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# Selection of different Okra genotypes against *Earias* spp. (Lepidoptera: Noctuidae).

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**Abstract**
The present study titled "Selection of different Okra genotypes against *Earias* spp." was carried out at Entomological Research Institute, Faisalabad and GC University Faisalabad. Twenty genotypes of okra viz., Parbhani kranti, Pusa swani, Ikra-1, Clean spineless, Pussa green, Ikra-2, Sanam, Dera local, Pusa green, Makhamali, Okra-3, Ikra-3, Green wonder, Kirn-51, PMS-55, Punjab selection, Arka anamika, Namdahari. Diksha and Anarkali with the objective to find their comparative resistance susceptibility were studied during 2011 regarding fruit infestation percentage caused by *Earias* spp. From these preliminary study, nine genotypes of okra showing three susceptible (Parbhani kranti, Pusa swani and Ikra-1), three intermediate (Makhamali, Okra-3 and Ikra-3) and three comparatively resistant (Anarkali, Diksha and Namdahari) were selected for final study during 2012. The genotype Parbhani kranti showed susceptible trend with fruit infestation of 17.83 percent during preliminary screening trial during 2011 and fruit infestation of 4.78 percent during final screening trial during 2012 while the genotype Anarkali was found to be comparatively resistant resulted in minimum fruit infestation i.e., 7.60 during preliminary screening trial and 1.30 percent during final screening trial. The maximum Host Plant Susceptibility Indices (HPSIs) were recorded to be 16, 19 ad 17 percent for Parbhani kranti during 2011, 2012 and on cumulative basis of 2011 and 2012, respectively and this genotype was found to be comparatively susceptible, whereas minimum HPSIs were observed to be 7.0, 5.0 and 4.0 percent on the genotype Anarkali during 2011, 2012 and cumulative basis of both years, respectively and was found to be comparatively resistant genotype.

**Keywords:** Okra, genotypes, selection, Okra fruit borer, HPSI.

## 1. Introduction

Okra, *Abelmoschus esculentus* (L.) is an important vegetable crop of the tropical and subtropical parts of the temperate region. Due to high consumer demand and healthier price, it is extensively grown by the farmers, throughout Pakistan [3]. Okra is broadly cultivated for its young fruits as well as leaves, petioles, stems, shoots, rhizomes, inflorescence, and seeds. Okra plays significant role in the human diet by supplying carbohydrates, proteins, fats, minerals and vitamins that are generally lacking in the staple foods. The nutritional value of okra is higher than that of tomato, eggplant and most of the cucurbits, except bitter gourd [7].

Spiny bollworms are the most terrible pests causing serious turn down of the produce, in terms of quality as well as of quantity [1]. Due to marked tendency for stem boring Earias spp. is distinguished from other pests of okra. The larvae enter the terminal bud of vegetable shoot and channel down from the growing point. The wilting of tender leaves and collapsing of the main stem results in severe attack. The larvae also bore into the flower buds, flowers and fruits of the crop. Serious decline in production of okra due to the okra fruit and shoot borer has been reported by different workers; 8.4 to 73.2% variations in fruit infestation [4], 32.06 to 40.84% loss in yield [10]. The use of crop varieties (insect resistance) is being practiced in advanced agriculture production since half century. Constant increase in the expenditure of food production has eminent the need to use the varieties having resistance against vegetable pests [11]. Plant opposition to insects provides the crucial foundation on which the structure of the Integrated Pest Management for different pests can be built. Insect resistant cultivars can be used as only control method and also interact synergistically with biological, chemical and cultural control methods to reduce the spread of pest insects [12].

## 2. Material and Methods

### 1. Screening of the Okra Genotypes

Studies were carried out, during 2011 and 2012, to screen Okra genotypes, based on the infestation percentage (%) per plant. Experiments were laid out in a Randomized Complete Block Design (RCBD) with three replicates. The row to row distance was kept as 75 cm and plant to plant as 30 cm. The plot size was keptat 17 m × 19 m.

### 1.1. Preliminary Varietal Screening

Preliminary experiment (Exp-I) was conducted for varietal screening of okra genotypes. 20 promising okra genotypes (Table 1) were sown in Randomized Complete Block Design (RCBD) and repeated in three replicates. Okra genotypes were categorized into three groups on the basis of fruit infestation i.e., least preferred, intermediate and most preferred based on the data of fruit infestation. For final screening (Exp-II) against spotted bollworms nine genotypes were selected, three from each group.

**Table 1:** Response of okra genotypes resistance /susceptibility against *Earias* spp. in preliminary screening trial during 2011.

| Genotypes | Reaction |
|---|---|
| Parbhani kranti | Susceptible |
| Pusa sawani | -do- |
| Ikra-1 | -do- |
| Clean spineless | Moderately susceptible |
| Pussa green | -do- |
| Ikra-2 | -do- |
| Sanam | -do- |
| Dera local | -do- |
| Pusa green | -do- |
| Makhmali | Intermediate |
| Okra-3 | -do- |
| Ikra-3 | -do- |
| Green wonder | Moderately resistance |
| Kirn-51 | -do- |
| PMS-55 | -do- |
| Punjab Selection | -do- |
| Arka anamika | -do- |
| Namdahari | Resistant |
| Diksha | -do- |
| Anarkali | -do- |

### 1.2. Final screening

Nine okra genotypes (Table 2) selected from Exp-I were sown in the same area and data of *Earias* spp. Infestation percentage (fruit infestation) as follows.

**Table 2:** Selected okra genotypes for the year 2012.

| Sr. No. | Genotypes | Response |
|---|---|---|
| 1. | Parbhani kranti | Susceptible |
| 2. | Ikra-1 | -do- |
| 3. | Pusa sawani | -do- |
| 4. | Makhamali | Intermediate |
| 5. | Okra-3 | -do- |
| 6. | Ikra-3 | -do- |
| 7. | Namdahari | Resistant |
| 8. | Diksha | -do- |
| 9. | Anarkali | -do- |

### 1.3. Fruit incursion

For both experiments (Exp-I and Exp-II) five plants, from each experimental plot were selected randomly to record data of both damaged and undamaged okra plants. Data was collected for 7 dates with an interval of 7±1 days. Okra fruit infestation by *Earias* spp. was calculated by the following formula:

$$\text{Fruit Infestation percentage (FIP)} = \frac{Ft}{Fd} \times 100$$

Where: Ft= Total number of fruits and Fd= No. of damaged fruits

### 1.4 Plant susceptibility indices (PSI)

The plant susceptibility indices(PSI), based on fruit infestation caused by *Earias* Spp., on different selected genotypes of okra were determined by using an IBM compatible computer, with a Microsoft chart package. However, PSI may be calculated by the following formula:

$$\text{PSI \%} = \frac{B - A}{B} \times 100$$

Where: A = Fruit infestation in individual genotypes, and
B = Fruit infestation in all genotypes of okra on average basis.

Host plant susceptibility indices with the help of Excel software using IBM compatible computer. The means were compared by DMR test at $P<0.05$.

## 3. Results

The results revealed significant difference among dates of observation, genotypes and interaction between dates of observation and genotype. It is evident from the results that Parbhani kranti appeared as relatively susceptible with maximum fruit infestation (17.83 percent) and differed significantly from those observed in all other genotypes. The fruit infestation was recorded to be 16.88 and 16.11 percent in Pusa swani and Ikra-1, respectively and did not differ significantly with each other. The minimum infestation of fruit was observed to be 7.60 percent in genotype Anarkali differing significantly from all other genotypes. The genotypes Diksha and Namdahari possessed 8.32 and 9.02 percent fruit infestation and were thus categorized as comparatively resistant in descending position compared with Anarkali. The genotype Ikra-1 did not show significant difference with clean spineless and Pusa Green with 15.97 and 15.94 percent fruit infestation, respectively. Similarly Ikra-2, Sanam and Dera local with 14.43, 14.05 and 14.03 percent fruit infestation also showed nonsignificant difference with one another. The genotype Kirn-51 with 11.31 percent fruit infestation did not differ significantly with Okra-3, Ikra-3, Green wonder, PMS-55 and Punjab selection with 11.71, 11.56, 11.48, 10.95 and 10.92 percent fruit infestation, respectively. The genotype Makhmali possessed 12.59 percent fruit infestation and differed significantly from all other genotypes. The genotype Anamika with 10.46 percent fruit infestation, was found to be at par with Punjab selection. As indicated by this experiment , three genotypes showing maximum fruit infestation i.e. Parbhani kranti, Pusa swani and Ikra-1, three genotypes showing infestation at medium level i.e. Makhamali, Okra-3 and Ikra-3 and three genotypes viz., Anarkali, Diksha and Namdahari showing minimum fruit infestation were selected for final screening trials.

**Table 3:** Means comparison of the data regarding fruit infestation (%) caused by *Earias* spp. on various genotypes of okra during 2011.

| Genotypes | Reaction |
|---|---|
| Parbhani kranti | 17.83a* |
| Pusa sawani | 16.88b* |
| Ikra-1 | 16.11bc* |
| Clean spineless | 15.97c |
| Pussa green | 15.94c |
| Ikra-2 | 14.43d |
| Sanam | 14.05d |
| Dera local | 14.03d |
| Pusa green | 13.39e |
| Makhamali | 12.59f** |
| Okra-3 | 11.71g** |
| Ikra-3 | 11.56g** |
| Green wonder | 11.48g |
| Kirn-51 | 11.31gh |
| PMS-55 | 10.95h |
| Punjab Selection | 10.92hi |
| Arka anamika | 10.46i |
| Namdahari | 9.02 j*** |
| Diksha | 8.32 k*** |
| Anarkali | 7.60 l*** |

Means sharing similar letters are not significantly different by LSD Test at P = 0.05.
* = Most preferred genotype; ** = Intermediate genotype;
*** = Resistant genotype

The results obtained during 2012 (Table 4) depict that Parbhani kranti showed significantly maximum fruit infestation (4.78 percent) differing significantly from all other genotypes. The genotype Anarkali possessed minimum fruit infestation (1.30 percent) and did not show significant difference with Diksha. The genotypes Ikra-1, Pusa swani and Makhmali showed 4.67, 3.44 and 2.99 percent fruit infestation, respectively and showed significant difference with one another. The genotypes Okra-3 and Ikra-3 had 2.84 and 2.82 percent fruit infestation, respectively without any significant difference. The fruit infestation was recorded to be 1.59 percent in Namdahari differing significantly from all other genotypes. From these results, it can be inferred that the genotype Anarkali appeared as comparatively resistant with minimum fruit infestation whereas, Parbhani kranti possessed maximum fruit infestation and was found to be comparatively susceptible.

**Table 4:** Means comparison of the data regarding fruit infestation (%) caused by *Earias* spp. on various genotypes of okra (*Abelmoschus esculentus* L.) during 2012.

| Genotypes | Means (**) |
|---|---|
| Parbhani kranti | 4.78 [a] |
| Ikra-1 | 4.67 [b] |
| Pusa sawani | 3.44 [c] |
| Makhamali | 2.99 [d] |
| Okra-3 | 2.84 [e] |
| Ikra-3 | 2.82 [e] |
| Namdahari | 1.59 [f] |
| Diksha | 1.33 [g] |
| Anarkali | 1.30 [g] |

Means sharing similar letters are not significantly different by LSD Test at P = 0.05.

### 3.1 HPSI during 2011

The results regarding HPSIs in various selected genotypes of okra during 2011 are given in Fig 3. It is evident that the genotype Parbhani kranti showed maximum HPSI (16 percent) followed by Ikra-1, Pusa swani, Makhamali, Okra-3 and Ikra-3 respectively. The minimum HPSI was calculated to be 7 percent in Anarkali. The genotypes Namdahari and Diksha each showed 8 percent HPSIs. Thus Parbhani kranti proved to a susceptible genotype whereas Anarkali the resistant showing the highest and lowest HPSIs, respectively.

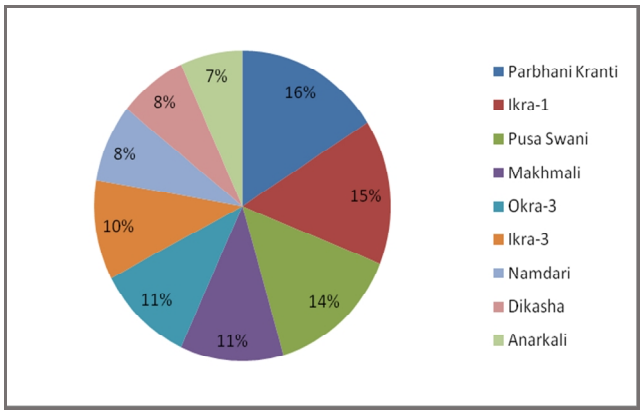


**Fig 1:** Host-plant susceptibility indices (%), based on percent infestation, on various genotypes of okra on cumulative basis, during 2011.

### 3.2 HPSI during 2012

During 2012 also, Parbhani kranti again was found to be susceptible showing maximum HPSI (19 percent) followed by Ikra-1, Pusa swani, Makhamali, Okra-3 and Ikra-3 respectively (Figure 2). The genotypes Anarkali and Diksha showed minimum HPSIs (5 percent) and were found to be comparatively resistant. The genotype Namdahari had 6 percent HPSI. Parbhani kranti was thus found to be the most susceptible with maximum HPSI whereas, Anarkali and Diksha were proved to be comparatively resistant with minimum HPSI.

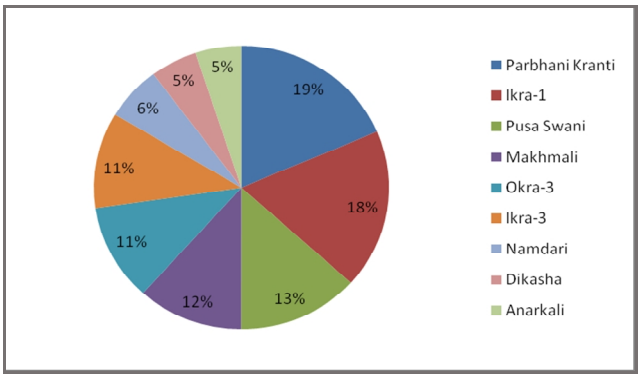


**Fig 2:** Host-plant susceptibility indices (%), based on percent infestation, on various genotypes of okra on cumulative basis, during 2012.

### 3.3 HPSI during 2011 and 2012

The results presented in Figure 3 reveal that Parbhani kranti resulted in maximum HPSI (17 percent). The genotype Anarkali was found to be comparatively resistant with minimum HPSI (4 percent). The genotype Diksha and Namdahari resulted in 8 and 7 percent HPSI, respectively.

Hence, the genotype Anarkali proved to be comparatively resistant whereas, Parbhani kranti showed susceptible response.

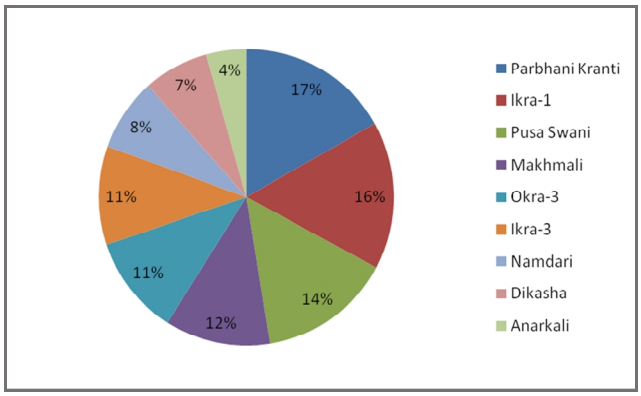


**Fig 3:** Host-plant susceptibility indices (%), based on percent infestation, on various genotypes of okra on cumulative basis, during 2011-12.

## 4. Discussion

It was evident from the results that the genotype Parbhani kranti showed susceptible trend with maximum fruit infestation of 17.83 percent during preliminary screening trial. The same genotype also showed similar trend during final screening study with maximum fruit infestation of 4.78 percent. The genotype Pusa sawani ranked next towards preference with 16.88 percent fruit infestation during 2011 whereas it stood at third place during 2012 with 3.44 percent fruit infestation. The present findings are inconformity with those of Shukla [8] who reported that Parbhani kranti had significantly higher shoot damage when compared with a set of seven okra varieties of hybrid. In the present study the genotype Pusa green was found to be moderately susceptible showing 15.94 percent fruit infestation during 2011 However the findings did not agree with those of Farooq [2] who reported that Pusa green produced maximum pod yield and produced flowers earlier than other cultivars. In the present study Arka anamika was found to be less preferred with 10.46 percent fruit infestation compared to most preferred Parbhani kranti (17.83%) and these findings can be compared in broader sense to those of Naresh [6] who reported that fruit damage was lowest in different set of genotypes of okra including Arka anamika. The present findings are also in conformity with those of Mandal [5] who reported that the minimum shoot infestation (8.7%) was recorded in D-12-87-5 which was statistically at par with Arka anamika (9.4%) whereas the maximum fruit infestation (11.9%) was recorded in Pusa swani.

The maximum host plant susceptibility index (HPSI) was recorded as 16, 19 ad 17 percent for Parbhani kranti during 2011, 2012 and on cumulative basis of 2011 and 2012, respectively and genotype was found to be comparatively susceptible. In contrast, minimum (HPSI) was observed to be 7.0, 5.0 and 4.0 percent for the genotype Anarkali during 2011, 2012 and cumulative basis of both years, respectively and was found to be comparatively resistant genotype.

## 5. Conclusion

From the present investigation, it can be concluded that the genotype Anarkali is comparatively resistant while Parbhani kranti is highly susceptible against okra fruit borer. So Anarkali will be given preferred in IPM programme regarding okra fruit borer.

## 6. References

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