

Studies on varietal susceptibility of oriental fruit fly, *Bactrocera dorsalis* (Hendel) on guava and its attraction to different poison baits

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Seven guava varieties viz. Lucknow-49, SeedLess, Behat Coconut, Red Flesh, Allahabad Safeda, Local and Pear Shaped were screened for their susceptibility to Oriental fruit fly, *Bactrocera dorsalis*, (Hendel) infestation at Dhaula Kuan, Distt. Sirmour (H.P.) during 2005-06. Smooth skinned varieties namely Red Flesh, Allahabad Safeda and Local were found to be highly susceptible to the fly attack (Infestation range 64.2 to 80.4%) whereas rough skinned Pear Shaped variety was least susceptible (35.1%) as compared to other varieties where the infestation ranged between 45.7 to 56.5 per cent. Five baits namely fruit pulps of banana, guava and apple along with jaggery (10% M:V) and jaggery alone @ 250 ml/bait and aqueous extract of Shyam tulsi (*Ocimum sanctum* var. Krishna) (1g crushed leaves in 4 ml water) @ 370 ml/bait were evaluated for their efficacy in attraction and killing of the fly. Fruit pulps of banana attracted maximum number of flies (23.2/week) followed by guava (18.2) as compared to other baits where the number ranged between 4.8 to 12.0/week. Use of less susceptible varieties and fruit pulps of banana and guava in poison baits have been suggested for better management of the pest.

Key words : Guava, Cultivars, Susceptibility, *Bactrocera dorsalis*, Baits.

INTRODUCTION

Guava popularly known as poor man's apple is one of the major sub-tropical fruits-grown in India. The fruits are either taken fresh or in processed forms and are rich source of proteins, vitamins and minerals. But like other crops, it is also attacked by a variety of insect-pests which limits its production to a great extent. The Oriental fruit fly, *Bactrocera dorsalis*, (Hendel) is one of the key pests of this crop and monsoon crop is highly susceptible for its infestation (Naryanan and Batra, 1960). The fly is polyphagous in nature and attacks a variety of crops besides guava. The gravid female causes pin hole damage at the site of oviposition and lays eggs inside the fruit pulp. The maggots after emergence feed on the pulp and the fully fed maggots wriggle out from the fruit and pupate in the soil. Brown depressed spots appear at the site of infestation which results in rotting and premature dropping of the fruits. For checking the pest attack, growing of resistant varieties (Sandhu *et al.*, 1979; Rana *et al.*, 1990 Arora *et al.*, 1998 and Reddy and Vasugi, 2002) and use of fruit pulps (Stole, 2000; Kumar and Aggarwal, 1998; Aggarwal and Kumar, 1999; Jhala *et al.*, 2005 and Thomas *et al.*, 2005), aqueous extract of tulsi (Patel *et al.*, 2005) have been tried and proved effective. The present studies were, therefore, carried out to generate more informations for better management of fruit fly infestation.

MATERIALS AND METHODS

The present investigations were carried out in the guava orchards (under hot and humid conditions) of Regional Horticultural Research Station (HRRS) Dhaula kuan located in Paonta valley of Himachal Pradesh during 2005-06.

Varietal susceptibility:

In order to know the varietal susceptibility of guava to *B. dorsalis*, infestation, seven varieties viz. Lucknow-49 Allahbad Safeda, Pear Shaped, Seedless, Behat Coconut, Red Flesh and Local were screened for their susceptibility for its attack during 2005- 06. For this purpose, four trees of each variety of equal vigour and size and of 15 year of age were randomly selected in the orchards of the station and were marked for recording observations. The fruit picking was done from mid- August till third week of September and in total six pickings were obtained. Fifty fruits were randomly selected from the each picking and were examined for the fruit fly infestation. The fruit bearing pin hole damage and/or brown spots were considered infested. Mean per cent infestation was then calculated for each variety. Data obtained so were assigned arc sine transformations and were analysed statistically using Randomized Block Design.

Attraction of baits:

For carrying out this experiment on attraction of different baits to *B. dorsalis*, guava orchard of 1.0 ha size of the station was selected and 0.1 ha plots (5 Nos.) were randomly selected in the center of it and marked for recording observations. Fruit pulps of banana, guava, and apple along with boiled jaggery (10% M:V), aqueous extract of Shyam tulsi (*Ocimum sanctum* var. Krishna) (1 g fresh crushed leaves in 4 ml water) and jaggery alone were evaluated for their effectiveness in attraction of the fly adults. For putting the above baits, 1L empty plastic table bottles were used with doors cut at the center of them in order to protect the bait materials from rains. Each bait @ 250 ml/g was put in each treatment bottle and to it 4-5 drops of 0.1 malathion solution was added after every 15 days interval except tulsi treatment where 370 ml aqueous extract was used. The bottles were placed at a height of 1.5 M from the ground level on the branches of the trees. Number of the fruit flies caught in each trap was recorded at weekly interval for one month. Data obtained so were assigned $\sqrt{n+1}$ transformation and analyzed statistically using Randomized Block Design.

RESULTS AND DISCUSSION*Varietal susceptibility:*

Results on the susceptibility of different varieties of guava to infestation of Oriental fruit fly have been summarized in Table 1. Results revealed that the fly attacked between 31.3 to 70.0 and 39.0 to 90.7 per cent fruits during 2005 and 2006, respectively During 2005. Red Flesh was

observed to be most susceptible variety as the pest infested its 70.0 per cent fruits (Table 1) followed by Allahabad Safeda (66.7%) and Local (55.7%). Least infestation was recorded in Pear Shaped (31.3) as compared to other varieties (40.0 to 50.0%). The trend of the fly infestation was almost similar in 2006 but the attack in each variety was more as compared to 2005. Mean fruit infestation (irrespective of years) revealed that it was maximum in Red Flesh (80.1%) and minimum in Pear Shaped variety (35.1%). Besides Red Flesh, Allahabad Safeda and Local were the other highly susceptible varieties. The varieties which fell under moderate susceptible category were Behat Coconut, Lucknow-49 and Seedless.

The present studies revealed that there existed wide variations in the susceptibility of guava germ plasm for the fruit fly infestation. Red Flesh variety suffered maximum attack followed by Allahabad Safeda and Local whereas Pear Shaped was observed to be least susceptible variety. Similar results have been reported by earlier workers (Sandhu *et al.*, 1979; Rana *et al.*, 1990, Arora *et al.*, 1998 and Reddy and Vasugi, 2002) and render support to the above results. The fruit fly attacked between 35.1 to 80.4 per cent fruits of the different varieties. Sandhu *et al.* (1979) also reported the fruit fly infestation between 25.0 to 80.4 per cent on this crop and are in line with the present results. Allahabad Safeda and Pear Shaped were judged as highly and least susceptible varieties for *B. dorsalis* infestation. Rana *et al.* (1990) also reported similar results and are in close agreement with the above observations. In the present study, Red Flesh was observed to be highly susceptible variety for the fly attack. On the contrary, Arora *et al.* (1998) and Reddy and Vasugi (2002) reported this variety as least susceptible for *B. dorsalis* infestation. This disagreement with the results of above workers was mainly due to the reason that they used thick skinned type of Red Flesh variety where as in the present investigation thin skinned variety was used. The present result receives support from the finding of Reddy and Vasugi (2002) who reported smooth skinned varieties as more susceptible to fruit fly infestation.

Attraction of baits:

Results on the efficacy of different baits in attraction and killing of *B. dorsalis* adults have been illustrated in Table 2. Results revealed that banana pulp attracted maximum number of the fly (23.2/week) followed by guava (18.2), apple (12.0) and jaggery (10.8). Least number of *B. dorsalis* was caught in Shyam tulsi bait (4.8/week) The study indicated that fruit pulps are more suitable for

Table 1 : Relative susceptibility of different varieties of guava against *B. dorsalis*

Cultivar	Skin type	Per cent infestation		
		2005	2006	2007
Lucknow-49	R	50.0 (46.027)	63.0 (52.613)	56.4 (49.320)
Behat Coconut	R	42.3 (40.557)	57.3 (48.913)	49.3 (44.735)
Red Flesh	S	70.0 (38.333)	90.0 (72.817)	80.4 (55.575)
Seed Less	S	55.7 (48.147)	72.7 (58.67)	64.2 (53.408)
Allahabad Safeda	S	66.7 (55.797)	86.7 (69.106)	76.7 (62.451)
Pear Shaped	R	31.3 (33.813)	39.0 (38.997)	35.1 (36.405)
Local	S	40.0 (35.053)	51.3 (45.470)	45.7 (40.261)
C.D. (P=0.05)		7.945	9.590	

R = Rough

S = Smooth

Table 2 : Efficacy of different poison baits in attraction of fruit fly *Bactrocera dorsalis* (Hendel) on guava (2006)

Dated (week)	Number of fruitflies caught / trap.				
	25.08.06	31.08.06	07.09.06	14.09.06	Mean
Banana	11.0 (3.464)	61.0 (7.874)	10.0 (3.317)	11.0 (3.464)	23.2 (4.530)
Guava	8.0 (3.000)	44.0 (6.708)	15.0 (4.000)	8.0 (3.000)	18.2 (4.177)
Apple	3.0 (2.000)	36.0 (6.083)	7.0 (2.828)	2.0 (1.732)	12.0 (3.161)
Shyam tulsi	2.0 (1.732)	4.0 (2.236)	12.0 (3.605)	1.0 (1.414)	4.8 (2.247)
Jaggery	8.0 (3.000)	14.0 (3.872)	9.0 (3.162)	12.0 (3.605)	10.8 (3.410)
Mean	6.4 (2.635)	31.8 (5.354)	10.6 (3.382)	6.8 (2.643)	
C.D. (P=0.05)	For baits 1.462		For dates 1.462		

attraction of the fruit fly adults. Banana pulp was highly suitable for attraction followed by guava. Various workers (Aggarwal and Kumar 1999; Kumar and Aggarwal 1999, Stoll, 2000; Jhala *et al.*, 2005 and Thomas *et al.*, 2005) also reported fruit pulps as more suitable bait materials for attraction of tephritids and render support to the above results. The present observations of eliciting more response of banana and guava pulps for attractions of the tephritid are in close line with those of Jhala *et al.* (2005) who reported banana pulp as highly attractive bait material for fruit flies as compared guava and other fruit pulps. Apple was moderate in attraction which might be due to less preference of the fruit fly to this material in the presence of the other highly attractive pulps. Aquous extract of Shyam tulsi could not elicit good response. JiJi *et al.* (2005) also reported less effectivity of Shyam tulsi in attraction of fruit flies and are in agreement with the above finding. On the contrary, Patel *et al.* (2005) reported it as a suitable bait material for tephritids. This disagreement with the report of the above workers might be due to differences in the method of application used and agro- climatic conditions in the two studies.

In conclusion, results of the present study indicated that thin skinned Red Flesh, Allahabad Safeda and Local varieties of guava are highly susceptible and thick skinned Pear Shaped variety as least susceptible to *B. dorsalis* infestation. Fruit pulps of banana and guava are more suitable bait materials for attraction and killing of the fruit fly adults. Use of Less susceptible varieties and fruit pulps of banana and guava should be used for better management of the fly attack.

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