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Short communication

Resistance to fruit fly, *Bactrocera dorsalis* (Hendel) and tea mosquito bug, *Helopeltis antonii* (Sign.) in certain wild *Psidium* species

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ABSTRACT

Five wild species of *Psidium* viz., *Psidium cattleianum lucidum, P. chinensis, P. friedrichsthalianum, P. molle* and *P. quadrangularis* were evaluated for resistance to fruit fly [*Bactrocera dorsalis* (Hendel)] and tea mosquito bug (TMB) [*Helopeltis antonii* (Sign.)], during 2002-04. Significant variations were recorded among species in their reaction to pests. Two species *viz., P. chinensis and P. quadrangularis* were resistant to fruit fly (<10% fruit damage) while *P. quadrangularis* was immune. *Psidium. molle and P. cattleianum* were resistant to tea mosquito bug. Pest incidence was correlated with fruit biochemical components *viz.,* total soluble solids (TSS), total sugars, vitamin C and acidity. The TSS and total sugars were positively correlated with fruit fly infestation while acidity was negatively correlated. The TMB incidence did not exhibit significant correlation with any of these parameters.

Key Words: Guava, *Psidium* species, resistance, fruit fly, tea mosquito bug

Guava [*Psidium guajava* L., (Family: Myrtaceae)] is the only cultivated species among 70 odd *Psidium* species (Landrum *et al*, 1995). Though other species of Psidium are non-edible and wild in nature, some of them possess a few desirable traits, which could be exploited either as rootstocks or as parents for incorporating the pest and disease résistance. (Vasugi and Dinesh, 2007). Mango fruit fly, *Bactrocera dorsalis* (Hendel) and tea mosquito bug, *Helopeltis antonii* (Sign.) are serious and economically important pests of guava (Butani, 1975) and finding a source of resistance against them would be useful in evolving resistant varieties. Varietal differences of guava in their reaction to fruit fly and tea mosquito bug are reported (Arora *et al*, 2000; Reddy and Vasugi, 2004) but information is lacking on the reaction of wild *Psidium* species. In the present study, five wild species of *Psidium* were field evaluated for their resistance to *B. dorsalis* and *H. antonii*. As endogenous metabolites were reported to play a significant role in fruit fly resistance (Kaur *et al*, 1994), the per cent fruit fly and tea mosquito bug infestation were correlated with TSS, total sugars, vitamin C and acidity.

Field studies were carried out during 2002-2004 at the Indian Institute of Horticultural Research, Bangalore using 8-10 years old wild *Psidium* species viz., *P. cattleianum var. lucidum*, *P. chinensis*, *P. friedrichsthalianum*, *P. molle* and *P. quadrangularis*. 'Lucknow-49', a popular cultivar of *P. guajava*, was used as standard check. One hundred and fifty randomly selected, mature fruits were harvested from each species (comprising four trees) and brought to the laboratory to record fruit fly incidence during the months of August – September. On attaining the fully ripened stage, fruits were cut open and observed for the maggots. Tea mosquito bug incidence was recorded based on the visual symptoms of damage such as corky appearance on the fruit surface. Three replications were maintained with fifty fruits per replication. Data were subjected to the analysis of variance (ANOVA) to compare the significance of mean differences. Species were classified as immune (0% fruit damage), resistant (1-10%), moderately resistant (11-25%), susceptible (26-50%) and highly susceptible (>50%) based on the pooled means of both the years following a partially modified varietal classification suggested by Reddy and Vasugi (2002). The titrable acidity (%), vitamin C (mg/100g) and total sugars (g/100g) were estimated following Ranganna (2000) and total soluble solids (TSS) was determined as ^{0}Brix using a hand refractometer.

Table 1. Extent of fruit fly and tea mosquito damage in *Psidium* species

Species	Fruit fly damage (%)			Tea mosquito bug damage (%)		
	2002-03	2003-04	Mean	2002-03	2003-04	Mean
P. cattleianum var. lucidum	38.66	26.00	32.33	5.33	3.00	4.17
P. chinensis	7.33	6.00	6.67	21.00	16.33	18.67
P. friedrichsthalianum	16.00	12.00	14.00	29.33	32.00	30.67
P. molle	39.33	34.00	36.67	6.33	4.33	5.33
P. quadrangularis	4.66	3.33	4.00	0.00	0.00	0.00
P. guajava (Lucknow-49)	35.00	30.33	32.62	30.66	25.66	28.16
CV (%)	15.59	11.14		15.37	14.85	
CD *(P=0.05)*	4.31	4.67		4.19	4.02	

Data on the variable reaction of *Psidium* species to fruit fly and tea mosquito bug are presented in table 1. There were significant differences in the extent of fruit damage due to both the pests. The resistance trends of species were consistent in both the years of study. None of the *Psidium* species was completely free from fruit fly infestation. *Psidium quadrangularis* recorded the lowest fruit fly damage (4.66%) followed by *P. chinensis* (7.33%) during 2002-03 and they sustained the resistance in the subsequent year also with 3.33 and 6.00 % damage, respectively. Two species viz., *P. cattleianum var. lucidum and P. molle* suffered high incidence (38.66 and 39.33%, respectively) and were on par with 'Lucknow-49' (35.00%) during 2002-03 and recorded a similar trend in the following year. The extent of fruit damage due to *H. antonii* ranged from 0.00 to 29.33 % and 0.00 to 32.00 % during 2002-03 and 2003-04 respectively. *Psidium quadrangularis* remained free from tea mosquito bug damage in both the years while *P. friedrichsthalianum* had the highest fruit damage and at a par with check variety.

Based on two year means, two species *viz*., *P. quadrangularis and P. chinensis* were resistant (< 10% damage) to fruit fly while *P. cattleianum* was moderately resistant. The other two species *viz., P. friedrichsthalianum* and *P. molle* with >30% damage were classified as susceptible and were on par with the check 'Lucknow-49'. The species, *P. quadrangularis* was free from tea mosquito bug (immune) and the factors contributing to immunity need to be further examined. However, considering an earlier report of Reddy and Vasugi (2004), rough fruit surface can be one of the contributing factors. Among the rest of species, *P. cattleianum* (4.33%) and *P. molle* (5.33%) were resistant, *P. chinensis* (18.67%) was moderately resistant and *P. friedrichsthalianum* was susceptible.

Table 2. Biochemical composition of *Psidium* species

Species	TSS (%)	Total sugars (g)	Vitamin C (mg/100g)	Acidity (%)
P. cattleianum var. lucidum	7.40	5.85	16.78	1.31
P. chinensis	8.30	9.34	22.15	0.70
P. friedrichsthalianum	3.20	9.62	19.75	1.13
P. molle	11.60	8.12	80.65	2.70
P. quadrangularis	9.10	5.89	81.33	1.10
P. guajava (Lucknow-49)	11.50	8.80	19.50	0.61
CD *(P=0.05)*	1.14	1.85	4.02	0.78

Table 3. Correlation coefficient (r) values of per cent fruit infestation with biochemical parameters of *Psidium* species

Pest	TSS	Total sugars	Vitamin C	Acidity
Fruit fly	0.586*	0.674*	NS	-0.614*
Tea mosquito bug	NS	NS	NS	NS

* Significant at p= 0.05; NS = Non-significant

The TSS in *Psidium* species ranged from 7.4% in *P. cattleianum* to 11.6% in *P. molle* (Table 2). Similarly total sugars varied from 5.85 to 9.62g, vitamin C from 16.78 to 81.33 mg/100g and total acidity from 0.61 to 2.70%. Correlation analysis (Table 3) showed that the extent of fruit fly incidence was significantly correlated with three characters *viz.*, TSS, total acidity and sugars. There was a positive correlation between the fruit fly infestation levels in different species and their TSS and total sugar contents. The correlation coefficient values were 0.576 and 0.674 pertaining to TSS and total sugars, respectively. However, fruit acidity was negatively correlated with the fruit fly incidence (r = - 0.614) and thus considered to have a role in imparting resistance, while correlation with vitamin C was non-significant. Arora *et al* (2000) reported a similar trend of correlation between fruit fly incidence and TSS of guava fruits. They also observed that total phenols were negatively correlated while vitamin C had non significant correlation. Our findings are in agreement with these observations. On the other hand, none of these parameters showed significant correlations with the tea mosquito bug infestation. The non significant effect of biochemical components on tea mosquito bug infestation could be because of the fact that, the infestation starts at early stages of fruit formation and also confines to the fruit surface unlike fruit fly, where maggots develop inside the fruit and

are thus vulnerable to fruit biochemical composition variations.

High TSS and total sugars are generally desirable traits in fruits and hence it is appropriate to locate a resistance source rich in these quality parameters. Our results show that *P. quadrangularis*, which was immune to fruit fly and resistant to tea mosquito bug, holds promise in this direction. *Psidium cattleianum and P. chinensis*, which exhibited resistance to one pest and moderate resistance to another may also be useful. Though *P. molle* was resistant to tea mosquito bug, it was highly susceptible to fruit fly and thus its potential is limited. As majority of species tested showed high degree of resistance compared to the check, it is worthwhile to screen as many wild species as possible to find resistance.

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