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RESEARCH PAPER

Single bud transplanting technique of turmeric to reduce production cost

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Abstract : Turmeric is one of the most important spice crops of Tamenglong district of Manipur. Due to high seed requirement (15-20 q/ha) of turmeric the cost of production increases rapidly. Around 40-45% of total cost of cultivation is incurred for procurement of seed and this is one of the major constraints for large scale cultivation of Turmeric. To overcome the disadvantages of conventional planting system of seed rhizomes and to produce good quality planting material with reduced cost, rapid multiplication of turmeric, single bud transplanting technology was introduced to the farmers of Noney/ Tamenglong district. ICAR – KVK Tamenglong organized different capacity building programmes on single bud transplanting of turmeric.Disease-free seed rhizomes of turmeric (variety Lakadong) were cut into small pieces of 5-6 g containing a single bud and treated with *Trichoderma viridae* @ 2g/litre and sown in pro-trays using suitable growing media prepared by mixing coco peat: FYM @ 1:1 during March. After 30-40 days, the germinated and well-developed seedlings were transplanted in main field.Single bud transplanting technique of turmeric produced healthy crop.Single bud transplanting technique of turmeric was recorded to have reduced number of days required for tillering (52 days) and rhizome development (207 days) whereas in conventional planting method it took 85 days for tillering and 237 days for rhizome development. Single bud transplanting technique of turmeric recorded a higher yield of 220 q/ha within a shorter period as compare to 170q/ha in conventional planting method.An average cost of production of Rs.45,600/ hawas obtained underSingle bud transplanting methodas compare to Rs. 61000/ha under conventional planting method. Higher average net returns of Rs. 217200/ha and benefit cost ratio of4.8:1was recorded with single bud transplanting method. However, relatively lower average net returns of Rs. 143200/ha and benefit cost ratio of 2.3:1 was recorded with conventional planting method. An average cost saving of 34.2% was recorded with single bud transplanting method over conventional planting method.

Key Words : Turmeric, Rhizome, Single bud transplanting, On-farm trial

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INTRODUCTION

Turmeric (*Curcuma longa* L.) is a tropical perennial rhizomatic spice crop belonging to the family Zingiberaceae and triploid species (2n = 3x = 63)

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commonly used as a spice, cosmetics and natural food dye. Turmeric is one of the most important ancient spices grown in India which plays an important role in the national economy. India is hub of spices as well as the largest producer and exporter of turmeric in the world and accounts for more than 46 per cent of the world trade. The highest genetic diversity is concentrated in India and Thailand, with at least 40 species in each area, followed by Burma, Bangladesh, Indonesia and Vietnam. Turmeric is also known as the "golden spice" as well as the "spice of life". It is still used as a symbol of well-being and widely used in ceremonies and religious functions. Turmeric is valued for its deep yellow colour (0.2-8% curcumin) pungency (2.2-4.2% termerol) and aromatic flavour of volatile oil (1.5-5%). During Vedic period turmeric referred as "earthy herb of the Sun" with the orange-yellow rhizome it was regarded as the "scared spice" (Reshma *et al*., 2020).

Turmeric is one of the most important spice crops of Tamenglong district of Manipur. Due to high seed requirement (15-20 q/ha) of turmeric the cost of production increases rapidly. Around 40-45% of total cost of cultivation is incurred for procurement of seed in these crops and this is one of the major constraints for large scale cultivation of these two crops. To overcome the disadvantages of conventional planting system of seed rhizomes and to produce good quality planting material with reduced cost, the present on farm trial was conducted at Noney/ Tamenglong area.

MATERIAL AND METHODS

The present study "Single bud transplanting technique of turmeric to reduce production cost"was evaluated through On Farm Trial conducted at farmer's field during the year 2020-21 and 2021-22. The study was carried out by the ICAR Krishi Vigyan Kendra Tamenglong under ICAR Research Complex for NEH Region, Manipur Centre. A total of 6 On Farm Trial were conducted at selected farmers' fields of 3 adopted villages *i.e.,*Noney, Namdonjang and Laphokof Noney district, Manipur covering 2.0 ha area.

Initial status :

The farmers were growing turmeric following conventional methods. As we are all aware that in conventional way of planting one need 1800 – 2000 kg rhizome for planting a hectare land which leads to increased cost of cultivation of this crop, thus, making it a less profitable venture. Above all quality of the planting material were not check and proper treatment of the planting material were not done, which result to less healthy plant, infestation of pest and diseases which ultimately result in low yield and low return.

ICAR KVK Tamenglong intervention :

Awareness on Single Bud Transplanting Technique was created among the villagers. Field level training and On Farm Trial on Single Bud Transplanting Technique of Turmeric was organized in three selected villages. Extension literatures were also distributed among the respondents. Considering the various constraints and limitations of the area, On Farm Trial on Single Bud Transplanting Technique of Turmeric to Reduce Cost of Production were demonstrated at the field of 6 interested farmer of Noney area.

Material used:

Trichoderma viridae, Coco peat, FYM, Nursery pro-trays, Healthy Turmeric rhizomes.

Details of the technology

Single bud transplanting technique

Healthy Turmeric rhizomes for seed purpose were selected

⇓

The selected rhizome was treated with *Trichoderma viridae* @ 2g/ litre for 30 minutes and store in well ventilated place

⇓

One month before planting, the selected seed rhizomes were cut into single buds with small piece of rhizomes weighing 4-6g.

⇓

Single bud sprouts were treated with *Trichoderma viridae* @ 2g/litre for 30 minutes before planting.

⇓

The pro-trayswas filled with nursery medium containing mixture of Coco peat: FYM @ 1:1

⇓

Turmeric bud sprouts were planted in pro-trays

⇓

Pro-trays were kept under polyhouse or cover with straw/ dry weed mulches to protect them from wind and heavy rain.

⇓

Need-based irrigation with rose cane was given.

⇓

30-40 days old seedlings were used for transplanting

Observation :

Observations were recorded on Survivability (%), sprouting (days), days required for tillering (days), days required for rhizome development (days) and yield (q). Cost of cultivation, net income and benefit cost ratio of the demonstrations were worked out and compared with that of the traditional practices to assess the benefits of the intervention.

The data collected on various characters of turmeric crop and yield were processed and subjected to statistical analysis by t test (Chandel, 2002). First, all the growth and yield attributes of turmeric was analyzed and then the results were pooled over for both the years. Statistical analysis was carried out toanalyze the difference between two treatments using the 't' test of significance. The calculated 't' value was compared with the theoretical value from a 't' table at 5% probability level.

RESULTS AND DISCUSSION

The data on growth and yield attributing characters like survivability (%), sprouting (days), days required for tillering (days), days required for rhizome development (days) and yield (q) are presented in Table 1. Results showed that the average survivability (%) of conventional planting method was higher in both the years (96.5%) as compared to single bud transplanting method (89.5 %). Average days required for sprouting of bud (16.65 days), average days required for tillering (52.0 days), average days required for rhizome development (207 days) were significantly lower in both the years with single bud transplanting method, as compared to conventional planting method which required an average of 20.3 days for sprouting of bud, an average of 85 days for tillering, an average of 237 days required for rhizome development. Significantly higher rhizome yield of 218q/ha in 2020, 220 q/ha in 2021, with an average yield of 219q/ha were recorded with the adoption of single bud transplanting method than that of the conventional planting method which recorded a yield of 170.7q/ha in 2020 and 170 q/ha in 2021 with an average yield of 170.3q/ha. An increase of 27.7 % in 2020 and 29.3% in 2021 with an average increase of 28.5% in yield was recorded with single bud transplanting method. The result was in agreement with Malhotra *et al.* (2016).

Economic analysis:

Economic advantages for management of single bud transplanting method over conventional planting method were calculated based on the prevailing market prices, wages and other input costs, for both the years. It is evident from Table 2. that cost of production of Single bud transplanting method under the demonstrations recorded Rs. 46300/ha and Rs. 44900/ha in 2020 and 2021, respectively with an average cost of Rs.45,600/ha as compare to the conventional planting method which was Rs. 62000/ha in 2020 and 60400/ha in 2021 with an average cost of Rs. 61200. Higher net returns and benefit cost ratio were recorded with single bud transplanting methodin both the years *i.e.*, Rs. 215300/ha and 4.7:1 during 2020 and Rs. 219100/ha and 4.9:1 during 2021, with an average net return of Rs. 217200/ha and average

Table 1 : Comparative growth and yield parameters of single bud transplanting method and conventional method of turmeric production

	Survivability (%)			Sprouting (days)			Days required for tillering (days)			Days required for rhizome development(days)			Yield (q)			Yield increase %		
	2020	2021	Av	2020	2021	AV	2020	2021	AV	2020	2021	AV	2020	2021	AV	2020	2021	AV
Single bud rhizome	89.0	90.0	89.5	17.3	16.0	16.7	53.0	51.0	52.0	209.0	205.0	207.0	218.0	220.0	219.0	27.7	29.3	28.5
Conventional planting method	96.0	97.0	96.5	20.3	20.3	20.3	85.0	85.0	85.0	239.0	235.0	237.0	170.7	170.0	170.3			
t value (5%)	12.1	7.0	12.2	5.2	4.9	8.3	32.0	14.7	26.23	6.5	5.2	5.8	12.6	10.8	110.4			

Table 2 : Economics of single bud transplanting method and conventional method of turmeric production

	Cost (Rs.)			Net return (Rs.)			BC ratio			Cost saving (%)		
	2020	2021	AV	2020	2021	AV	2020	2021	AV	2020	2021	AV
Single bud rhizome	46300	44900	45600	215300	219100	217200	4.7	4.9	4.8	33.9	34.5	34.2
Conventional planting method	62000	60400	61200	142800	143600	143200	2.3	2.4	2.3			

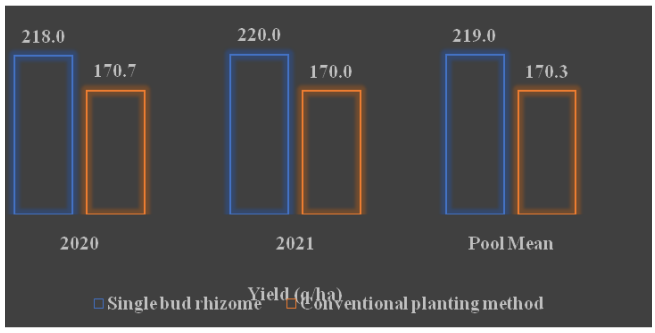

Fig. 1 : Comparative yield parameters for single bud transplanting method and conventional method of turmeric production

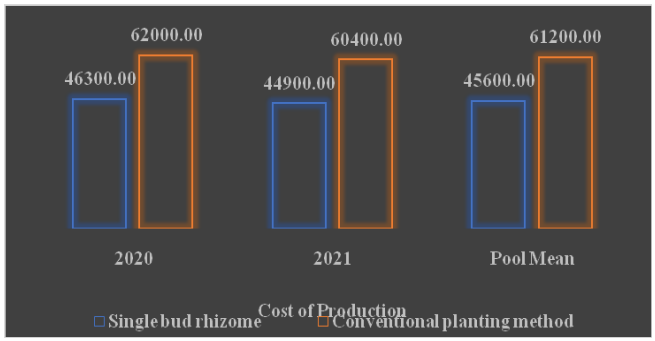

Fig. 2 : Comparative cost of production for single bud transplanting method and conventional method of turmeric production

Fig. 3 : Comparative net return for single bud transplanting method and conventional method of turmeric production

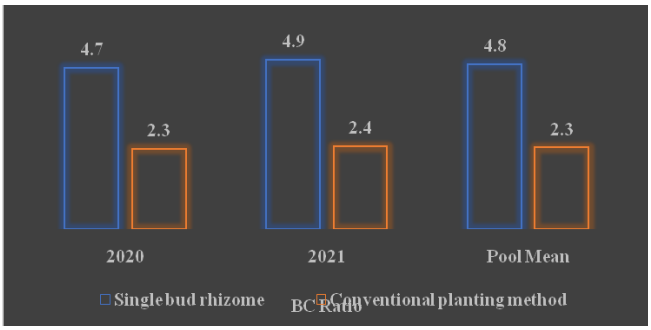

Fig. 4 : Comparative BC ratio for single bud transplanting method and conventional method of turmeric production

BC ratio of 4.8:1. However, relatively lower net returns and benefit cost ratio were recorded with conventional planting method in both the years *i.e.*, Rs. 142800/ha and 2.3:1 during 2020 and Rs. 143600/ha and 2.4:1 during 2021, with an average net return of Rs. 143200/ha and average BC ratio of 2.3:1. A cost saving of 33.9% in 2020 and 34.5% in 2021 with an average cost saving of 34.2 was recorded with single bud transplanting method over conventional planting method. This may be due reduction on rhizome requirement for seed, shorter duration for crop management, better health of the plant due to proper selection of planting material, proper treatment of the rhizome and higher yield.

Conclusion :

The results of the on-farm trial showed that the Single bud transplanting method substantially increased the yield and economic benefits of turmeric production at Noney/ Tamenglong district. There is a need to increase the adoption and spread of improved technologies by the extension agencies to improve the area expansion and production potential of turmeric.

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