63 percent with the better technological intervention with drip and fertigation. Favourable benefit/cost ratio is self-explanatory of economic viability of the demonstration. The technology is suitable for enhancing the productivity of turmeric crop and appropriate time for area expansion under turmeric production in Korea dist. The suitable climate for its growth can transform lives of many rural growers if more interventions are conducted and technical knowledge is given to the growers with bottom up policy.

Application of research: Study of nutrient and water management in turmeric in a sustainable manner and maintains the soil health on long term basis.

Research Category: Irrigation and Nutrient Management

Abbreviations: ha=hectare, hr⁻¹=per hour, lt=litre, RP= Recommended practice, FP= Farmers practice, B:C ratio= Benefit/cost ratio,

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Study area / Sample Collection: Nagar, Umjher and Dudhaniya

Cultivar / Variety / Breed name: Turmeric (*Curcuma longa* L.) var. Roma

Conflict of Interest: None declared

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Ethical Committee Approval Number: Nil

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