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Practice wise extent of adoption of Tomato growers in Annamaya District of Andhra Pradesh

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Abstract

Tomato (*Lycopersicum esculentum*) belongs to the genus Lycopersicum under the Solanaceae family. Tomato is a fruit that is almost universally treated as a vegetable and a perennial plant that is almost universally treated as an annual.Tomato is a well-known and very popular vegetable grown successfully throughout India.Tomato is a highly nutritive vegetable which is a rich source of vitamins A, B and C. Tomato is a major vegetable crop that has achieved tremendous popularity over the last century. It is grown in practically every country of the world - in outdoor fields, greenhouses, and net houses. Most of the farmers had a medium level of adoption ontomatocultivation.

Key words : Adoption, Tomato growers. Annamaya District.

Tomato (*Lycopersicum esculentum*) belongs to the genus Lycopersicum under the Solanaceae family. Tomato is a fruit that is almost universally treated as a vegetable and a perennial plant that is almost universally treated as an annual. The genus Lycopersicum of the Solanaceae family is believed to have originated in the coastal strip of western South America, from the equator to about 30° latitude south. The species is native to South America, primarily in Peru and the Galapagos Islands. It is believed that tomato was first domesticated in Mexico as seeds were taken to Europe from Mexico after Cortez conquered Mexico City in 1519.

The designation of the tomato fruit as "Moor's apple" (Italian) or "love apple" (French) during the 16th century is unverified, but commonly believed. The colour of the fruit first noted in Italy was yellow. By the 18th century, the tomato began to be used as an edible food, although it was still listed as being among the poisonous plants. Tomato is a major vegetable crop that has achieved tremendous popularity over the last century. It is grown in practically every country of the world - in outdoor fields, greenhouses, and net houses.

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Tomato is a highly nutritive vegetable which is a rich source of vitamins A, B and C. The tomatoes are used either raw or ripe for culinary purposes and ripe fruits for processing into various products like juice, jam, ketchup, sauce, and pickles. It promotes gastric secretion and acts as a blood purifier. Tomato is one of the most economically important crops of all those that exist in the world. Economically speaking, tomatoes are worth a tremendous amount of money because they give more yield.

Andhra Pradesh produces 36% of tomatoes in the country and is the leading producer of tomatoes involving a production of 250.30 thousand metric tonnes from an area of 44.50 thousand hectares with a productivity of 15.05Mt/ha. The main tomato producing areas are Prakasam, Madanpalle, Palamneru.

In Anamaya district horticulture crops are grown in an extent of 1.05 lakh hectares including fruits and vegetables. Out of 21199 hectares of vegetables, tomato is grown to an extent of 16000 hectares as a predominant vegetable crop. Tomato is grown in 49 mandals in the western parts of the district. It is grown in 2 seasons i.e., Kharif and Rabi. It is cultivated in an extent of area 8077 hectares in the kharif season and 4908 hectares in Rabi.

Advantages of growing tomatoes :

1. High yield of the crop which results in high economic value.
2. Have very high nutritional value with high levels of pro-vitamin A and C. As well as being ranked first in their nutritional contribution to the human diet.
3. Short duration of the crop.
4. Very well suited for different cropping systems that are used on grains, pulses, cereals, and oilseeds.

Extent of adoption refers to measure how far the technology was adopted by an individual correctly without any distortion of message. Rogers (1983) defined adoption as a decision to make use of an innovation as the best course of action available.

In this study,36 recommended tomato technologies were selected to study the extent of adoption. Everyone was asked about adoption and non-adoption against each item. The score of two was allotted for adoption and non-adoption received one score. The scores for all these items were added up for each respondent and the total adoption score was calculated. For constructing an adoption index, the procedure was followed by Kannan (2022).

Adoption index= (respondents total score)/(total possible score) ×100

The score was obtained for each of the recommended items by adding the scores obtained by an individual farmer on each item and indices were worked out. The items of the recommended practices were also categorized into low, medium, and high by using percentage analysis.

Findings :

Extent of adoption of recommended to mato cultivation practices :

To assess the overall extent of adoption of the recommendedcultivation practices of tomato by the tomato growers, necessary data werecollected and the respondents

were categorized into three groups viz., low,medium, and high by using mean and standard deviation and the results were presented in Table-1.

Table-1. Distribution of respondents based on the extent of adoption

(n=120)

S. No.	Extent of adoption	Number	Percent
1.	Low	20	17.00
2.	Medium	72	60.00
3.	High	28	23.00
	Total	120	100.00

From the Table 1,60.00 per cent of the respondents were in the category of medium exten to fadoption of recommended cultivation practices followed by high (23.00 per cent) and low (17.00 per cent) extent of adoption. Majority of the respondents were having medium levels of scientific orientation, achievement orientation, management orientation and knowledgeon recommended cultivation practices. These along with low levels of credit orientation, market facilities might be there as ons formediumexten to fadoption. Lack of family labour and farm labour coupled with high cost of labour also might have contributed much in lowering the extent of adoption by the tomato growers.

Competent authorities should show their attention in imparting moretrainings to the farmers, inculcate the urge to achieve more and more from the field and raise their economi c orientation, develop good management orientation and mobilize more numbers of middle aged and youngsters intoagricul turalact ivitiestoinc reasetheextent of adoption of recommended practices to ahighlevel from the present medium level. The result was in conformity with the results of Subhadeeproy and Rekha[2] and Tamil Selven[3].

Practice wise extent of adoption of recommended farming practices by the tomato growers :

The extent of adoption of the respondents depends on the knowledge level of the respondents. Knowledge of innovations could create motivation for adoption. Hence, an attempt was made to assess the adoption level of the tomato growers on precision farming practices.

1. Climate

From the Table 2 it was observed that 83.33 per cent of the respondents had taken up correct climate.

2. Variety

The varieties are very important for getting higher yield in precision farming. From the table it is found that all the respondents (100.00 per cent) had adopted the recommended varieties.

3. Season of sowing

More than half of the respondents (74.17 per cent) had adequate knowledge on right season of sowing and the respondents had taken up sowing at correct season.

4. Seed rate

Seed rate is very much essential for obtaining optimum population and higher yields. From the table it is found that 91.67 per cent of the respondents had adopted the recommended seed rate, this is because of their high knowledge level.

Table-2. Practice wise extent of adoption of recommended farming practices by the tomato growers

(n=120)

S. No.	Recommended practices	Number	Percent
1.	**Climate**		
	Optimum temperature (21-24 C)	100	83.33
2.	**Variety**		
	Recommended tomato variety (P-448, P-440)	120	100.00
3.	**Season of sowing**		
	Recommended season of sowing(April-May)	89	74.17
4.	**Seed Rate**	110	91.67
5.	**Seed treatment**		
	i) Recommended bio-fertilizer	81	67.50
	ii) Recommended quantity of bio-fertilizer	74	61.67
	iii) Recommended time of application of biofertilizer	74	61.67
	Mean percentage		**63.61**
6.	**Nursery Bed Preparation**		
	i) Portray Nursery	94	78.33
	ii) Shade net for nursery	93	77.5
	iii) Seed treatment with Azospirillum	81	67.5
	iv) Recommended method of sowing	83	69.17
	Mean percentage		**73.13**
7.	**Nursery Management**		
	i) Recommended method of Irrigation	108	90.00
	ii) Panchakavya spray (%)	46	38.33
	iii) Drenching of NPK + Micronutrients@0.5%	99	82.50
	Mean percentage		**70.28**
8.	**Main Field Preparation**		
	i) Recommended method of ploughing	102	85.00
	ii) Recommended quantity of FYM	70	58.33
	iii) Basal application of 75% of recommendeddose of Super Phosphate	97	80.33
	iv) Application of recommended quantity of Bio fertilizers	61	50.83
	v) Application of pre-emergence herbicides	87	72.50
	Mean percentage		**69.50**
9.	**Transplanting**		
	i) Transplanting of seedlings on 25-30 days	93	77.50

	ii) Optimum space for transplanting(P×P-45-75 cm, R×R-60-120 cm)	102	85.00
	iii) Gap filling	105	87.50
	Mean percentage		**83.33**
10.	**Irrigation Management**		
	i) First irrigation immediately aftertransplanting	115	95.83
	ii) Light irrigation given at 3-4 days interval in summer and 10-15 days interval in winter	103	85.83
	iii) Drip irrigation	105	87.50
	Mean percentage		**89.72**
11.	**Fertigation**		
	i) Application of manures (FYM @20-25/ha) as basal	111	92.50
	ii) NPK@120kg: 60kg:60kg and nitrogen applied in three splits as basal	105	87.50
	iii) Borax 10kg/ha as basal	67	55.83
	Mean percentage		**78.61**
12.	**Weed Management**		
	i) Apply Pendimethalain 1kg a.i./ha	85	70.83
	ii) Hand weeding	120	100
	Mean percentage		**85.41**
13.	**Inter cultivation**		
	i) Foliar application of *Pseudomonas fluoroscens*	108	90.00
	ii) Staking by using Bamboo on 30 th day after planting	83	69.17
	iii) Application of Triacontanol (1.25ppm) on the 5th and 30th day of planting	61	50.83
	iv) Application of Plano fix spray (0.25ppm) at 45^{th}, 60^{th}, 90^{th} days after planting	51	41.67
	Mean percentage		**62.91**
14.	**Plant Protection (Pest Management)**		
	i) Fruit Borer		
	a) Planting of one row of American marigold seedling for every 16 rows of tomato cultivation.	81	67.50
	b) Manual collection and destruction of affected plants	60	50.00
	c) *Bacillus thuringiensis* spray	71	59.17
	d) Application of Carbonyl 0.2kg/ha	89	74.17
	e) Time of Application of Pesticides	82	68.33
	ii) Aphids		

	a) Yellow sticky traps	57	47.50
	b) Application of methyl dematon at 2ml/litre	95	79.17
	c) Time of Application	82	68.33
	Mean percentage		**64.27**
15	**Disease Management**		
	i) Leaf curl		
	a) Neem seed carnel extract spray@3%	92	76.67
	b) Planting of sorghum,Subabul around the field	84	70.00
	c) Application of Phasalone 2ml/litre	74	61.67
	ii) Fusarium wilt		
	a) Seed treatment with Trichoderma viridi @4gm/kg of seed	100	83.33
	Mean percentage		**72.91**
16.	**IPM**		
	a) Seed treatment with Pseudomonas fluorescens	102	85.00
	@10 g /kg of seeds		
	b) Application of Neem cake 2250kg/ha	70	58.33
	c) Soil application of P.fluorescens @2.5kg/ha	67	55.83
	d) Spraying neem formulations (1%) and Neem seed kernel extract (5%)	57	47.50
	Mean percentage		**61.66**
17	**Harvesting**		
	Recommended time of Harvest	120	100

5. Seed treatment

The respondents had 67.50 per cent adoption rate on recommended bio fertilizer followed by 61.67 on recommended quantity of bio fertilizer and 61.67 per cent on recommended time of application of bio fertilizer.

6. Nursery bed preparation

The mean adoption score for nursery bed preparation was 73.13 per cent. Portray nursery (77.5 per cent) and shade net nursery (78.33 per cent) is adopted by more than 75 per cent of the respondents and the practices such as recommended method of sowing and seed treatment with Azospirillum was found to be adopted by 69.17 per cent and 67.50 per cent of respondents. The respondents might have adopted these practices because it helps better seed germination and vigorous growth of plants.

7. Nursery management

The mean adoption score of (70.28 per cent) was observed for nursery management. Majority of the respondents had adopted the practices namely drenching of NPK+ micro nutrient solution at 0.5per cent (82.50 per cent) and recommended method of watering by

using rose cane (90.00 per cent), but the application of Panchakavya spray was adopted only by (38.33 per cent) of the respondents this might be due to lack of knowledge and interest of the respondents.

8. Main field preparation

The mean adoption percentage under main field preparation was 69.50 per cent. Majority of respondents had adopted the recommended number of ploughing (85.00 per cent), the recommended quantity of FYM was adopted by 80.83 per cent of respondents and basal application of recommended quantity of super phosphate by 72.50 per cent of respondents. 57.5 per cent of the respondents had adopted recommended quantity of bio-fertilizer, but the application of pre-emergence herbicide was adopted by only 50.83 per cent of the respondents. The main reason for the non- adoption of the weedicide might be due to high cost of chemicals and lack of knowledge.

9. Transplanting

The mean adoption percentage score for planting was found to be high (83.33 per cent). Around 80 per cent of the respondents had adopted the practices namely age of seedlings (77.50 per cent), recommended spacing (85.00 per cent) and gap filling (87.50 per cent). Majority of the respondents might have adopted these practices as all these practices are important to maintain optimum population to get higher yield.

10. Irrigation Management

Majority of the respondents followed recommended first irrigation immediately after transplanting (95.83 per cent), followed by drip irrigation systems (87.50 per cent) and light irrigation @ 3-4 days interval in summer and 10-15 days interval in winter (85.83 per cent). Subsidy is given by the state government for installing drip irrigation system in tomato fields under precision farming and hence all the respondents had Installed drip system.

11. Fertigation

The mean adoption percentage score for fertigation was found to be 78.61 per cent. The recommended quantity of application of manures was adopted by 92.50 per cent and NPK mixture as split dose was adopted by 87.50 per cent of respondents and the recommended time of application of borax was adopted by 55.83 per cent of the respondents. The non-adoption of these practices might be due to the high cost of fertilizers, non-availability of fertilizers at peak time and non-availability of labour.

12. Weed management

The mean adoption percentage score for weed management was found to be 85.41 per cent. The hand weeding was adopted by all the respondents whereas the recommended quantity of application of Pendimethalin was adopted by 70.83 per cent of the respondents.

13. Inter cultivation

The mean adoption percentage score for inter cultivation was found to be 62.91 per cent. Among the inter cultivation practices, foliar application of *Pseudomonas fluorescens* (90.00 per cent) were adopted by majority of the respondents. The other practices namely staking by using bamboo on 30th day after planting (69.17per cent), application of Triacontanol (50.83 per cent) and application of Plano fix spray (41.67 per cent) were found to be adopted by less than seventy per cent of the respondents. The lack of visible impact of

these practices on crop growth and yield might be the reason for non-adoption of these practices.

14. Pest management

The mean percentage score of adoption on pest management fruit was found to be 64.27 per cent. For fruit borer the time of application of pesticide were found to be adopted 68.33 per cent of the respondents, 50.00 per cent respondents had adopted manual collection and destruction of affected plants, planting of one row of American marigold seedlings for every 16 rows of tomato seedlings was adopted by 67.50 per cent of the respondents. The practices namely *Bacillus thuringiencis* spray 2g/lit was adopted by around fifty per cent of the respondents (59.17 per cent). The non-adoption may be due to their lack of complete information and non- availability of bacterial extract in time. The respondents revealed that they would prefer chemical application due to its immediate effect on pest control.

More than seventy per cent of the respondents had adopted the practice namely application of Methyl Demeton (or) Dimethoate 82 ml/lit (79.17 per cent) and time of application of pesticide (68.33 per cent) for controlling aphids. Only less than half the proportion of respondents had adopted yellow sticky traps (47.50 per cent). The non-adoption may be due to lack of adequate knowledge on these practices.

15. Disease management

The mean percentage score of adoption on disease management was (72.91 per cent). Majority of the respondents (76.67 per cent) had adopted neem seed kernel extract spray. The fusarium wilt management practices such as root drenching with Carbendazim @ 2gm/lt and seed treatment with *Trichoderma viridi* @ 4gm/kg of seeds were adopted by (83.33 per cent) The leaf curl management practices such as planting of sorghum around the field were adopted by (70.00 per cent) of respondents and application of Phasalone @ 2ml/lit had adopted by (61.67 per cent) of respondents. The non-adoption may be due to lack of adequate knowledge on these practices.

16. IPM

The mean percentage score of adoption on integrated pest management was (61.66 per cent). Majority of the respondents (85.00 per cent) had adopted Seed treatment with *Pseudomonas fluorescens* @1 kg /kg of seeds followed by Soil application of *P. fluorescens* @2.5kg/ha (55.83 per cent), Spraying neem formulations (1%), Neem seed kernel extract (5%) (47.50 per cent) and application of neem cake (58.33 per cent). The non-adoption may be due to lack of adequate knowledge on these practices.

17. Harvesting

All the respondents had adopted the recommended time of harvesting (100.00 per cent). These respondents were aware of harvesting.

Summary

Among the respondents, 60.00 per cent were in the category of medium extent of adoption of recommended cultivation practices followed by high (23.00 per cent) and low (17.00 per cent) extent of adoption.

Practice-wise Extent of adoption of recommended package of practices of tomato cultivation

1. Majority of the respondents (83.33 per cent) had adopted the recommended climate for the recommended practices.
2. All the respondents (100.00 per cent) reported that they had adopted the recommended varieties.
3. Majority of the respondents (74.17 per cent) adopted the correct season of sowing, 91.67 per cent of the respondents had adopted the recommended seed rate and the mean score of 63.61 per cent of the respondents had adopted the recommended seed treatment.
4. Portray nursery (78.33 per cent) and shade net nursery (77.50 per cent) is adopted by more than seventy-five per cent of the respondents and practices such as the recommended method of sowing and seed treatment with Azospirillum were found to be adopted by 69.17 per cent and 67.50 per cent of respondents.
5. Majority of the respondents had adopted the practices namely drenching of NPK+ micronutrient solution @0.5% (82.50 per cent) and recommended method of watering by using rose cane (90.00 per cent), but the application of Panchakavya spray was adopted only by (38.33 per cent) of the respondents.
6. Majority of respondents had adopted the recommended number of ploughing (85.00 per cent), the recommended quantity of FYM was adopted by 58.33 per cent of respondents and the basal application of a recommended quantity of super phosphate by 80.33 per cent of respondents. 50.83 per cent of the respondents had adopted the recommended quantity of bio-fertilizer, but the application of pre-emergence herbicide was adopted by only 72.50 per cent of the respondents.
7. Majority of the respondents had adopted the practices namely age of seedlings (77.50 per cent), recommended spacing (85.00 per cent) and gap filling (87.50 per cent).
8. Majority of the respondents recommended first irrigation immediately after transplanting (95.83 per cent), followed by drip irrigation systems (87.50 per cent) and light irrigation @ 3-4 days intervals in summer and 10-15 days intervals in winter (85.83 per cent).
9. Majority of the respondents had adopted the recommended quantity of NPK mixture as split dose was adopted by 80.83 per cent of respondents and the recommended time of application of fertilizers was adopted by (79.17 per cent) of the respondents.
10. Majority of the respondents had adopted the inter-cultivation practices and foliar application of *Pseudomonas fluorescens* (90.00 per cent). The other practices namely staking by using bamboo on the 30th day after planting (69.17per cent), application of Triacontanol (50.83 per cent) and application of Plano fix spray (41.67 per cent) were found to be adopted by less than seventy per cent of the respondents.
11. For fruit borers the Time of application of pesticide were found to be adopted by 68.33 per cent of the respondents, 50.00 per cent of respondents had adopted manual collection and destruction of affected plants, Planting of one row of American marigold seedlings for every 16

rows of tomato seedlings was adopted by 67.50 per cent of the respondents. The practice namely *Bacillus thuringiencis* spray 2g/lit was adopted by around fifty per cent of the respondents (59.17 per cent).

12. More than seventy per cent of the respondents had adopted the practice namely application of Methyl Demeton (or) Dimethoate 82 ml/lit (79.17 per cent) and time of application of pesticide (68.33 per cent) for controlling aphids.
13. Only less than half the proportion of respondents had adopted yellow sticky traps (47.50 per cent). The non-adoption may be due to a lack of adequate knowledge of these practices.
14. The leaf curl management practices such as planting of sorghum around the field were adopted by 70.00 per cent of respondents and the application of Phasalone @ 2ml/lit had adopted by 61.67 per cent of respondents. The non-adoption may be due to a lack of adequate knowledge of these practices.
15. Majority of the respondents (76.67 per cent) had adopted neem seed kernel extract spray. The fusarium wilt management practices such as root drenching with Carbendazim @ 2gm/lt and seed treatment with Trichoderma viridi @ 4gm/kg of seeds were adopted by (83.33 per cent).
16. Majority of the respondents (85.00 per cent) had adopted Seed treatment with Pseudomonas fluorescens @10 kg /kg of seeds followed by Soil application of P. fluorescens @2.5kg/ha (55.83 per cent), Spraying neem formulations (1per cent) and Neem seed kernel extract (5%) (47.50 per cent) and (58.33 per cent).
17. The entire respondent had adopted the recommended time of harvesting (100.00 per cent).

References :

1. Kannan, G. (2022). A Study on Knowledge and Adoption Behaviour of Groundnut Growers in Dharmapuri District, **Unpublished M.Sc., (Ag.) Thesis,** Department of Agricultural Extension, Annamalai University, Annamalai Nagar.
3. Tamil Selvan, M, (2019). A study on precision and utilization of eco-friendly Farming practices among the farmers in erode district, Unpublished M, Sc. (Ag.,) Thesis. Annamalai university, Annamalai Nagar.
2. Subhadeeproy and Rekha, (2012). *Indian Journal of Extension Education. 48*(1&2): 78-80.