

Impact of Frontline Demonstration on PAU Fruit Fly Traps in Guava Crop in Bassi Pathana Block of Distt Fatehgarh Sahib of Punjab

¹Arvind Preet Kaur*, ¹GPS Sodhi and ²Sandeep Singh

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. The management of fruit flies (*Bactrocera* spp.) by using methyl eugenol based traps was attempted in guava orchards of the district @ 16 traps/acre. A field study was conducted in guava orchards of 10 villages of Block Bassi Pathana of District Fatehgarh Sahib of Punjab during year 2015. A sample size of 75 fruit growers were used for this study. The data were collected through the use of structural interview schedule. 25.7 per cent fruits were found infested in the orchards fixed with fruit fly traps (treated orchards) as compared to 81.3 per cent in control plots. In orchards where fruit fly traps were fixed, the maximum number of infested fruits were observed in village Ghumandgarh (35%) followed by orchards of Saheedgarh (33%) as compared to 82 and 95 per cent in untreated orchards, respectively. Maximum number of marketable fruits in these orchards was recorded in orchard of village Talanian (1243 fruits/tree) followed by orchard of village Rasulpura (1203 fruits/tree) in the treated orchards as compared to 721 and 603 in untreated plots, respectively. About 67 per cent fruit growers were found to be more sincere in adopting this technology. Thus, successful management of fruit flies in guava can be achieved by fixing 'PAU Fruit Fly Traps' @ 16 traps/acre during first week of the July till end- October.

Keywords: *Bactrocera* spp., guava fruit fly, methyl eugenol, PAU Fruit Fly Traps.

INTRODUCTION

Guava is an important fruit crop of Punjab occupying 8.07 thousand hectares. However, guava fruit flies, *Bactrocera* spp., are most important insect-pest of guava and this fruit crop is highly prone to damage by this pest in Punjab particularly during rainy season. Several biotic factors limit the production and productivity of guava during rainy season, of which guava fruit fly (*Bactrocera* spp.) has been the most prominent pest over the last several decades^[1]. Depending on the environmental conditions and susceptibility of the crop, the extent of losses varies between 80 to 100% damage to rainy season guava crop^[2] as it is the most preferred host

of fruit flies. The fruit flies are very difficult to manage as they are polyphagous, multivoltine, adults have high mobility and fecundity and all the developmental stages are unexposed. Only adults are exposed while eggs and maggots remain protected in the host tissues and most of insecticidal treatments are ineffective. Application of insecticides disrupts the ecosystem and causes numerous hazards, which in the present scenario warrants the need of integrated approach for fruit fly management^[3].

Because of the difficulties associated with the control of fruit flies through insecticides, fruit growers of the district experience great losses in

¹ Department of Fruit Science, Punjab Agricultural University-Ludhiana, Presently working at Krishi Vigyan Kendra Fatehgarh Sahib (Punjab)

² Department of Fruit Science, Punjab Agricultural University- Ludhiana.

* E-mail: drarvindpreet@gmail.com

Table 1
Efficacy of PAU fruit fly traps in guava orchards in Bassi Pathana block of Dist Fatehgarh Sahib during 2015

Treatment	BP1	BP2	BP3	BP4	Talanian	Himatpura	Rasulpura	Saheedgarh	Mohadian	Ghumndgarh	Average
<i>Mean percent fruit infestation</i>											
16 traps/acre	20	25	22	20	24	30	20	33	28	35	25.7
Control	70	85	78	80	85	85	75	95	78	82	81.3
<i>Number of marketable fruits / tree</i>											
16 traps/acre	830	786	564	460	1243	743	1203	249	895	672	765
Control	82	43	52	73	721	532	603	89	306	156	266

BP1, BP2, BP3 and BP4 = Bassi Pathana



Plate 1: PAU Fruit Fly Trap demonstrated in guava orchards.

guava fruit crop. To overcome these difficulties, Krishi Vigyan Kendra, Fatehgarh Sahib 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 under a project on , "Technology transfer for PAU Fruit Fly Traps among fruit growers of Fatehgarh Sahib through on farm demonstration" under aegis of National bank for agriculture and rural development (NABARD) in Fatehgarh Sahib district. The project is aimed 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. Therefore, 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 fruit growers.

MATERIALS AND METHODS

To manage the infestation of fruit flies in guava, field demonstrations were conducted by Krishi Vigyan Kendra Fatehgarh Sahib over ten locations in different orchards of Bassi Pathana block of district Fatehgarh Sahib during 2015. In this context, a pheromone trap called PAU Fruit Fly Trap, purchased from Department of Fruit Science, Punjab Agricultural University Ludhiana was used for controlling fruit flies infesting guava fruit crop. Sixteen traps/acre were fixed per acre of area in each guava orchard along with an untreated control area. The baited bottles were hanged with the trees at equidistance. 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 in guava orchards 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 (16 traps/per acre and control), a random sample of 50 fruits was collected at weekly interval and these were sorted out as infested (based on the

oviposition punctures), maggots emerging out of fruits, fallen fruits and healthy fruits. The impact of traps on the number of marketable fruits was also assessed by counting number of marketable fruits from five trees randomly.

With an objective to find out the adoption of this eco-friendly technology, a sample size of 75 fruit growers was selected related to guava fruit orchard 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 fruit growers through personnel interview schedule at their orchard or at home. In order to measure the level of knowledge and extend of adoption of fruit growers, the standardized scales were developed for the purpose. The data was collected as age, education, land holding, annual income, source of information and socio-economic status.

RESULTS AND DISCUSSION

Consolidated data revealed that the fruit fly infested fruits were 25.7 per cent as compared to 81.3 per cent in untreated orchards (Table 1). The marketable fruits/tree was 665 fruits/tree in treated orchards where 16 traps/acre were fixed as compared to 266 fruits/tree in untreated plots. The results further showed that the maximum infested fruits were observed in orchard of village Ghumandgarh (35 per cent) followed by 33 per cent each in orchards of village Saheedgarh, in 16 traps/acre. In untreated orchard, maximum infested fruits were recorded in orchard of village Saheedgarh (95 per cent) followed by 85 per cent each at Bassi Pathana, Talanian and

Himatpura and Ghumandgarh (82 per cent). The highest number of marketable fruits/tree was recorded at village Talanian (1243 fruits/tree), in 16 traps/acre whereas in untreated plot, maximum number of marketable fruits were recorded at village Talanian (721 fruits/tree).

Jalaluddin *et al.*, 2001^[4] assessed the population fluctuations of the *Bactrocera correcta* (Bezzi) in guava orchards using methyl eugenol traps and recorded a distinct population peak from July to August, which coincided with the ripening.

According to Singh and Sharma, 2012^[5], 16 traps/acre fixed in peach orchards at Ludhiana had significantly more population of male fruit flies compared to 4, 8 and 12 traps/acre. They further observed that more the number of males captured, less was the number of maggots/fruit in the field and 16 traps/acre had significantly less number of maggots/fruit as also observed in the present study. It was further observed that number of traps had a significant impact on the quality of marketable fruits and yield. Palam Trap, a lure based mineral water bottle trap was found effective in monitoring and management of 10 species of fruit flies including *B. dorsalis* (Hendel) and *B. zonata* (Saunders) in fruits and vegetables in Himachal Pradesh^[6] and 16 traps/acre in the present studies with methyl eugenol also attracted both the species. The results on capture of male fruit flies in the present study are comparable with Sharma, 2012^[7] who also found that methyl eugenol traps were effective against *Bactrocera* complex on mango, guava, sapota and peach.

Table 2
Effect of age on adoption of PAU fruit fly traps technology (n = 75) during 2015

Age group of fruit growers	% fruit growers adopted
18-30	13.33
30-40	61.67
40-50 and above	25.00
Total	100



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

Table 3
Effect of education on adoption of PAU fruit fly traps
technology ($n = 75$) during 2015

Education level of fruit growers	% Fruit growers adopted
Illiterate	16.66
Upto middle	24.17
Upto higher secondary and above	59.17
<i>Total</i>	<i>100</i>

This technique has been successfully used for the eradication and control of several *Bactrocera* species^[8,9]. Fruit fly infested fruits in peach orchards were 6.86 per cent in orchards with methyl eugenol based traps as compared to 43.5 per cent in control^[10]. The present findings showed a significant impact in reducing the damage and increasing the number of quality fruits as also reported in earlier study^[11]. The findings that 16 traps/acre in guava were very effective in reducing fruit fly damage was also reported by Viraktamath and Ravikumar, 2006^[12] in India. Sandeep *et al*, 2014^[13] 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.

The data in Table 2 revealed that age of the fruit growers affected the adoption rate of PAU Fruit Fly Traps technology. Farmers between the age group of 30-40 years were found to have the highest

(61.67%) rate of adoption followed by age groups of 40-50 and 18-30 as 25.00 and 13.33 per cent respectively.

The data presented in Table 3 indicated that educational level of the fruit growers also affected the adoption of technology of PAU Fruit Fly Traps among the fruit growers i.e. 59.17% fruit growers having qualification of upto higher secondary and above were found more sincere to adopt the modern technology followed by upto middle 24.17 per cent and illiterate 16.66 per cent, respectively.

The findings of the present study in Table 4 revealed that considerable percentage (67.0%) of fruit growers has 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, 20% has partially adopted and 13% 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 more 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.



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

Table 4
Extent of Adoption of PAU Fruit fly traps in guava orchards in Block Bassi Pathana (n = 75) during 2015

Technology	Full adoption		Partail adoption		Non adoption	
	Frequency	%age	Frequency	%age	Frequency	%age
PAU Fruit fly traps	50	67.0	15	20.0	10	13.0

were responsible for low adoption of technology. The findings of the study were in accordance with the results of Vasanthakumar *et al* 2000^[14].

CONCLUSION

This paper assessed the economic benefits of managing fruit flies infecting guava fruit crop by using PAU Fruit Fly Traps. The present studies conclude that the fruit fly causes great damage in guava. It is also concluded that spraying of chemical insecticide is worthless in fruit fly management options. Therefore, future efforts should be made to adopt implementation of 'PAU Fruit Fly Traps' to reduce the cost of cultivation and to protect natural resources as well as human life. Thus, successful management of fruit flies in guava can be achieved by fixing 'PAU Fruit Fly Traps' @ 16 traps/acre during the first week of July. The overall adoption of this technology among fruit growers is 67% in implementation of 'PAU Fruit Fly Traps' technology which calls for extension approach through appropriate aids to motivate the fruit growers for complete adoption and also need to educate the farmers. The state horticulture department as well as other concerned authorities may take care of these aspects to popularize 'PAU Fruit Fly Traps' in the district.

Acknowledgement

Krishi Vigyan Kendra Fatehgarh Sahib is highly indebted to NABARD for providing financial help to serve the fruit growers of the district.

References

Manjunathan TM (1997), A report on the integrated pest management (IPM) consultancy for Lumle Agriculture Research Centre (LARC). Occasional Paper No. 97/2. LARC, Kaski, Nepal.

Singh S and Sharma DR (2013), Management of fruit flies in rainy season guava through male annihilation technique

using methyl eugenol based traps. *Indian J. Hort.* 70(4): 512-518.

Vergheese A, Shinananda TN and Hegde MR (2012), Status and area-wide integrated management of mango fruit fly, *Bactrocera dorsalis* (Hendel) in South India. In: Ameta O P, Swaminathan R, Sharma U S and Bajpai N K (eds).
Jalaluddin SM, Natarajan K and Sadakathulla S (2001), Population fluctuation of the guava fruit fly, *Bactrocera correcta* (Bezzi) in relation to hosts and abiotic factors. *J. Exp. Zool.* 4: 323-327.

Singh S and Sharma DR (2012), Abundance and management of fruit flies on peach through male annihilation technique (MAT) using methyl eugenol based mineral water bottle traps. *J. Insect Sci.* 25: 135-143.

Mehta PK, Sood P and Prabhakar CS (2010), Palam Trap: A novel triumph in fruit fly suppression in Himachal Pradesh. *Ent.Reporter* 1: 8-9. *National Seminar on Emerging Pest Problems: Biorational Management.* 2-3 March, 2012, Udaipur. Patiala, pp. 82.

Sharma K (2012), Fruit fly management at Indian Agricultural Research Institute for production of organic fruits with male annihilation technique. *International Conference on Entomology.* February 17-19, 2012. Punjabi University Patiala.

Stonehouse JM, Mumford JD, Vergheese A, Shukla RP, Satpathy S, Singh HS, Thomas J, Jijli T, Patel ZP, Jhala RC, Patel RK, Manzar A, Shivalingaswamy TM, Mohantha AK, Nair B, Vidya CV, Jagadale VS, Sisodiya DB and Joshi BK (2007), Village-level area wide fruit fly suppression in India: Bait application and male annihilation at village level and farm level. *Crop Protec.* 26: 788-793.

Vergheese A, Shinananda TN and Hegde MR (2012), Status and area-wide integrated management of mango fruit fly, *Bactrocera dorsalis* (Hendel) in South India. In: Ameta O P, Swaminathan R, Sharma U S and Bajpai N K (eds).

Sandeep S, Sharma DR and Kular JS (2015), Eco-friendly management of fruit flies in peach with methyl eugenol based traps in *Punjab Agric Res J* 52 (1): 47-49.

Singh S and Sharma DR (2013), Management of fruit flies in rainy season guava through male annihilation technique using methyl eugenol based traps. *Indian J. Hort.* 70(4): 512-518.

Viraktamath S and Ravikumar C (2006), Management of fruit flies through mass trapping in guava at Dharwad. *Pest Mgmt. Hort. Ecosys.* 12: 137-142.

- Sandeep S, Sharma DR, Kular JS, Gill MIS, Arora NK, Bons MS, Singh B, Boora RS, Kaur A, Saini MK, Pandha YS, Chahal TS, Kumar G, Singh B, Singh S, Pandher S, Sharma RK and Kaur P (2014), Eco-Friendly Management of Fruit Flies, *Bactrocera* spp. in Guava with Methyl Eugenol Traps in Punjab. *Indian J. Ecol.* 41(2): 365-367.
- Vasanthakumar MP (2000), A study on knowledge, adoption behavior and economic performance of coffee growers in Virajpet Taluk of Coorg district . M.Sc (Agri.) Thesis, University of Agricultural Sciences, Bengaluru, Karnataka, India.