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Impact of frontline demonstrations on adoption of PAU fruit fly traps in Guava in Tarn Taran district of Punjab

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Abstract

Guava fruit flies, Bactrocera spp. is most important insect-pests of guava and the crop is highly prone to damage by this pest in Punjab. Because of the difficulties associated with the control of this pest through chemical insecticides, the farmers experience huge losses to guava crop both in nutrition gardens and orchards. The management of fruit flies (Bactrocera spp.) by using methyl eugenol-based traps was attempted in guava nutrition gardens of the district. A field study was conducted in nutrition gardens of 5 villages of District Tarn Taran of Punjab during year 2023. A sample size of 100 farmers was used for this study. The data were collected through the use of structural interview schedule. In orchards where fruit fly traps were fixed, the maximum number of infested fruits were observed at location 4 (64%) followed by location 2 (52%). The farmers with age group between 30-40 years were more interested in adopting fruit fly traps as compared to other age groups. In terms of effect of education, the maximum adoption level (63 per cent) was shown by the farmers who studied up to higher secondary and above. On the other hand, about 62.5 per cent farmers were found to be more sincere in fully adopting this technology.

Key words: Adoption, age, education, guava fruit fly, PAU fruit fly traps

Introduction

To overcome these difficulties, Farm Advisory Service Centre, Tarn Taran implemented the frontline demonstrations on a technology devised for management of male fruit flies with methyl eugenol based mineral water bottle traps designated as PAU Fruit Fly Traps with the objective of "Technology transfer for PAU Fruit Fly Traps among farmers of Tarn Taran district through on farm demonstration. Sandeep *et al,* 2014 reported that successful eco-friendly management of fruit flies in guava can be achieved by fixing PAU fruit fly traps @ 16 traps/acre in the first week of July to get higher number of marketable fruits. Singh and Sharma (2026) studied that the prolonged persistence of chemicals resulted in harmful residue build-up on fruits, raising concerns for both human safety and environmental sustainability, thus highlighting the need for alternative approaches to manage this pest. Therefore, the aim of the study was to create awareness among the farming community about chemical free production of fruits by implementing eco – friendly technology for fruit fly management among fruits over a wider area. The consequences or impact of frontline demonstrations reflected in terms of extent of adoption of technology and attitude of beneficiaries towards this technology.

Hence, it is felt worthwhile to investigate its impact with respect to extent of adoption of respondents about PAU Fruit Fly Traps. Keeping these points in view, this investigation was

undertaken with the objective to assess the per cent fruit infestation, number of marketable fruits and extent of adoption of the technology by the farmers.

Materials and methods

Study area

Tarn Taran district is located in the northwestern part of India in the state of Punjab, lies between 31°052 and 31°302 053 North latitude and 74°302 East longitude (along the India–Pakistan international border) and 75°152 053 East longitude. The district is characterized by fertile alluvial plains and covers a geographical area of 2,583 square kilometres.

The district is bounded by Amritsar district in the north, Kapurthala district in the east, Pakistan in the west and Firozpur district in the south. The district headquarter is situated in Tarn Taran. Administratively, the district is divided into eight development blocks, namely Gandiwind, Bhikhiwind, Tarn Taran, Khadur Sahib, Naushehra Pannuan, Chohla Sahib, Patti and Valtoha.

Agriculture is the predominant occupation of the district's population and a major portion of the cultivable land is under active agricultural production. The location and administrative boundaries of the district are presented in Fig. 1.

Fig. 1: Map of Tarn Taran district

Climate

Tarn Taran, an important district of Punjab, India, experiences a tropical steppe climate that remains predominantly dry throughout the year, except during the southwest monsoon season. The climate of the district can be broadly classified into four distinct seasons: the cold season, the hot season, the southwest monsoon season, and the post-monsoon season, which extends from September to early November.

The cold season is influenced by a series of western disturbances that occasionally bring rainfall and lower temperatures. The hot season is characterized by intense heat, dry weather and uncomfortable conditions. In contrast, the monsoon period, extending from July to September, is marked by increased humidity, cloudy skies, and the majority of the annual precipitation. The district receives an average annual rainfall of approximately 545 mm and its distribution is uneven across different parts of the district.

Methodology

To manage the infestation of fruit flies in guava, field demonstrations were conducted over five locations viz. L1: Cheema Kalan, L2: Cheema Khurd, L3: Bhuchar Kalan, L4: Chamba Khurd and L5: Jamarai (Table 1) in different nutrition gardens of district Tarn Taran during 2023. In this context, a pheromone trap called PAU fruit fly traps were procured from Department of Fruit Science, Punjab Agricultural University, Ludhiana for controlling fruit flies infesting guava fruit crop. The traps were fixed at each nutrition garden along with an untreated control area. The baited bottles were hanged with the trees. The traps were fixed in the first week of the July till end-October when the fruit harvesting was over. PAU fruit fly traps were installed to assess losses to the fruit and to measure the efficacy of different local and recommended management options to address the problem of it in guava fruit crop. From both the treatments, a random sample of 10 fruits were collected at weekly interval and these were sorted out as infested, maggots emerging out of fruits, fallen fruits and healthy fruits. The impact of traps on the number of consumable fruits was also assessed by counting their number.

Table 1: Selection of district, blocks, villages and respondents

Name of District	Location	Village	Block	No. of respondents
Tarn Taran	Location 1	Cheema Kalan	Gandiwind	20
	Location 2	Cheema Khurd	Gandiwind	20
	Location 3	Bhuchar Kalan	Gandiwind	20
	Location 4	Chamba Khurd	Naushehra Pannuan	20
	Location 5	Jamarai	Chohla Sahib	20

With an objective to find out the adoption of this eco-friendly technology, a sample size of 100 farmers (20 farmers from each village) was selected related to guava plantation with the objective to find out the adoption of technology. The data were collected by using a structural interview schedule developed with the help of scientists and extension functionaries. The interview schedule was modified wherever needed and finalized. The final interview schedule was used to elicit the information from the farmers through personnel interview schedule at their nutrition garden. In order to measure the level of knowledge and extend of adoption, the standardized scales were developed for the purpose. The data was collected on the basis of age, education, land holding, annual income, source of information and socio-economic status.

Results and Discussion

The consolidated data presented in Table 2 indicated that fruit fly infestation was highest at Location 4 (64%) and lowest at Location 1 (52%). The results further showed that even after using fruit fly traps, the infestation varied from location to location. Kaur *et al* (2016) reported that traps had a significant impact on the quality of marketable fruits and fruit fly infestation in guava. Jalaluddin *et al.,*2001 assessed the population fluctuations of the *Bactrocera correcta* (Bezzi) in guava plantation using methyl eugenol traps and recorded a distinct population peak from July to August, which coincided with the ripening. Shah *et al*. (2017) observed that the practices which were simple and were traditionally practiced were known to majority of the farmers. The practice like management of fruit fly using fruit fly traps is not taken on the priority. It might be due to the reason that the growers are reluctant to perform the tasks which need proper knowledge as described by Meena *et al*. (2017) and Khehra and Kaur (2021).

Table 2: Infestation of fruit flies at each location

S. No.	Location	Fruit fly infestation (%)
1	Location 1	52
2	Location 2	61
3	Location 3	57
4	Location 4	64
5	Location 5	59

Table 3: Effect of age on adoption of PAU fruit fly traps technology (n = 80) during 2023

S. No.	Age group of farmers	% farmers adopted
1	18-30	15.00
2	30-40	57.33
3	40-50 and above	27.67
	Total	100

The findings presented in Table 3 revealed that the adoption of PAU Fruit Fly Trap technology varied according to the age of the farmers. Farmers between the age group of 30-40 years were found to have the highest (57.33%) rate of adoption followed by age groups of 40-50 and above and 18-30 as 27.67 and 15 per cent respectively. The results of study are also supported by previous findings of Abbas *et al*. (2017) who elucidated that there might be constraints like age, literacy and reluctance to acceptance of technology. Similar findings were sustained by Kumar *et al.* (2015) and Khehra and Kaur (2021).

The data presented in Table 4 indicated that educational level of the fruit growers also affected the adoption of technology of PAU Fruit Fly Traps among the farmers i.e. 63% fruit growers having qualification of upto higher secondary and above were found more sincere to adopt the modern technology followed by upto middle 22.67 per cent and illiterate 14.33 per cent, respectively. Similar findings were reported by Otieno et al. (2023).

Table 4: Effect of education on adoption of PAU fruit fly traps technology (n = 80) during 2023

S.No.	Education level of farmers	% farmers adopted
1	Illiterate	14.33
2	Upto middle	22.67
3	Upto higher secondary and above	63.00
Total		100

The findings of the present study in Table 5 revealed that considerable percentage (62.5%) of farmers has fully adopted the technology. The reason behind the higher adoption of technology is that the practice was easy to adopt and effectiveness of traps were shown on the spot. On the other hand, 25% has partially adopted and 12.5% did not adopt the technology. The adoption of the technology depends on various factors. The reason behind the partial and non-adoption of the technology might be that adoption of plant protection measures is complex one as it involves skills and more risk. Since, the greater number of farmers were small land holders, their income was very low. Hence, they were not ready to take risk and they preferred to depend on insecticidal sprays only. And for many other reasons like farmer's knowledge, situational factors, personal and socio–psychological characteristics of farmers, availability of inputs etc. were responsible for low adoption of technology. The findings of the study were in accordance with the results of Kaur *et al* (2016). Further, the partial fruit fly adopters only applied the technology on a few of their plants, as a result of lack of efforts to implement the technology. Lack of knowledge was also highlighted as one of the reasons contributing to the partial adoption of the technology. As noted by Otieno et al. (2023), the partial adopters did not use the recommended rates for the replacement of the lures, and hence, reported the ineffectiveness of the technology in controlling the fruit fly pest.

Conclusion

The present studies concluded that the fruit fly causes great damage in guava and this paper assessed the impact of frontline demonstration on adoption of PAU fruit fly traps in guava in the district. The overall adoption of this technology among fruit growers is 62.5% in implementation of 'PAU Fruit Fly Traps' technology which calls for additional extension approach through suitable aids to motivate

Plate 1: PAU Fruit Fly Trap demonstrated in guava plantation

Table 5: Extent of Adoption of PAU Fruit fly traps in guava in district Tarn Taran (n = 80) during 2023

Technology	Full adoption		Partial adoption		Non adoption	
PAU Fruit fly traps	**Frequency**	**%age**	**Frequency**	**%age**	**Frequency**	**%age**
	50	62.5	20	25.0	10	12.5

Plate 2: Officials monitoring the efficacy of PAU Fruit Fly Traps in guava orchards

Plate 3: Personnel interview by the scientists with the fruit growers at their farm regarding adoption of technology

the fruit growers for complete adoption and also need to educate the farmers to popularize 'PAU Fruit Fly Traps' in the district. It can be concluded that the extent of adoption of fruit fly traps for guava needs to be boosted in district Tarn Taran. This can be accomplished through the strengthening the importance and dissemination of the technology by extension officers and practising farmer groups. To improve the technology's long-term acceptance, traps should be made easily accessible to farmers.

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