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# Screening of ridge gourd genotypes aganist melon fruit fly, *Bactrocera cucurbitae* (Coquillett) under field conditions

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**Abstract**
Using resistant varieties is one of the effective components in the management of melon fruit fly on ridge gourd due to difficulties associated with its chemical and biological control methods. Twenty ridge gourd genotypes were screened against melon fruit fly under field conditions at University of Horticultural Sciences, Bagalkot, (Karnataka, India). Among the different genotypes screened, the eleven genotypes such as UHSBRG-5, UHSBRG-15, UHSBRG-12, UHSBRG-18, UHSBRG-19, UHSBRG-17, UHSBRG-9, UHSBRG-1, UHSBRG-6, UHSBRG-16 and UHSBRG-13 were classified under resistant category. Whereas, the genotypes such as UHSBRG-3, UHSBRG-4, UHSBRG-2, UHSBRG-14, UHSBRG-8, UHSBRG-20 and UHSBRG-7 were categorized as moderately resistant genotypes and UHSBRG-11 and UHSBRG-10 were classified as susceptible genotypes. Resistant genotypes found in the present study could be further used in breeding programme as sources for developing resistant ridge gourd varieties.

**Keywords:** Ridge gourd, fruit fly, genotypes, screening

## 1. Introduction
Ridge gourd, popularly known as Kalitori and also called as angled gourd, angled loofah, Chinese okra, silky gourd and ribbed gourd. Ridge gourd belongs to genus *Luffa* of Cucurbitaceous family and has chromosome number 2n = 26. Fruits of ridge gourd are very nutritious and good source of vitamin A, calcium, phosphorous, ascorbic acid and iron. The insect pests and diseases are the major biotic factors which influence the production of ridge gourd. Among the different insect pests reported on the ridge gourd, the melon fruit fly *Bactrocera cucurbitae* (Coquillett) is one of the economically important pests which is geographically distributed throughout the tropics and sub tropics, especially in most of the countries of south east-Asia. It has more than 81 host plants, but plants of the family cucurbitaceae are considered to be its preferred host [1]. Among 15 cucurbits reported as the host plants for fruit fly, it prefers ridge gourd next to bitter gourd. Depending on the season, prevailing climatic conditions and cucurbitaceous species, the extent of loss varies between 30 to 100 percent [2].

The fruit fly prefers to infest young, green, soft skinned fruits. It inserts the eggs 2 to 4 mm deep in the fruit tissues and the maggots feed on fleshy part of fruits causing decay of fruits and in some cases premature dropping of fruits. The affected fruits are distorted and lose their market value. The pupation occurs in the soil at 0.5 to 15 cm below the soil surface depending on the nature and type of soil.

As the fly oviposits inside the fruit pulp and hatched maggots feed on the pulp, it becomes difficult to control with insecticides. Therefore, there is a need to develop alternative management practices. One such alternative is using of resistant variety to manage the melon fruit fly infesting ridge gourd, which is a right choice as it do not have adverse effect on the ecosystem. Hence, present investigation was undertaken to screen around twenty genotypes of ridge gourd for their resistance against melon fruit fly under natural infestation in the field conditions.

## 2. Materials and Methods
Twenty genotypes of ridge gourd were sown at Haveli farm, College of Horticulture, Bagalkot, Karnataka (16° 46' N, 74° 59' E) during *kharif* season of 2015.

The experiment was laid out in a Randomized Complete Block Design with two replications of each genotype. The area of each block was 24 m x 9 m and the space between rows and between the plants was 1.2 m and 0.9 m respectively. All the plants were raised in field following recommended package of practices of UHS, Bagalkot and observation were recorded from date of fruiting to still harvesting of the fruits. Five plants of each genotype from each replication were selected randomly and tagged for recording the observations. Observations were recorded at weekly interval by counting the damage and healthy fruits to know the percent fruit infestation. The resistance / susceptibility for individual lines was judged as per the susceptibility scale on the basis of percent fruit infestation (Table 1). The cumulative percent fruit infestation was worked out on the basis of total number of fruit from all the picking as given below:

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

The genotypes screened under field condition were grouped in to different categories on the basis of percent-infested fruits in each genotype [3].

**Table 1:** Susceptibility rating scale of the genotypes on the basis of percent fruit damage [3]

| Scale | Fruit damage (%) | Rating |
|---|---|---|
| 1 | No damage | Immune |
| 2 | 1 – 10 | Highly resistant |
| 3 | 11 – 20 | Resistant |
| 4 | 21 – 50 | Moderately resistant |
| 5 | 51 – 75 | Susceptible |
| 6 | 76 – 100 | Highly susceptible |

## 3. Results and Discussion

### 3.1 Fruit damage

The results presented in Table 2 revealed that none of the genotype remained free from damage by fruit flies. However, fruit damage varied significantly in the screened ridge gourd genotypes.

The mean value of fruit damage was ranged from 12.37 to 60.69 percent among the screened genotypes. The lowest fruit damage was found in UHSBRG-5 (12.37%) followed by UHSBRG-15 (16.14%) and UHSBRG-12 (16.17%). Whereas the highest percent fruit damage of 60.69 and 57.17 was recorded with UHSBRG-11 and UHSBRG-10 genotypes, respectively. However, there was no significant difference between these two genotypes.

**Table 2:** Fruit damage due to melon fruit fly, *Bactrocera cucurbitae* in different genotypes of ridge gourd

| Genotypes | Fruit damage (%) | Resistance category |
|---|---|---|
| UHSBRG-1 | 19.15 (25.95)$^{efgh}$ | R |
| UHSBRG-2 | 23.32 (28.87)$^{cd}$ | MR |
| UHSBRG-3 | 34.05 (35.69)$^{b}$ | MR |
| UHSBRG-4 | 25.39 (30.25)$^{c}$ | MR |
| UHSBRG-5 | 12.37 (20.58)$^{i}$ | R |
| UHSBRG- 6 | 19.79 (26.38) $^{defgh}$ | R |
| UHSBRG-7 | 21.25 (27.45)$^{cdef}$ | MR |
| UHSBRG-8 | 22.00 (27.96)$^{cdef}$ | MR |
| UHSBRG-9 | 18.44 (25.39)$^{fgh}$ | R |
| UHSBRG-10 | 57.17 (49.12)$^{a}$ | S |
| UHSBRG-11 | 60.69 (51.17)$^{a}$ | S |
| UHSBRG-12 | 16.17 (23.71) $^{gh}$ | R |
| UHSBRG-13 | 19.95 (26.52)$^{defg}$ | R |
| UHSBRG-14 | 22.90 (28.57)$^{cde}$ | MR |
| UHSBRG-15 | 16.14 (23.62)$^{h}$ | R |
| UHSBRG-16 | 19.86 (26.44) $^{defg}$ | R |
| UHSBRG-17 | 17.28 (24.56)$^{gh}$ | R |
| UHSBRG-18 | 16·52 (23.98) $^{gh}$ | R |
| UHSBRG-19 | 16.59 (24.03) $^{gh}$ | R |
| UHSBRG-20 | 21.88 (27.88)$^{cdef}$ | MR |
| SEm ± | 0.941 | |
| CD (p=0.05) | 2.814 | |

Figures in the parentheses are arc sin transformed values

Figures in each column followed by same alphabet (s) are not significantly different (P=0.05)

R = Resistant, MR= Moderately Resistant S= Susceptible

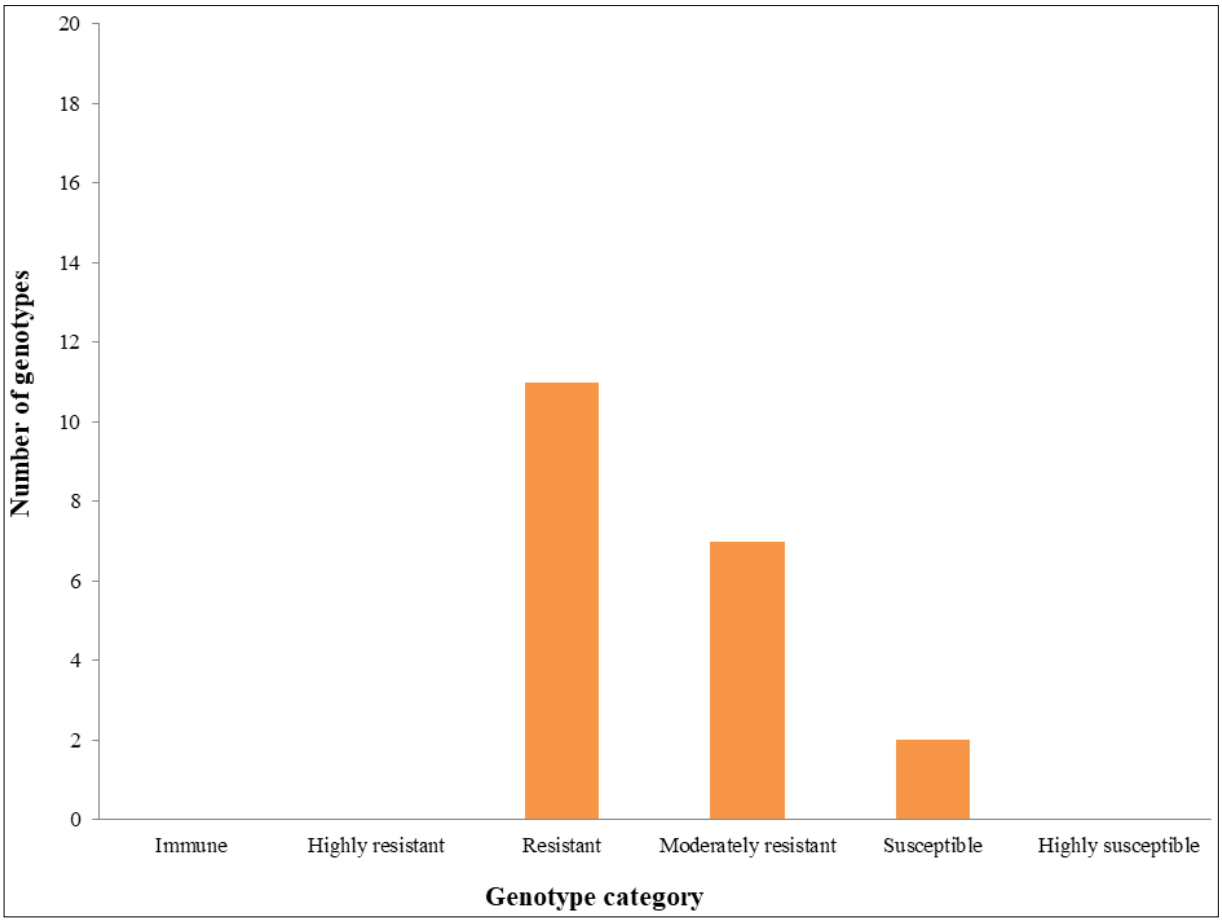


**Fig 1:** Distribution of ridge gourd genotypes across different categories following susceptibility rating scale adopted by Nath, 1966

### 3.2 Categorization of ridge gourd genotypes based on percent fruit damage

The results of categorization of ridge gourd genotypes based on the percent damage of fruits by melon fruit fly indicated that genotypes UHSBRG-5, UHSBRG-15, UHSBRG-12, UHSBRG-18, UHSBRG-19, UHSBRG-17, UHSBRG-9, UHSBRG-1, UHSBRG-6, UHSBRG-16 and UHSBRG-13 were classified under resistant category. Whereas, the genotypes such as UHSBRG-3, UHSBRG-4, UHSBRG-2, UHSBRG-14, UHSBRG-8, UHSBRG-20 and UHSBRG-7 were classified as moderately resistant and UHSBRG-11 and UHSBRG-10 were classified as susceptible genotypes (Fig. 1).

Similar results were also observed by previous authors [4] who screened different ridge gourd genotypes against fruit fly and reported that AHRG-29, AHRG-57 and Pusa Nasdar were categorized as resistant as these genotypes recorded lowest percent fruit infestation and maggot density. Whereas genotypes such as AHRG-49, AHRG-33, AHRG-42, AHRG-30, AHRG-23, AHRG-58, AHRG-50, AHRG-28, AHRG-43, AHRG-52 and AHRG-59 were categorized as susceptible genotypes. Authors further opined that the genotypes AHRG-29, AHRG-57 and Pusa Nasdar could be used as the sources for developing resistant ridge gourd varieties.

Similarly, lower fruit infestation and larval densities were observed on resistant genotypes of bitter gourd than their susceptible genotypes [2, 5]. Twenty genotypes of cucumber against fruit fly *B. cucurbitae* were evaluated under mid hill of Himachal Pradesh and reported that among the screened genotypes, three were categorized as moderately resistant, eight as susceptible and nine as highly susceptible genotypes [6]. Similar findings were also noticed in Water melon [7].

## 4. Conclusion

The categorization of ridge gourd genotypes based on their reaction to fruit fly damage indicated that the UHSBRG-5, UHSBRG-15, UHSBRG-12, UHSBRG-18, UHSBRG-19, UHSBRG-17, UHSBRG-9, UHSBRG-1, UHSBRG-6, UHSBRG-16 and UHSBRG-13 were found resistant category among different genotypes screened. UHSBRG-3, UHSBRG-4, UHSBRG-2, UHSBRG-14, UHSBRG-8, UHSBRG-20 and UHSBRG-7 were categorized under moderately resistant genotypes. Whereas, UHSBRG-11 and UHSBRG-10 were classified under susceptible category. Resistant genotypes can be used as sources for developing resistant ridge gourd varieties.

## 5. Acknowledgement

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