

Adoption and Marketing Practices of Tomato Growers

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Received: 11-05-2022

Revised: 23-08-2022

Accepted: 02-09-2022

ABSTRACT

The present study was conducted in ten villages of Madanapalle division in Chittoor district of Andhra Pradesh to analyze the adoption and marketing practices of tomato growers. Six tomato growers were personally interviewed using a pre-tested schedule. It was found that majority of the tomato growers had not completely followed the practices such as: (a) seedling treatment one day after planting (Copper oxychloride @ 0.3% of 100 grams/ha) (60.00%), (b) application of neem cake (75.00%) and biofertilizers viz., *Trichoderma viridae* (83.33%) and *Pseudomonas* (80.00%), (c) pruning (91.66%) and training operations (95.00%), (c) growing of trap crops (60.00%), (d) chemical control of fruit borer (70.00%), and (e) biological control of nematodes (75.00%) and aphids and mites (60.00%). The results further revealed that due to the non-availability of neem cake, biofertilizers, and plant protection chemicals the tomato growers could not able to completely apply the recommended dose of organic manure, biofertilizers, and plant protection chemicals to the tomato crop. A vast majority of the tomato growers (96.66%) had marketed their produce at regulated cum wholesale market, while the remaining 3.34 per cent of the tomato growers had marketing their produce at retail market including modern retail outlets. Two-third (66.66%) and a majority (51.66%) of the tomato growers had consulted fellow farmers and APMCs, respectively for collecting information on marketing of tomato, while 23.33 per cent of the tomato growers consulted farm scientists for collecting information on marketing of tomato.

Keywords: Adoption, Farm Scientists, Marketing, Tomato

Tomatoes are a well-known and hugely popular vegetable that are successfully grown throughout the year. The vegetable tomato is indeed highly nutritious and rich of vitamins A, B, and C. Fruits are used in cooking either raw or ripe, while ripe fruits being used to prepare juice, ketchup, sauce, and pickles. The major advantages of growing tomato over other crops are: (1) short duration vegetable crop, (2) important solanaceous vegetable crop which could be grown both indoors and outdoors globally, (3) excellent for use with various cropping systems for grains, pulses, cereals, and oilseeds, (4) produces higher yields, which increases economic value, (5)

Because of their high pro-vitamins A and C content, tomatoes are one among the best contributors of nutrients to the human diet, and (6) large-scale preparations of a variety of processed foods are made for ingestion, additionally for exporting purposes.

Considering the importance of increasing the tomato productivity, the farm scientists have been advocating

How to cite this article: Chandana, C.J., Lakshminarayan, M.T., Ganapathy, M.S., Siddayya and Narayanareddy, R. (2022). Adoption and Marketing Practices of Tomato Growers. *Agro Economist - An International Journal*, 09(03): 193-200.

Source of Support: None; **Conflict of Interest:** None



a good number of recommended cultivation practices for the adoption of the same by the farmers, In spite of the educational efforts, it has been observed that there is slow adoption of these practices by the tomato growers. Further, they put forth many difficulties to practice the recommended cultivation practices it, although few farmers adopt them in full package here and there. There is gap between the available tomato cultivation practices and its application in the farmer's field. Besides, marketing of tomato is more complicated as majority of the farmers are scattered and unorganized. While, tomatoes are one of the few vegetables which has a high fluctuation in price, but it has not deterred farmers from cultivating it. In this backdrop, the present study is taken up with the following objectives:

- ♦ To study the extent of adoption of recommended practices by tomato growers.
- ♦ To analyse the marketing practices of tomato growers.

Methodology

The study was carried out in Madanapalle division of Chittoor district in Andhra Pradesh state during 2022. Among the 26 districts of Andhra Pradesh, the Chittoor district stood first in terms of maximum area under tomato cultivation (32,093 ha) during the year 2020-2001, hence Chittoor district was purposively selected for the study. Out of the three divisions in Chittoor district, Madanapalle division (22098 ha) was again purposively selected for the study since tomato was cultivated in more area as compared to Chittoor (4951 ha) and Tirupathi (5044 ha) divisions during the year 2020-21 (Anonymous, 2022). Five villages each from Madanapalle and Nimmanapalle mandals were randomly selected for the research study. In each village, six tomato growers were again randomly selected for the study. Thus, the total sample constituted 60 tomato growers from ten villages in two mandals of Madanapalle division. The research design adopted for this study was ex-post-facto technique.

Adoption of recommended tomato cultivation practices is operationally defined 'as the extent of recommended cultivation practices followed by tomato growers'. A set of 38 recommended cultivation practices in tomato were identified

consulting Horticulture Scientists of University of Agricultural Sciences, Bangalore. As many as 11 marketing aspects (Table 4) were considered for the study. The farmers were asked to what extent each of the recommended practices were adopted by them and also they were asked to what extent the marketing aspects were followed by them .The collected data were analyzed using frequency and percentage..

RESULTS AND DISCUSSION

1. Adoption of recommended cultivation practices by tomato growers

1.1. Adoption of land preparation, planting and staking practices by tomato growers

A perusal of Table 1 reveals that all the tomato growers had completely adopted/ practiced ploughing (2-3 times) (100.00%), raised bed for planting seedlings (1m width and 30 cm height) (100.00%), drip laying (100.00%), plastic mulching (400 gauge of 100 micron and 5cm diameter of holes) (100.00%), recommended cultivars (Sahoo/ 448/454) (100.00%), age of seedlings (20-25 days old) (100.00%), seedling rate (18000-20000 /ha) (100.00%), seedling treatment before planting (Imidachloropride @ 30% - 25 grams/ha) (100.00%) and staking (15-20 days after transplanting) (100.00%). While, a vast majority of the tomato growers had completely adopted the recommended spacing (90 × 5cm) (83.34%). The above recommended cultivation practices are very essential for raising a successful tomato crop in getting optimum and sustained yields, hence all or a vast majority of tomato growers have completely adopted the recommended technologies such as ploughing, planting seedling in raised bed, drip laying, plastic mulching, cultivars, age of seedlings, seedling rate and seedling treatment before planting (Imidachloropride @ 30% - 25 grams/ha) and staking.

It is also seen from Table 1 that less than half of the tomato growers had completely followed the seedling treatment one day after planting (Copper oxychloride @ 0.3% of 100 grams/ha) (40.00%) and the remaining 60.00 per cent of the tomato growers had not followed the seedling treatment one day after

Table 1: Adoption of land preparation, planting and staking practices by tomato growers (n=60)

Sl. No.	Production technologies	Tomato growers					
		Non-adoption		Partial adoption		Complete adoption	
		No.	%	No.	%	No.	%
1	Ploughing (2-3 times)	0	0.00	0	0.00	60	100.00
2	Preparation of raised bed for planting seedlings (1 m width and 30 cm height)	0	0.00	0	0.00	60	100.00
3	Drip laying	0	0.00	0	0.00	60	100.00
4	Plastic mulching (400 gauge of 100 micron and 5 cm diameter of holes)	0	0.00	0	0.00	60	100.00
5.	Recommended cultivars (Sahoo/ 448/454)	0	0.00	0	0.00	60	100.00
6	Age of seedlings (20-25 days old)	0	0.00	0	0.00	60	100.00
7	Seedling rate (18000-20000 /ha)	0	0.00	0	0.00	60	100.00
8	Seedling treatment before planting (Imidachloropride @ 30% - 25 grams/ha)	0	0.00	0	0.00	60	100.00
9	Spacing (90 × 45 cm)	0	0.00	10	16.66	50	83.34
10	Seedling treatment one day after planting (Copper oxychloride @ 0.3% of 100 grams/ha)	36	60.00	0	0.00	24	40.00
11	Staking (15-20 days after transplanting)	0	0.00	0	0.00	60	100.00

planting (Copper oxychloride @ 0.3% of 100 grams/ha). Due to lack of awareness about the importance of seedling treatment a majority of the tomato growers (60.00%) have not completely followed the seedling treatment one day after planting (Copper oxychloride @ 0.3% of 100 grams/ha).

1.2. Adoption of integrated nutrient management, pruning, training , deleafing and irrigation practices by tomato growers

1.2.1. Adoption of integrated nutrient management practices by tomato growers

In respect of organic manure, it is observed from Table 2 that a majority of tomato growers (60.00%) had completely applied the recommended quantity of farm yard manure (16 tons/ha), while 40.00 per cent of the tomato growers had partially applied the recommended quantity of farm yard manure. One-fourth of the tomato growers (25.00%) had completely adopted the recommended quantity of neem cake (300 kgs/ha), whereas three -fourth of the tomato growers (75.00%) had not applied the recommended quantity of neem cake (300 kgs/ha) to the tomato crop. Only 16.64 and 20.00 per cent of the tomato growers had completely applied the recommended quantity of *Trichoderma viridae* (2 kgs/

ha) and *Pseudomonas* (2 kgs/ha), respectively to the tomato crop.

With respect to the application of fertilizers, all the tomato growers (100.00%) had applied the recommended quantity of fertilizers (100 kgs Diammonium phosphate /ha) as basal dose to the crop and cent per cent of the tomato growers had applied the fertilizers as top dressing after 10-15 days after planting (13-15 kgs/ha of fertilizers) (100.00%). An overwhelming majority of the tomato growers (95.00%) had also applied fertilizers along with water through drips once in a week up to 120 days after planting.

Although the tomato growers have applied a variety of manures (organic and inorganic manures), but few have not completely applied the recommended dose of manures to the tomato crop. Hence, the horticulture extension personnel and farm scientists should educate the tomato growers about the importance of integrated nutrient management practices and encourage the tomato growers to use more of organic manure to the tomato crop. The respondents reported during the interview that due to non availability of biofertilizers they could not apply the recommended dosage to the tomato crop, hence the Andhra Pradesh Horticulture Department should make arrangements for providing the

Table 2: Adoption of integrated nutrient management, pruning, training, deleafing and irrigation practices by tomato growers (n=60)

Sl. No.	Production technologies	Tomato growers					
		Non-adoption		Partial adoption		Complete adoption	
		No.	%	No.	%	No.	%
1	Integrated nutrient management practices						
(A)	Organic manure						
a	Quantity of FYM applied (16 tons/ ha)	0	0.00	24	40.00	36	60.00
b	Application of Neem cake (300 kgs/ha)	45	75.00	0	0.00	15	25.00
c	Biofertilizers						
I	<i>Trichoderma viridae</i> (2kg/ha)	50	83.33	0	0.00	10	16.64
Ii	<i>Pseudomonas</i> (2kg/ha)	48	80.00	0	0.00	12	20.00
(B)	Fertilizers						
a	Quantity of fertilizers applied as basal dose (100 kgs Di-ammonium phosphate /ha)	0	0.00	0	0.00	60	100.00
b	Fertigation (top dressing)						
I	10-15 Days After Planting (DAP) (13-15 kgs/ha of fertilizers)	0	0.00	0	0.00	60	100.00
II	Fertigation once in a week up to 120 DAP (13-15 kgs /ha)	3	5.00	0	0.00	57	95.00
2	10-15 DAP (5 litres of humic acid)	2	3.34	0	0.00	58	96.66
3	Pruning (28 DAP@ an interval of 3-4 days)	55	91.66	0	0.00	5	8.34
4	Training (20,35 and 30 DAP)	0	0.00	0	0.00	60	100.00
5	Deleafing (70 DAP)	57	95.00	0	0.00	3	5.00
6	Irrigation methods/practices						
(a)	Drip irrigation	0	0.00	0	0.00	60	100.00
(b)	Irrigated the crop twice a week	0	0.00	0	0.00	60	100.00

DAP = days after planting.

biofertilizers in adequate quantity at right time nearby villages to the tomato growers.

1.2.2. Adoption of pruning, training, deleafing and irrigation practices by tomato growers

The research data in Table 2 also reveals that a greater majority of the tomato growers (96.66%) had applied 5 liters of humic acid as recommended after 10-15 days after planting. Less number of tomato growers had performed pruning (28 days after planting at an interval of 3-4 days) (8.34%) and deleafing operations (5.00%) to the tomato crop, whereas all the tomato growers (100.00%) had performed training operations after 20,35 and 30 days after planting. Due to inadequate knowledge of the tomato growers on the training and deleafing practices, a vast majority of them could not follow these practices in tomato crop. The extension personnel should motivate the tomato growers to carry out the prerequisite operations such as training and deleafing in tomato crop for getting increased tomato yield.

It is heartening to note that all the tomato growers (100.00%) are irrigating the tomato crop using drip irrigation and the crop is irrigated every twice a week by cent per cent of the respondents (100.00%). Water is an important and scarcity input, hence its utilization and management is very important to obtain better crop production and productivity. Effectiveness in water saving and efficiency in water use are the two important sustainable use of available surface and ground water resources. Over irrigation and its bad impact on physical, chemical and biological properties of soil can be checked when water is used efficiently and economically. Similar results was reported by Karpagam (2000).

1.2.3. Adoption of integrated pest management practices by tomato growers

The findings in Table 3 reveals that the summer ploughing/soil solarization (100.00%), burning of previous crop residues (100.00%) and crop rotation with horse gram, vegetable cowpea, pole beans etc. (100.00%) were the cultural methods followed by

Table 3: Adoption of integrated pest management practices by tomato growers (n=60)

Sl. No.	Production technologies	Tomato growers					
		Non-adoption		Partial adoption		Complete adoption	
		No.	%	No.	%	No.	%
1	Integrated pest management practices						
(a)	Cultural method						
i	Summer ploughing/ soil solarisation	0	0.00	0	0.00	60	100.00
ii	Burning of previous crop residues	0	0.00	0	0.00	60	100.00
iii	Crop rotation (Horsegram, vegetable cowpea, pole beans etc.)	0	0.00	0	0.00	60	100.00
iv	Growing of trap crops (marigold, bendi etc.)	36	60.00	0	0.00	24	40.00
(b)	Mechanical method						
i	Removal of infested plant parts (viral disease)	0	0.00	0	0.00	60	100.00
ii	Use of light traps (5-10 traps/ha)	28	46.67	0	0.00	32	53.33
iii	Use of Pheromone traps (10-15 traps/ha)	29	48.34	0	0.00	31	51.66
(c)	Chemical method						
i	Mites (Dicofol @ 2ml/litre, 1.5 l/ha)	18	30.00	0	0.00	42	70.00
iii	Thrips (Acephate @ 1.5gm/litre, 1kg/ha)	0	0.00	0	0.00	60	100.00
iii	Fruit borer (Corboryl @ 0.1%, 250 ml/ha)	42	70.00	0	0.00	18	30.00
iv	White flies (Imidachloroprid @0.4%, 0.5 kgs/ha)	24	40.00	0	0.00	36	60.00
v	Root knot nematode (Carbofuran @ 40% granules, 8kgs/ha)	0	0.00	0	0.00	60	100.00
(d)	Biological method						
i.	Nematodes (Neem cake @ 300kg/ha 4-5 days before transplanting to the beds)	45	75.00	0	0.00	15	25.00
ii.	Aphids and mites (Pongamia oil @ 5-8 ml/litre, 3 l/ha)	36	60.00	0	0.00	24	40.00

cent per cent of the tomato growers, while trap crops (marigold, bendi etc.) were grown by 40.00 per cent of the tomato growers to control the pests in tomato crop. All the tomato growers had removed the infested viral plant parts (100.00%), whereas a simple majority of the tomato growers had used light traps (5-10 traps/ha) (53.33%) and pheromone traps (10-15 traps/ha) (51.66%) as mechanical methods to control the pests in tomato crop. Since most of the cultural and mechanical methods of controlling tomato pests are simple and are of no/low cost, almost all the tomato growers had completely followed the cultural and mechanical methods of controlling tomato pests. However, only 40.00 per cent of the tomato growers have raised trap crops like bhendi, marigold etc. due to lack of awareness of these practices, hence the horticulture extension personnel should encourage the tomato growers to grow trap crops as one of the cultural method of controlling tomato pests.

Cent per cent of the tomato growers had applied the recommended dose of plant protection chemicals to control thrips (Acephate @ 1.5 gm/litre, 1 kg/ha) (100.00%) and root knot nematode (Carbofuran @ 40% granules, 8 kgs/ha) (100.00%). While, a majority of the tomato growers had applied the recommended dose of plant protection chemicals to control mites (Dicofol @ 2 ml/litre, 1.5 l/ha) (70.00%) and white flies ((Imidachloroprid @0.4%,0.5 kgs/ha) (60.00%). Less than one-third of the tomato growers had applied the recommended dose of plant protection chemicals to control fruit borer (Corboryl @ 0.1%,250 ml/ha) (30.00%). It is also noticed in Table 3 that less than half of the tomato growers (40.00%) had applied the recommended quantity of pongamia oil @ 5-8 ml/litre (3 litres/ha) for controlling aphids and mites, whereas only one-fourth of the tomato growers (25.00%) had applied the recommended quality of neem cake of 300kg/ha 4-5 days before transplanting to the beds for controlling nematodes. Due to non

availability of corboryl, neem cake and pongamia oil, a majority of the respondents were unable to apply the recommended dose to the tomato crop for controlling fruit borer, nematodes and aphids and mites, respectively. The results are in line with the findings reported by Sabu (2020) and Nongri (2022).

It is necessary for the farm scientists and horticulture extension personnel to convenience the tomato growers to follow the integrated pest management practices for controlling the harmful pests in tomato. This could be done by making use of a combination of extension methods such as farm and home visit, demonstration, farm school/farm field schools, exhibitions, field days coupled with the use of mass media for greater utilization of technology by the tomato growers.

2. Marketing practices of tomato growers

The research results in Table 4 revealed that all the tomato growers had studied the available resources and facilities in the area before cultivating tomato (100.00%), understood the customers' needs before

cultivating tomato (100.00%), understood the market distribution system of tomato (100.00%) and collected information about institution/ persons engaged in marketing of tomato(100.00%), while a greater majority of the tomato growers (90.00%) had decided the marketing channel for marketing tomato that will give maximum profit. It is quite obvious that whenever a farmer decides to cultivate a particular crop, he/she will plan to utilize the available resources efficiently, knows the marketing information sources, studies the marketing system and channels and also the customer needs of that area (demand for the crop produce).

Two-third (66.66%) and a majority (51.66%) of the tomato growers had consulted fellow farmers and APMCs, respectively for collecting information on marketing of tomato, while 23.33 per cent of the tomato growers consulted farm scientists for collecting information on marketing of tomato. Fifteen per cent each of the tomato growers had read newspaper and viewed television for collecting information on marketing of tomato, whereas 11.66

Table 4 : Marketing practices of tomato growers (n=60)

Sl. No.	Marketing practices	Tomato growers	
		No.	%
1	Studied the available resources and facilities in the area before cultivating tomato	60	100
2	Understood the customer's needs before cultivating tomato	60	100
3	Understood the market distribution system of tomato	60	100
4	Collected information about institution/ persons engaged in marketing of tomato	60	100
5	Decided the marketing channel for marketing tomato that will give maximum profit	54	90.00
6	Sources of collecting market information		
(a)	Newspaper	9	15.00
(b)	Radio	11	11.66
(c)	Television	9	15.00
(d)	APMCs	31	51.66
(e)	Fellow farmers	40	66.66
(f)	Internet	6	10.00
(g)	University scientists	14	23.33
7	Type of market used for sale of tomato		
(a)	Regulated cum Wholesale market	58	96.66
(b)	Retail market including modern retail outlets	2	3.34
8	Grading of tomato	60	100.00
9	Packing of tomato by improved methods (crates)	60	100.00
10	Vehicle used for transporting tomato		
(a)	Own vehicle	20	33.33
(b)	Private vehicle	38	63.33
(c)	Public vehicle	2	3.34
11	Value addition for tomato produce	0	0.00

and ten per cent of the tomato growers had listened to radio and viewed the internet, respectively for collecting information on marketing of tomato. It can be inferred that the tomato growers have utilized as many as seven consultancy sources for obtaining information on tomato marketing.

A vast majority of the tomato growers (96.66%) had marketed their produce at regulated cum wholesale market, while the remaining 3.34 per cent of the tomato growers had marketing their produce at retail market including modern retail outlets. The regulated and wholesale markets provide competitive price and other logistics facilities, further these markets eliminates the fraudulent practices adopted by commission agents. Hence, a vast majority of tomato growers have marketing their produce at regulated cum wholesale markets.

All the tomato growers had graded the produce (100.00%) before marketing it and packing of tomato by improved methods (crates) was also followed by cent per cent of the tomato growers (100.00%). Grading and packing of tomato by improved methods will help the farmers in minimizing the wastage of tomato and helps in earning more income and profit.

A majority of tomato growers had transported for marketing the produce using private vehicle (63.33%), while one-third (33.33%) and 3.34 per cent of the tomato growers had used their own vehicle and public vehicle for transporting produce for marketing, respectively. It can be inferred from the findings that a little less than two-third of the tomato growers (63.33%) have used their own vehicle to transport tomato for marketing, while the remaining number of tomato growers (36.67%) were dependent on private vehicles and public transport for transporting the tomato for marketing the same. It is very disheartening to note that none of the tomato growers were involved in value addition of the produce and they have sold the produce immediately after harvesting. More or less similar findings were reported by Pallabi Phukan *et al.* (2018) and Rashmi (2018).

CONCLUSION

It was observed from the research results that majority of the tomato growers had not completely

followed: (a) seedling treatment one day after planting (Copper oxychloride @ 0.3% of 100 grams/ha) (60.00%), (b) application of neem cake (75.00%) and biofertilizers *viz.*, *Trichoderma viridae* (83.33%) and *Pseudomonas* (80.00%), (c) pruning (91.66%) and training operations (95.00%), (d) growing of trap crops (60.00%), (e) chemical control of fruit borer (70.00%), and (f) biological control of nematodes (75.00%) and aphids and mites (60.00%). Hence, the Farm Universities, Andhra Pradesh State Department of Horticulture, Indian Council of Agricultural Research Institutes, etc., must educate the tomato growers regarding the advantages of the above-mentioned technologies through extension activities (demonstrations, discussion, meetings, farmers field school, horticultural campaigns, field visit, etc.) leading to the adoption of the same in the farmers' fields for getting increased yield and income.

The study results also revealed that due to the non-availability of neem cake, biofertilizers, and plant protection chemicals the tomato growers could not able to completely apply the recommended dose of organic manure, biofertilizers, and plant protection chemicals to the tomato crop, therefore the Andhra Pradesh Horticulture Department should make arrangements for the timely supply of neem cake, biofertilizers and plant protection chemicals in adequate quantity and at nearby villages to the tomato growers. Above all, the government may consider in providing a minimum support price to tomato, and limiting the area under tomatoes which helps in avoiding distress sales by tomato growers.

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