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Field screening of different bitter gourd genotypes against melon fruit fly, *Bactrocera cucurbitae* (Coquillett)

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Abstract
Field screening of different bitter gourd genotypes against melon fruit fly, *Bactrocera cucurbitae* were conducted at vegetable research farm, CCS HAU, Hisar, Haryana during 2017 and 2018. Promising bitter gourd genotypes namely, HK-127, HK-164, HK-168, BL-237, Jaun Puri, PB-14, Arka Bahar, Solan Hara, HK-157, Prithee and PDM were sown with row to row spacing of 1.5 m and plant to plant 45 cm in a randomized block design. Study of both the year shows that maximum infestation of fruit fly was observed in PDM variety. Highest percentage of marketable fruit (68.67) was recorded in HK 164 with minimum number of fruit fly infested fruits (31.33%) among all the tested genotypes. None of the genotypes were found resistance against fruit fly infestation.

Keywords: Bitter gourd, genotype, fruit fly, *Bactrocera cucurbitae*, screening

Introduction
Bitter gourd (*Momordica charantia* L.) also known as bitter melon, balsam pear, or karela, is cultivated throughout the world, especially in the tropical areas [1]. It is one of the most popular cucurbitaceous vegetable crop, rich in folate and vitamin C. Bitter gourd is grown extensively in the tropics and subtropics especially in India. It has immense medicinal properties and uses in numerous culinary preparations. Bitter gourd is attacked by a number of insect pests among them only fruit flies are the most serious pest. It has wide host range but plants of family Cucurbitacae are considered to be its preferred hosts [2]. Amongst cucurbits, the fruits of bitter gourd (*Momordica charantia*), muskmelon (*Cucumis melo*), snap melon (*Cucumis melo* var. *momordica*) and snake gourd (*Trichosanthes anguina* & *T. cucumeria*) have been reported as being the most preferred hosts [3].
The extent of losses varies between 30-100 per cent depending on the season and cucurbit species [4, 5]. In our country, the production of vegetable crops is already much below the requirement and therefore the damage due to this fly is undesirable. The commercially grown varieties of bitter gourd are almost susceptible to melon fruit fly. The fruit fly oviposits 2-4 mm inside the fruit pulp and the maggots after hatching remain inside the fruit. Hence the maggots feed internally and protected from direct contact with insecticides so it is very difficult to control this pest with insecticides. Therefore, there is a need of integrated and eco-friendly management of this pest. The development of resistant varieties to is an important component for an integrated pest management of melon fruit fly [6]. The identification of promising resistant/moderately resistant genotype is very effective alternative and do not have adverse effect on the ecosystem. Considering the above aspects in view, eleven genotypes of bitter gourd (including variety) based on the performance of preliminary screening were evaluated against melon fruit fly under field conditions.

Materials and Methods
The experiment on screening of different bitter gourd genotypes against melon fruit fly, *Bactrocera cucurbitae* were conducted at vegetable research farm, CCS HAU, Hisar, Haryana during 2017 and 2018. The bitter gourd seeds were sown with row to row spacing of 1.5 m and plant to plant 45 cm in a randomized block design. It was replicated three times. Eleven genotypes (including variety) were taken as treatment to find out their relative resistance against fruit fly.
Five plants of each genotype were selected randomly and tagged for recording the

observations from each replication. Observations were recorded at each peacking till the end of crop. Fruit fly infestation was recorded by counting the number of healthy and damage fruits and converted into percent fruit infestation. The cumulative percent fruit infestation was worked out on the basis of total number of fruit from all the picking as given below:

$$\text{Percent fruit infestation} = \frac{\text{Total no. of infested fruit}}{\text{Total no. of fruits}} \times 100$$

Results and Discussion

The persung of data in table 1 shows that fruit fly infestation during 2017 ranged from 35.67 to 60.89 per cent in different genotype. Minimum fruit fly infestation was observed in HK-164 (35.67%) with highest marketable fruit yield (64.33%). Second highest marketable fruit (62.11%) was observed in HK-168 followed by HK-127 (61.56%), Prithee (60.78%), HK-157 (59.11%), PB-14 (58%) and BL-237 (57.56%) which had non significant difference with each other except HK-168. Maximum fruit fly infestation (60.89%) was observed in variety Pusa Do Mausami (PDM), followed by Solan Hara (51.78%), June Puri (50.11%) and Arka Harit (44.89%) which had significant difference with each other except Solan Hara and June Puri. During 2018 the infestation was ranged from 31.33 to 54.56 per cent in different genotypes. Marketable fruit yield varies from 45.44 to 68.67 per cent. The result was more or less similar to 2017. Highest marketable fruit yield was obtained from HK-164 (68.67%) followed by HK-168 (66.78%), HK-127 (65.56%), HK-157 (65.56%), PB-14 (65.33%) and BL-237 (64.56%) which had non significant difference with each other. Lowest marketable fruit yield (45.44%) was recorded in Pusa Do Mausami (PDM) with highest fruit infestation (54.56%). followed by Solan Hara, June Puri and Arka Harit. Hence the study of both the year shows that none of the bitter gourd genotype have resistant against fruit fly.

Similarly Sen *et al.* [7] screened twenty five genotypes of bitter gourd under field condition to study their susceptibility against the infestation of melon fruit fly, *B. cucurbitae* (Coq.) in two agro-climatic zones of West Bengal and found that Pusa Do Mausami had the highest infestation and maggot density (63.67% and 10.36 maggot per fruit) of fruit fly. Panday *et al.* [8] conducted a field experiment to determine the varietal resistance of bitter gourd against the infestation of melon fruit fly. They reported variety Pusa Do Mausami was most susceptible (having 81.57% fruit infestation) followed by Arka harit (78.17%) and Jaunpuri (76.21%). None of the genotypes were found highly resistance, out of 74 genotypes. Nath and Bhushan [9] screened thirteen cucurbits against melon fruit fly infestation for two year and found that none of the cucurbits were found free from the fruit fly infestation. They found highest damage in bitter gourd is (26.11 and 31.96) and minimum in pumpkin (2.78 and 1.39) during summer season. Similarly damage during rainy season was minimum in pumpkin (7.4% and 11.1%) and maximum in bitter gourd (46.8% and 45.3%). Ingoley *et. al.* [10] screened twenty genotypes of cucumber against fruit fly under mid hill of Himachal Pradesh. They reported three genotypes moderately resistance, eight as susceptible and nine as highly susceptible.

Table 1: Fruit damage by Fruit fly in different genotypes of bitter gourd

Genotypes	2017		2018	
	Harvested marketable fruit (%)	Fruit damage (%)	Harvested marketable fruit (%)	Fruit damage (%)
HK-127	61.56 (51.66)*	38.44 (38.30)	65.56 (54.05)	34.44 (35.91)
HK-164	64.33(53.33)	35.67 (36.64)	68.67(55.96)	31.33 (34.00)
HK-168	62.11 (51.99)	37.89 (37.97)	66.78(54.78)	33.22 (35.18)
HK-157	59.11 (50.23)	40.89 (39.74)	65.56(54.04)	34.44 (35.92)
BL-237	57.56 (49.33)	42.44 (40.64)	64.56(53.44)	35.44 (36.52)
Jaun Puri	49.89 (44.92)	50.11 (45.05)	60.11(50.82)	39.89 (39.15)
PB-14	58.00 (49.59)	42.00 (40.37)	65.33(53.91)	34.67 (36.05)
Arka Harit	55.11 (47.92)	44.89 (42.05)	61.56(51.67)	38.44 (38.30)
Solan Hara	48.22 (43.96)	51.78 (46.00)	57.00(49.00)	43.00 (40.96)
Prithee	60.78 (51.21)	39.22 (38.75)	61.78(51.80)	38.22 (38.16)
PDM (Pusa Do Mausami)	39.11 (38.69)	60.89 (51.27)	45.44 (42.37)	54.56 (47.59)
CD at 5%	(2.38)	(2.38)	(2.23)	(2.23)

*Figure in parenthesis is angular transformed value

Conclusion

On the basis of two year study we conclude that fruit fly is a very serious pest of bitter gourd. The infestation of fruit fly ranged from 31.33 to 60.89 per cent in different genotypes and none of the genotype have resistant against fruit fly, *B. cucurbitae* infestation.

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