Assessment Of Cotton Grower's Knowledge In Pesticide Impacts And Clothing Practices At Srivaikundam Taluk, Thoothukudi District

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ABSTRACT

Cotton cultivation plays a crucial role in sustaining the agricultural economy of India, but it also requires extensive pesticide use, particularly in pest-prone regions. This study was conducted to assess the pesticide knowledge and protective clothing practices of cotton growers in ten villages in Srivaikundam Taluk, Tamil Nadu, where pesticide use is prevalent. Data were collected from 115 farmers through structured questionnaires, focusing on socio-demographic characteristics, pesticide handling practices, awareness of health risks, and the use of protective equipment. The results indicated that the majority of farmers (85.21%) were male, with most farmers being middle-aged or older. While most farmers (73.04%) were aware of the health risks associated with pesticide exposure, significant gaps in knowledge remained, particularly regarding the symptoms of exposure, and only 36.52% regularly used face masks. Furthermore, 12.17% of respondents believed no protective equipment was necessary. These findings underscore the urgent need for targeted education and training programs to improve the safety and well-being of cotton farmers by promoting the use of protective clothing and safer pesticide handling practices. Such interventions could reduce the health hazards faced by these farmers and promote sustainable agricultural practices in the region.

Keywords: Cotton cultivation, pesticide knowledge, protective clothing, pesticide handling practices, health risks.

INTRODUCTION

Cotton cultivation plays a pivotal role in the agricultural economy of India, being one of the leading cash crops that sustains the livelihoods of millions of farmers. However, its cultivation, particularly in pest-prone regions, necessitates extensive pesticide use to safeguard crops from various insect pests like aphids, jassids, and bollworms. (Eyhorn, 2007; Eyhorn *et al.*, 2005; Habermann, 2021; Imran *et al*., 2018). Pesticides, while essential for managing these threats, pose significant health hazards to farmers due to the toxic nature of chemical exposure. The issue is compounded by the lack of awareness among many cotton growers about the proper handling, application, and storage of pesticides, as well as the importance of protective clothing and safety measures during their use (Jallow *et al*., 2017; Adesuyi *et a*l.,2018; Mergia *et al*., 2021). Srivaikundam Taluk in the Thoothukudi district of Tamil Nadu is one of the regions where cotton cultivation is widespread, and where farmers rely heavily on pesticide use to maintain crop health (Soundarapandian, 2005).

Despite this reliance, little is known about the knowledge base and practical awareness of the farmers regarding pesticide safety. Many farmers, due to a combination of traditional practices, economic constraints, and lack of formal training, may not follow recommended guidelines for pesticide application, potentially exposing themselves to long-term health risks and environmental hazards (Lekei *et al.,* 2014; Khan and Damalas 2015; Berni *et al.,* 2021). This scenario underlines the critical need to assess the current level of pesticide knowledge among cotton growers in this region and their practices, particularly in terms of protective clothing and exposure prevention measures. Clothing plays a key role in minimizing direct skin contact with harmful chemicals during pesticide spraying, but the use of appropriate protective gear, such as gloves, masks, and coveralls, is often inconsistent or absent among farmers (Sapbamrer and Thammachai, 2020; Derafshi *et al*., 2017; Weng and Black 2015).

By evaluating the knowledge and practices of pesticide usage and safety protocols in selected villages of Srivaikundam Taluk, this study aims to identify knowledge gaps, unsafe practices, and the barriers that prevent the adoption of safer alternatives. The findings will help in shaping targeted awareness campaigns, education programs, and policy recommendations to enhance the health and safety of cotton growers, promoting both their well-being and the sustainability of agricultural practices in the region.

MATERIALS AND METHODS

Study Area

This study was conducted in summer irrigated cotton-growing areas of (Alanda, Poovani, Ulakkudi, Villathikkulam, Konarkulam, Kasilngapuram, Karacheri, Sekkarakkudi, Singathak kuruchi and Savalapperi), these villages are situated

in Srivaikundam taluk of Tuticorin District. The study was carried out between January to June 2022 to assess the pesticide use, practice, and handling of small-scale and large-scale holder farmers in Srivaikundam taluk.

Data Collection

The data collection was carried out using structural questionnaires developed and used as a data collection tool. The survey targeted assessing and gathering all the available and relevant information for a detailed scenario study. Random systemic sampling technique and land locations were used to take a representative sample. A total of 115 small and large-scale holder agro and semi-pastoral farmers were selected. The open and closed structured questionnaire with similar mother languages were prepared and given to respondents according to their mother language of preference at their residence. The farming system scope and importance obliged us to use different questionnaires for small-scale farmers.

As background information, we recorded farmers; names, sex, age, and the highest educational level were recorded. Pesticide profile includes pesticides name, knowledge, time of application, application interval was recorded. Pest profile includes the name of major pests in cotton. Farmer's practices and traditions on using personal protective equipment for pesticide application, smoking, drinking, eating of chat, and food during pesticide application were observed (Derafshi *et al*., 2017).

Data Analysis

Qualitative and quantitative data were recorded through observation, questionnaires and interviews. All questionnaires and answers have been checked and revised by the researcher, and then the data have been entered and analysed using SPSS software version 20. Finally, we used descriptive statistical methods as tools were used like frequency, average, and percentage to describe the respondents' profile for socio-demographic, education, pest and pesticide variables. The results of these studies are described and presented using tables (Sileshi *et al.*, 2021)

RESULTS

Socio-demographic characteristics

The survey was conducted among 115 cotton farmers across ten villages in Srivaikundam taluk present a detailed overview of their socio-demographic characteristics, farming practices, and knowledge regarding pesticide use and protective measures. The majority of respondents (85.21%) were male, indicating a gender imbalance in cotton farming, with only 14.78% female participation. Age distribution data showed that most farmers were middle-aged or older, with the largest group (33.91%) falling in the 50-59 age range, followed by 28.69% between 60-69 years, suggesting that cotton farming in the region is largely undertaken by older individuals, with a relatively small percentage (9.56%) under the age of 40.

Table 1. Socio-demographic characteristics of farmers in ten villages in the Srivaikundam taluk N=115

S.No	Variables	Frequency of Respondents	Percent (%)
	Sex		
	Male Farmers	98	85.21
	Female Farmers	17	14.78
	Age		
	30-39 years	11	9.56
	40-49 years	16	13.91
	50-59 years	39	33.91
	60-69 years	33	28.69
	>70 years	16	13.91
	Marital status		
	Married	96	83.47
	Unmarried	19	16.52
	Number of children		
	None	5	4.34
	1	24	20.86
	2	43	37.39
	3	29	25.21
	4	14	12.17
	Educational level		
	Illustrate	16	13.91
	Primary Scholl	82	71.30
	Secondary	14	12.17
	University	3	2.60

* Note may not sum to 100% due to rounding

Marital status data indicated that 83.47% of the respondents were married, while 16.52% were unmarried. In terms of family size, a significant portion of farmers had two or more children, with 37.39% having two children, followed by 25.21% with three children. Education levels among the farmers were generally low, with 71.30% having completed only primary school, 13.91% being Illustrate, and only 2.60% holding a university degree, highlighting the educational challenges in the region (Table 1).

Farming activities of cotton growers

The farming practices reported by respondents showed a strong preference for power sprayers, with 80.86% of farmers using this equipment for pesticide application, while only 19.13% used knapsack sprayers. In terms of pesticide formulation, the majority (88.69%) used pesticides in powder form, and a smaller proportion (11.30%) used liquid pesticides. Most of the farmers cultivated small to medium-sized agricultural land, with 63.47% owning 3 hectares, and only 13.04% farming on land smaller than 2 hectares. When evaluating farmers' knowledge about pesticide health risks, it was found that while 73.04% were aware that pesticides can enter the body through various routes, 26.95% lacked this critical knowledge.

Table 2. Farm activities of cotton growers in Srivaikundam taluk.

Variables	Frequency of Respondents	Percent (%)
Application type (Spryer type)		
Knapsack spryer	22	19.13
Power spryer	93	80.86
Types of pesticide used farmers		
Powder mode	102	88.69
Liquid mode	13	11.30
Agriculture land farm type		
<2 ha	15	13.04
3 ha	73	63.47
>4 ha	27	23.47

* Note may not sum to 100% due to rounding.

Regarding the recognition of symptoms caused by pesticide exposure, 39.13% of respondents identified chest pain as a symptom, followed by 27.82% who reported skin irritation, and 14.78% who recognized eye irritation. However, only a small fraction (7.82%) associated headaches with pesticide exposure, indicating potential under-recognition of other significant health risks (Table 2).

Farmers' knowledge of health risks, pesticide productive equipment.

When examining the farmers' awareness of protective equipment, 36.52% believed that face masks were effective, while 20.86% considered gloves and eye protection important. However, it is concerning that 12.17% of farmers believed that no protective equipment was necessary during pesticide application, underscoring a serious knowledge gap. These results highlight the pressing need for improved awareness and education regarding the use of protective clothing and the risks associated with pesticide exposure.

Table 4. Knowledge of health risks

Variables	Frequency of respondents	Percent (%)
Specific knowledge		
1)Do you know if pesticides can enter your body through the following ways?		
(A) Know	84	73.04
(B)Unknow	31	26.95
2) Are you aware that the following symptoms are caused by pesticide exposure?		
(A) Headaches	9	7.82
(B) Eye irritation	17	14.78
(C) Difficulty in breathing	12	10.43
(D) Skin irritation	32	27.82
(E) Chest pain	45	39.13

* Note may not sum to 100% due to rounding

Training awareness create in cotton growers

Training programs focused on proper pesticide handling, the use of protective equipment, and understanding health risks are essential to improving the safety and well-being of cotton farmers in Srivaikundam taluk. This also emphasizes the need for interventions aimed at reducing health hazards and fostering safer farming practices in the region. (Table 3).

Table 5. knowledge of pesticide productive equipment

Variables	Frequency of respondents	Percent (%)
General knowledge		
From the following list of protective clothing against pesticide exposure which do you believe to be effective?		
Gloves	24	20.86
Rubber boots	11	9.56
Face Masks	42	36.52
Eye glasses	24	20.86
None	14	12.17

* Note may not sum to 100% due to rounding

DISCUSSION

farmers‟ knowledge regarding health risks associated with pesticides is high (Gesesew *et al*., 2016 ; Akter *et al*., 2018; Sharafi *et a*l., 2018). Given the mature age of the participants (68% over 50 years), high literacy rate, and farming experience; older farmers should be more knowledgeable (Lockheed *et al* 1980; Lewis, 2018; Gartaula *et al.,* 2020). Mohsen *et al.,* 2016 reported that farmers suffered from symptoms including nausea and eye itchiness, headache, and chest tightness. Farmers in the current study also indicated experiencing one or more of these symptoms. Former experience of symptoms may also account for their high level of knowledge of health risks associated with pesticides. Furthermore, when compared to Greek farmers (Manyilizu *et al*., 2017), Turkish farmers were more aware of pesticide exposure routes. Intensive agriculture and excessive application of pesticides in the Aegean region will inevitably lead to adverse health effects unless preventive measures are taken (Beshwari *et al*.,1999). This finding is similar to that of Derafshi *et al*., (2017) but in contrast with Stone et al. (1994). One possible explanation for the differences between Turkish and Iowa farmers. However, the desire for higher crop yields and farmers‟ unwillingness to take protective measures is reflected in their attitudes (beliefs) and clothing practices. Turkish farmers believed that they would not be harmed by pesticides; yet, they also believed that pesticides have adverse health effects and may cause cancer. This is an example of how participants‟ knowledge is not consistent with their attitudes and farming practices. Additionally, attitudes such as the farmers‟ perceived insusceptibility to the health effects of pesticides, may discourage them from wearing appropriate protective clothing (Weng and Black 2015).

CONCLUSION

The study assesses the socio-demographic characteristics, pesticide knowledge, and protective practices of cotton farmers in Srivaikundam Taluk. It reveals significant gaps in knowledge about pesticide-related health risks and the use of protective equipment. Low education levels exacerbate this issue. Improving knowledge and practices will enhance cotton growers' health and contribute to sustainable agriculture, ensuring long-term sustainability.

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