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Research Journal of Agricultural Sciences
Volume 14; Issue 03 (May-Jun 2023); pp 638–641

ISSN: 0976-1675 (P)
ISSN: 2249-4538 (E)

Full Length Research Article

Adoption of Sorghum Practices by Farmers under Agricultural Technology Management Agency (ATMA) in Dindigul District of Tamil Nadu

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Abstract

Various Transfer of Technology (TOT) is implemented by the Government of India for the socio-economic development and welfare of farmers. ATMA programme is one among them which is pilot tested in 1999 under the National Agricultural Technology Project (NATP) in 28 districts of seven states in India which gave a positive outcome of the result in the dissemination of innovative technology. The present study was conducted in Dindigul district of Tamil Nadu to know the adoption per cent of farmers who had attended training on sorghum production technology. The trainees list was obtained from the State Department of Agriculture. A sample size of 120 respondents were selected by using a proportionate random sampling method. An ex-post facto research design was used. The collected data were tabulated and analyzed using appropriate statistical tools. This study revealed that more than half of the respondents (51.67 per cent) had a medium level of adoption of sorghum production technology recommended by ATMA.

***Key words*:** ATMA, Sorghum, Adoption, Technology, Practice-wise adoption

Sorghum (*Sorghum bicolor* L.) is a native place of Africa. It is the world's fifth most important cereal crop after wheat, rice, maize, and barley. Millions of people in Africa and Asia depend on sorghum as their staple food. It is considered as King of Millets and is extensively grown in semi-arid tracks of Africa, China, and India. The USA has the largest share of the global sorghum area, while the maximum production of sorghum occurs in the USA. India's sorghum production of about 4.73 million tons of sorghum grains from an area of 4.71 million ha and productivity of 1005 kg/ha (Source: Directorate of Economics & Statistics, DAC&FW, 2019). In India, the crop is primarily grown in Maharashtra, Karnataka, Tamil Nadu, Rajasthan, and Andhra Pradesh [1].

Agriculture Technology Management Agency (ATMA) started in 2005 and it is a district-level body created under the Innovation in Technology Dissemination (ITD) component of the National Agricultural Technology Project (NATP). This is an autonomous institution with the participation of all key stakeholders involved in agricultural development during 1999. ATMA is a decentralized and demand-driven extension mechanism that would focus more on diversification and increasing farm income and rural employment [2]. The concept of ATMA envisages a paradigm shift from "top-down" to "bottom-up" in the planning and implementation of agriculture development programmes. It is a registered society responsible for technology dissemination at the district level through SREP (Strategic Research and Extension Plan) [3].

ATMA has the main responsibility for the technology dissemination activity at the district level. To attain sustainable growth in agriculture the present concentration of service was given to the market-led extension for the farmers from the State Department of Agriculture [4]. To increase agricultural production, it is not only necessary to accelerate improved technologies appropriate to the farm situation, but there must also be systematic efforts to transfer the relevant technologies from the research system to the ultimate users, the farmers. Thus, extension functionaries should be updated with the latest technologies so as to improve their knowledge and skill regarding transfer of technologies, which is possible through periodical pre-in-service training programmes [5].

MATERIALS AND METHODS

The present study was conducted in Dindigul district of Tamil Nadu. Out of the fourteen blocks in Dindigul district three blocks namely Sanarpatty, Vadamadurai and Dindigul were selected based on the respondent's list obtained from the State Department of Agriculture were more number of respondents had participated. Sorghum practices were purposely selected as the study focused on Agriculture. A list

Received: 01 Feb 2023; Revised accepted: 20 Apr 2023; Published online: 04 May 2023

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Citation: V. Sandhiya, Balakrishnan T, Sakthivel V. 2023. Adoption of sorghum practices by farmers under Agricultural Technology Management Agency (ATMA) in Dindigul district of Tamil Nadu. *Res. Jr. Agril. Sci.* 14(3): 638-641.

of trainees who attended the training on sorghum production technology was obtained from the State Department of Agriculture. A sample size of 120 respondents were selected by using a proportionate random sampling method. An ex-post facto research design was used in the study. Percentage analysis was computed to study the practice-wise adoption of the respondents on recommended sorghum production technology.

RESULTS AND DISCUSSION

Adoption level of the respondents on sorghum practices recommended by ATMA

The results obtained from the present study as the relevant discussion is presented below.

Table 1 Distribution of the respondents according to their adoption level about the sorghum practices recommended by ATMA (n=120)

S. No.	Category	Number of respondents	Per cent
1	Low	32	26.67
2	Medium	62	51.67
3	High	26	21.67
	Total	120	100.00

It could be observed from (Table 1) that more than half of the respondents (51.67 per cent) fell under the medium category followed by 26.67 per cent of the respondents fell under low adoption category and 21.67 per cent of the respondents fell under high adoption category. Hence it may be inferred that most of the respondents (78.34 per cent) had medium to low adoption levels for the recommended sorghum crop practices. The training given by the ATMA is playing a significant role in increasing the adoption level of the respondents.

Practice-wise extent of adoption of the respondents about the sorghum practices recommended by ATMA

The results on the distribution of respondents according to their practice-wise adoption of recommended practices are furnished in (Table 2).

Table 2 Distribution of the respondents according to their practice-wise adoption of sorghum practices (n=120)

S. No.	Recommended Practices	Number of respondents	Per cent
I	Field preparation		
1.	FYM @ 12.5 t/ha	96	80.00
II	Varieties		
2.	Variety (K11, BSR 1, APK 1 and CO (S) 28)	67	55.83
III	Seed rate		
3.	Seed rate (Rainfed-15kg/ha)	82	68.33
IV	Seed Treatment		
4.	Seeds pre-soaked in KCL solution for seed hardening	85	70.83
5.	Seed treatment with Bio-fertilizer and Azospirillum	96	80.00
6.	Seed treatment with 2 kg of Azospirillum and 2 kg of Phosphobacteria with 25kg of FYM + 25kg of soil	90	75.00
7.	Seed treatment with Thiram or Bavistin@ 2g/kg of seeds	70	58.33
	Mean percentage		71.04
V	Spacing and Sowing		
8.	Spacing(45x15cm)	98	81.66
9.	Depth of sowing (not less than 2 to 3 cm)	100	83.33
	Mean percentage		82.49
VI	Nutrient Management		
10.	NPK (40:20:0) kg / ha fertilizer application	75	62.50
11.	Split doses for NPK application as 50 % basal + 25 DAS	55	45.83
	Mean percentage		54.16
VII	Integrated Weed Management		
12.	Pre-emergence herbicide application of Atrazine @ 500 g / ha (0.25kg / ha)	46	38.33
13.	First-hand weeding done at 15DAS	95	79.16
14.	Second-hand weeding done at 30-35 DAS	92	76.66
	Mean percentage		64.71
VIII	Plant protection measures		
I	Pest Management		
a)	Cultural Control		
15.	Suitable Season for Sowing (June to July)	108	90.00
16.	Raising pest and disease resistant varieties	64	53.33
17.	Summer ploughing	95	79.16
18.	Crop rotation	82	68.33
19.	Roughing of crop residues	83	69.16

	Mean percentage		71.99
b)	Mechanical Control		
20.	Use of pheromone trap	50	41.66
21.	Use of solar light trap	42	35.00
22.	Removal of dead heart-affected plant	90	75.00
	Mean percentage		50.55
c)	Chemical Control		
	Insecticide Application		
	Malathion 5 D @ 25 kg/ha		
23.	Dicofol 18.5 EC 1500 ml/ha	42	35.00
	Endosulfan 35 EC 750 ml/ha		
	Methyl demeton 25 EC 12 ml/ha)		
	ETL for Spraying Pesticide		
24.	(1. Shoot fly 1egg/plant- (Seed treatment with Imidacloprid 70WS)	30	25.00
	2. Ear head caterpillar-2/earhead (Pheromone trap 12/ha))		
	Mean percentage		30.00
II	Disease Management		
	Seed treatment with fungicides (Mancozeb @ 1 kg/ha		
25.	Captan @ 1 kg + Aurofungin sol.100 g/ha	45	37.50
	Trichodermaviride @ 4 g/kg of seed)		

Field preparation

Eighty per cent of the respondents adopted recommended Farm Yard Manure (FYM t/ha) for sorghum cultivation. A vast majority of the respondents had higher level of adoption about field preparation to get more yield and this would have resulted in higher adoption. This might be due to their positive attitude towards the adoption of Farm Yard Manure (FYM) which has been adopted for many years. Further FYM application will enhance crop growth and enrich the soil.

Selection of variety

It is observed from (Table that more than half of the respondents (55.83 per cent) cultivated the recommended sorghum varieties. This might be due to the less availability of the seeds of recommended sorghum varieties K11, BSR 1, APK 1 and CO (S) 28.

Seed rate

Around seventy per cent (68.33 per cent) of the respondents adopted the recommended seed rate. Some of the respondents felt that there may be the possibility of seedlings loss during germination due to heavy rain, hence they have adopted a more seed rate than the recommended quantity.

Seed treatment

The mean adoption percentage of seed treatment was (71.04 per cent). Among the sub-items under seed treatment, seed treatment with bio-fertilizer (Azospirillum and Phosphobacteria) was adopted by eighty per cent of the respondents. Recommended quantity of Bio-fertilizer for seed treatment (2 kg of Azospirillum and 2 kg of Phosphobacteria with 25 kg FYM + 25 kg of soil) was adopted by (75.00 per cent) of the respondents, Seeds presoaked in KCL solution for seed treatment was adopted by (70.83 per cent) of the respondents. Seed treatment with Bavistin or thiram were adopted by (58.33 per cent) of the respondents. Moreover, the bio-fertilizer packets are distributed by the government at free of cost. This would enable the respondents to adopt the practices.

Spacing and sowing

The mean adoption percentage of spacing and sowing were (82.49 per cent). Recommended spacing for sorghum were adopted by (81.66 per cent) of the respondents. The majority of the respondents (83.33 per cent) adopted the recommended sowing depth of sorghum.

Nutrient management

The mean adoption percentage under nutrient management is (54.16 per cent). Among the sub-items under nutrient management, the application of a recommended quantity of N, P, K fertilizer (40:20:0 kg / ha) and recommended split doses of fertilizer were adopted by (62.50 per cent) and (45.83 per cent) of the respondents respectively. This might be due to the lack of information about NPK fertilizers and micronutrients application.

Integrated weed management

The mean per cent of adoption under integrated weed management was (64.71 per cent). Around eighty per cent of the respondents reported that first-hand weeding and second-hand weeding were done regularly. Hand weeding was adopted by most of the respondents because it is the simple and traditional method. In addition, hand weeding helps in better soil aeration and the weeds pulled out are puddles in the soil. Recommended pre-emergence herbicide application of atrazine @ 500 g / ha was adopted by (38.33 per cent). The high cost of pre-emergence herbicide may be the reason for the low adoption level and farmers might have felt that it is an environmental hazard [6].

Plant protection measures

Pest management

Cultural control

The mean per cent score of adoption for cultural control were (71.99 per cent). Among the sub-items of cultural control, the recommended season for sowing for rainfed sorghum was reported by (90.00 per cent) of the respondents. Nearly eighty per cent of the respondents reported that summer ploughing was done regularly. Around seventy per cent of the respondents adopted the practices roughing of crop residues and crop rotation. More than fifty per cent of the respondents have adopted raising pest and disease-resistant varieties.

Mechanical control

The mean score of adoption percentage for mechanical control was (50.55 per cent). Among the sub-items of mechanical control, three-fourths of the respondents adopted the removal of dead heart-affected plants followed by the use of pheromone traps (41.66 per cent) of the respondents. Only thirty-five per cent of the respondents adopted the use of solar light trap.

Chemical control

The mean per cent for chemical control were (30.00 per cent). Among the sub-items, recommended insecticide application was adopted by (35.00 per cent) and one-fourth of the respondent's spray pesticide was based on ETL recommendation. The reason for low adoption was the high cost of pesticides and the non-availability of recommended pesticides at the appropriate time. Further, even though ATMA imparts training on assessing ETL, the farmers felt difficult in understanding the complex practice, as it must be given regularly.

Disease management

Regarding disease management, the adoption percentage for seed treatment with fungicides (mancozeb @ 1 kg / ha, captan @ 1 kg + aureofungin sol. 100 g / ha, Trichoderma viride @ 4 g / kg of seed) was adopted by (37.50 per cent) of the respondents. The high cost of chemicals may be the reason for the above result.

CONCLUSION

The analysis presented in this study gives an idea of the extent of adoption of sorghum practices for agriculture development through training imparted by Agricultural Technology Management Agency (ATMA). It is concluded that most of the trainees have a medium level of adoption of sorghum practices. Agricultural Technology Management Agency (ATMA) training is an integrated process of linking State Agriculture Universities (SAUs), Krishi Vigyan Kendra Scientists, NGOs, and the State Department of Agriculture. The officials should take proper steps and suitable extension strategies to be followed for the maximum adoption of sorghum production technologies in the study area.

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