IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 8, Issue 3 Ver. II (Mar. 2015), PP 15-17
www.iosrjournals.org

Effect of Organic Cultivation and Mulching on Improved Varieties of Turmeric

Sukanta Kumar Sahoo[1], Sanat Kumar Dwibedi[2], Jatindra Nath Das[3] and Manorama Behera[4]

[1](Subject Matter Specialist (Horticulture), Krishi Vigyan Kendra, Deogarh, Odisha, India)
[2](Assistant Professor (Agronomy), College of Agriculture (OUAT), Chiplima, Odisha, India)
[3](Professor, Department of Floriculture, College of Agriculture (OUAT), Bhubaneswar, Odisha, India)
[4](Research Scholar, College of Agriculture (OUAT), Chiplima, Odisha, India)

Abstract: *A field experiment in split-split plot design entitled "Effect of organic cultivation and mulching on improved varieties of turmeric" was undertaken in farmer's field in West Central Table Land zone during kharif 2007-08. The scientific cultivation of turmeric recorded significantly higher number of fingers hill^{-1} (12.21), fresh rhizome yield (18.093 t ha^{-1}) and dry rhizome yield (4.682 t ha^{-1}) than the fingers hill^{-1} (10.08), fresh rhizome yield (11.337 t ha^{-1}) and dry rhizome yield (3.071t ha^{-1}) produced with farmer's cultivation practice. The number of fingers hill^{-1}, fresh and dry rhizome yield were significantly higher in both Sal-leaf mulching (12.13, 17.706 and 4.817 t ha^{-1}, respectively) and Sesbania-leaf mulching (11.76, 16.324 and 4.315 t ha^{-1}, respectively) compared to no mulching. The cv. Roma yielded significantly higher fresh (17.326 t ha^{-1}) and dry (5.517 t ha^{-1}) rhizomes than cv. Lakagong and local variety. The scientific cultivation of cv. Roma with Sal mulching generated highest gross return of Rs.3,16,920/- with highest B:C of 2.45.*

Keywords: *Organic cultivation, mulching, varieties of turmeric.*

I. Introduction

Turmeric, an essential spice of Indian cuisine, is famous worldwide for its pungent aroma and medicinal values. In India, the state Orissa has 14.6% of the national turmeric area and 23.24% of annual production (Ministry of Agriculture, 2014). The state of Orissa has annual production of 2,25,690 MT from 28,330 ha turmeric area with productivity of 7,966 kg ha^{-1} (Directorate of Agriculture and Food Production, 2012-13). The district Deogarh with 51.43% of cultivable upland (Annual Report of DAO-Deogarh, 2013-14) mostly covered with mango, litchi and citrus orchards and low value millets, are best suited for turmeric cultivation. In spite of its soil and agro-climatic feasibility, the spread of turmeric is restricted to only 190 ha with deplorably low total annual production and productivity of 1,010 MT and 5,316 kg ha^{-1}, respectively. Traditional cultivation practices by using local varieties, lack of adequate plant protection measures and improper mulching or no mulching leads to low yield and quality. No attempt for varietal replacement and scientific cultivation of turmeric in West Central Table Land zone has either been taken up by the Agriculture or Horticulture Department. Keeping in view the scope of horizontal expansion and vertical economic growth, a field experiment was conducted during *kharif* 2007-08 with the technical support from the Krishi Vigyan Kendra, Deogarh to study the performance of organic cultivation and mulching on improved varieties of turmeric.

II. Materials and Methods

A field experiment was conducted during 2007-08 in the field of Sri Rebati Mohan Pradhan, a progressive farmer of Kantapalli village in Barkote block of Deogarh district under West Central Table Land zone. The experiment was laid out in split split-plot design in red sandy loam type of soil with pH of 6.0. Two systems of cultivation *viz.* farmer's cultivation practice with application of FYM @ 10.0 t ha^{-1} without any plant protection measures (S_1) and scientific cultivation practice with application of FYM @ 20.0 t ha^{-1} and adequate plant protection measures (S_2) were allotted in the main plots. Mulching of Sal leaves (M_1) and Sesbania leaves (M_2) and no mulching (M_3) were allotted to three sub-plots. Each sub-plot was planted with three varieties of turmeric *viz.* Roma (V_1), Lakadong (V_2) and one local variety (V_3). The 18 treatment combinations were allotted at random and the experiment was replicated thrice. The rhizomes brought from the AICRIP, Dry land, Phulbani, Orissa and KASAM, Orissa were planted at 30 cm X 20 cm spacing (Islam *et al*., 2002) on well ploughed raised beds. In scientific cultivation practice, rhizomes were planted after seed treatment with

Trichoderma viridae and the crop was applied with FYM of 20.0 t ha^{-1} and *neem* cake @ 1.0 t ha^{-1} at the time of planting without any chemical fertilizer. *Azotobacter* and PSB were treated with the fingers at the time of planting. Organic pesticides like *neem* oil (0.5%) was applied to check shoot borer at 15 days intervals. Bordeaux mixture @ 1% was applied to check leaf spots and *Trichoderma viridae* was applied at the time of planting to check rhizome rot. The green leaf mulches of *Sorea robusta* and *Sesbania sp.* @ 10.0 to 12.0 t ha^{-1} was used to facilitate good germination by providing suitable soil microclimatic situation. At 50 days after planting, the above said mulches @ 5.0 to 6.0 t ha^{-1} were again used in respective sub-plots along with application of cow dung slurry (1.0 kg fresh cow dung in 10.0 liters of water) to increase nutrient availability. Data on number of fingers $hill^{-1}$, fresh and dry rhizome yield and economics were recorded and evaluated on due course.

III. Results and Discussion

During *kharif* 2007-08, the scientific organic cultivation of turmeric produced significantly higher number of fingers $hill^{-1}$ (12.21) than the farmer's cultivation practice (10.08) (table 1). Similarly, the number of fingers $hill^{-1}$ under Sal (12.13) and Sesbania-leaf mulching (11.76) were significantly higher than no mulching (9.56). Among the varieties, both cv. Roma and cv. Lakadong recorded significantly higher fingers $hill^{-1}$ than local variety of turmeric whereas, the numbers were at par with each other in both. The scientific organic cultivation of turmeric recorded significantly higher fresh (18.093 t ha^{-1}) and dry rhizome yields (4.682 t ha^{-1}) than the respective yields from farmer's cultivation practice (11.337 and 3.071 t ha^{-1}). Such significant and positive result in the former cultivation practice could possibly be due to the double rate of application of FYM along with adequate organic plant protection measures compared to the latter cultivation practice without any plant protection. The fresh and dry rhizome yields were also significantly higher under Sal and Sesbania leaf mulchings than no mulching (table 1). The Sal-leaf mulching with better moisture retention capacity could record significantly higher fresh (17.706 t ha^{-1}) and dry (4.817 t ha^{-1}) rhizome yield than Sesbania-leaf mulching (16.324 and 4.315 t ha^{-1}, respectively). Both the improved varieties had significantly higher fresh and dry rhizome yields than local variety. The variety cv. Roma produced significantly higher fresh (17.326 t ha^{-1}) and dry (5.517 t ha^{-1}) rhizome yield than cv. Lakadong (16.012 and 3.785 t ha^{-1}, respectively). So far as the economics of cultivation is concerned, scientific cultivation of cv. Roma with Sal mulching generated the highest gross return of Rs.3,16,920/- with the highest B:C of 2.45 whereas cultivation of local turmeric variety without mulching cultivated as per farmer's practice recorded the lowest gross return of Rs.73,560/- with the lowest B:C of 1.12.

IV. Conclusion

Thus it is concluded that scientific organic cultivation of turmeric cv. Lakadong with sal mulching recorded significantly higher fresh and dry rhizome yields than the respective yields from farmer's cultivation practice in west central table land zone of Odisha.

V. Acknowledgements

We acknowledge the financial assistance provided by the ICAR, New Delhi through KVK, Deogarh for executing this on-farm trial.

References

[1]. Annual Report of DAO-Deogarh, 2013-14. Land utilisation pattern in different blocks, pp-3.
[2]. Directorate of Agriculture and Food Production, Odisha, Bhubaneswar, 2012-13. District wise area, production and yield rate. Odisha Agriculture Statistics 2012-13, pp-72.
[3]. Ministry of Agriculture, Department of Agriculture and Cooperation, Govt. of India, 2014. Area and production of horticulture crops for the years (2012-13), pp-11. Hand book on horticulture statistics 2014 retrieved on December 12, 2014 from web http://agricoop.nic.in/imagedefault/whatsnew/handbook2014.pdf.
[4]. Islam, F., Karim, M. R., Sahajahan, M. O., Hoque, M.O., Rabiul Alam, M. and Akhtar Husein, M., 2002. Study on effect of plant spacing on the production of turmeric in farmer's field. Asian Journal of Plant Science. Vol-1(6), pp-616-617.

Table 1. Influence of system of cultivation and mulching on yield attributes and yield of turmeric varieties.

Treatments	System of cultivation		Mulching			Varieties		
	Farmer's practice (FYM @ 10 t ha^{-1} + No plant protection)	**Scientific practice (FYM @ 20 t ha^{-1} + Neem cake @ 0.1 t ha^{-1} + Organic plant protection)**	**Sal leaves**	**Sesbania leaves**	**No mulching (Farmers' Practice)**	**Roma**	**Lakadong**	**Local**
Fingers hill^{-1}	10.08	12.21	12.13	11.76	9.56	12.56	12.07	8.82
S.Em (±)	0.230			0.163			0.304	
CD at 5%	0.99			0.38			0.63	
Fresh rhizome yield (t ha^{-1})	11.337	18.093	17.706	16.324	10.115	17.326	16.012	10.808
S.Em (±)	0.059			0.589			0.616	
CD at 5%	0.256			1.359			1.271	
Dry rhizome yield (t ha^{-1})	3.071	4.682	4.817	4.315	2.497	5.517	3.785	2.328
S.Em (±)	0.015			0.188			0.250	
CD at 5%	0.064			0.433			0.515	

Table 2. Economics of system of cultivation and mulching of turmeric varieties.

Treatment Combinations	**$S_1M_1V_1$**	**$S_1M_1V_2$**	**$S_1M_1V_3$**	**$S_1M_2V_1$**	**$S_1M_2V_2$**	**$S_1M_2V_3$**	**$S_1M_3V_1$**	**$S_1M_3V_2$**	**$S_1M_3V_3$**
Cost of cultivation (Rs.)	94830	94619	87960	94652	94418	87837	72298	72220	65920
Gross Return (Rs.)	194400	177480	124800	180120	161400	114960	103800	97560	73560
B:C	2.05	1.88	1.42	1.93	1.71	1.31	1.44	1.35	1.12
Treatment Combinations	**$S_2M_1V_1$**	**$S_2M_1V_2$**	**$S_2M_1V_3$**	**$S_2M_2V_1$**	**$S_2M_2V_2$**	**$S_2M_2V_3$**	**$S_2M_3V_1$**	**$S_2M_3V_2$**	**$S_2M_3V_3$**
Cost of cultivation (Rs.)	129612	129268	121842	129166	128967	121804	106386	106271	99660
Gross Return (Rs.)	316920	289440	175320	281280	265320	172320	170880	161640	112800
B:C	2.45	2.24	1.44	2.18	2.06	1.41	1.61	1.52	1.13