# Evaluation of Different Brinjal (*Solanum melongena* L.) Varieties for Yield Performance and Sucking Insect Pests in Bahawalpur, Pakistan

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**Abstract:** This study investigated the relative performance of ten brinjal (*Solamum melongena* L.) varieties for yield in fall 2014 in Bahawalpur. The study was conducted at farm area of Islamia University of Bahawalpur. Ten brinjal varieties were evaluated for yield performance in a research trial following randomized complete block design. Significant differences existed in the yield generated by tested varieties. Significantly more yield was recorded in Shamli and Eggplant deep black followed by Advanta 306, Sandhya F1, Black boy, Black nagina and Advanta 305 in descending order. Twinkle star and Kalash F1 generated significantly less yield while the significantly least yield was recorded for Xingchangjishi than all the tested varieties. Whitefly *Bemesia tabaci* (Homoptera: Aleyrodidae) and jassid *Amrasca biguttula biguttula* (Homoptera: Cicadellidae) were the major sucking insects attacking this crop. Populations of both pest insects were recorded significantly more on Xingchangjishi while least populations of these pests were recorded on Egg plant deep black and Sandhya F1. Correlation of insect populations with yield showed inverse relationships. These results are important regarding varietal performance for yield test conducted for ten brinjal varieties. Varieties *i.e.,* Eggplant deep black and Shamli with significantly more yields are recommended for cultivation in this area to get more brinjal yield.

**Keywords:** Egg plant, solanaceae, sucking pests, yield comparison.

## INTRODUCTION

Brinjal is also known as eggplant and this name is assumed to come from its resemblance to the shape of egg [1]. It is grown in warm season for its fleshy fruit. As a vegetable, it is grown worldwide (tropical and subtropical areas) and has potential of self-fertilization [2]. It is included in top ten vegetables of the world. One quarter of the world production comes from India. 94% of the world production comes from Asia [3].

In Pakistan, vegetables cover an area of about 385578 ha with production of 3116808 tons. Pakistan total cultivated area of brinjal is 8325 ha with 82999 tons annual production. In Punjab, the total cultivated area of brinjal is about 4452 hectares having annual production of 54159 tons [4]. Brinjal cultivars are available in a variety of shapes ranging from egg shaped or oval to club long shaped with different colors like yellow, green, white, black and purple. Brinjal is not only used as a fresh vegetable but it has medicinal values with many health benefits [5].

Production losses due to insect pests are very high in South Asia [6]. As brinjal is attacked by numerous insect pests and pesticides are used widely to decrease economic losses caused by these pests. The use of pesticides results in many hazards like environmental pollution, bioaccumulation and bio-magnification [7]. The indiscriminate and constant use of insecticides causes insecticide resistance in pest insects [8]. Pesticide residues are of chief importance when commodities of direct human consumption are under cultivation because when these vegetables are eaten by human beings, insecticides enter the bodies of humans and these can cause serious health problems. To avoid this, other than pesticides control actions for these pests are needed. The use of resistant varieties is one of these alternate methods [9].

Among the pest insects, different sucking pests like whitefly, jassid, aphid and thrips are big threats to brinjal cultivation and they attack from nursery period till harvesting and their attack can result in loss to the profitable yield [10]. Insect pests like whitefly and jassid are important sucking pests of brinjal. It has been reported that in the South East Asia the sucking pest caused 67% yield losses [11]. Use of insect resistant cultivars has got tremendous value in integrated pest management. Owing to importance of insect resistant cultivars for managing pest insects' present study was designed to evaluate ten certified varieties of brinjal in Bahawalpur for yield performance and against two major sucking pests namely jassid and whitefly for their

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preference for different varieties. Varieties with comparatively higher yield and low insect pests populations can be recommended for cultivation in this area.

## MATERIALS AND METHODS

The experiment was conducted in randomized complete block design (RCBD) with four replications in entomological research farm area situated at farm area of The Islamia University of Bahawalpur during fall 2014. Ten certified varieties of brinjal seedlings *viz.,* Advanta 305, Advanta 306, Black boy, Black nagina, Eggplant deep black, Kalash F1, Sandhya F1, Shamli, Twinkle star and Xingchiangjishi were used in this experiment. Nursery sowing of brinjal varieties in seed bed was done in 2nd week of March. After 30 days (3rd week of April), the seedlings were transplanted in the field with four replications. The unit plot size was 1 x 4 $m^2$ with spacing between row to row 90 cm and plant to plant distance was 45 cm. The recommended dose of NPK fertilizers in the form of Urea, DAP and Murate of potash were applied to all treatments. In this experiment, cow dung and other chemical fertilizer were applied for brinjal cultivation @ 15 tons of cow dung and 115, 72 and 75 kg of N, $P_2$ $O_5$ and $K_2$ O, respectively per hectare [12]. Irrigation was done one day before transplanting and then irrigation was carried out at weekly interval. The whole experimental plots were kept free from any insecticide application. For the eradication of weeds, weeding and hoeing were done after ten days interval.

### Data Recording

The data about sucking insect pests of brinjal namely Jassid (*Amrasca biguttula biguttula*) and whitefly (*Bemisia tabaci*) were recorded from six randomly selected plants per plot. At the nursery time, data of sucking insect pests were not taken. These activities were performed early in the morning hours when the pests were less active. Population of sucking insect pests was recorded from upper, middle and lower leaves respectively of six selected plants from each variety per plot. The observations were made at weekly interval starting from the one week after transplanting till to the harvesting of the crop.

For yield, the data was taken by picking all the fruits from all the plants of each plot ($4m^2$) and weighing the fruit with the help of electric weighing balance of every plot individually (40 plots). Yield was harvested when plants had maximum fruit. In total harvesting was done four times which was based on maximum yield one time obtained and total yield from four pickings was measured. Per plot yield was also converted into Kg/Ha by using formula:-

Grams per $4m^2/4$=Gram/$m^2$/1000=Kg/$m^2$*10000=Kg/Hectares

The results regarding yield and pest populations were subjected to statistical analysis for comparison among varieties.

### Data Analysis

The data of pest populations and yield was analyzed statistically by using analysis of variance

**Table 1: Comparison of *A. biguttula biguttula* and *B. tabaci* Population on Brinjal Varieties**

| Varieties | *A. biguttula biguttula* Means ± S.E | Varieties | *B. tabaci* Means ± S.E |
|---|---|---|---|
| Xingchangjishi | 4.01 ± .09 a | Xingchangjishi | 4.11± .15a |
| Black boy | 2.53± .08 b | Twinkle star | 2.72± 0.08b |
| Kalash F1 | 2.52± 0.13 b | Advanta 306 | 2.68±.06bc |
| Advanta 305 | 2.44 ± 0.09 b | Kalash F1 | 2.60±.13bbc |
| Shamli | 2.42 ± 0.08 b | Shamli | 2.52±.05bc |
| Twinkle star | 2.41 ± 0.06 b | Advanta 305 | 2.50±.08bc |
| Advanta 306 | 2.39 ± 0.07 b | Black nagina | 2.49±.04bc |
| Black nagina | 2.34 ± 0.07 bc | Black boy | 2.38±.13c |
| Sandhya F1 | 2.08 ± 0.05 cd | Sandhya F1 | 2.04±.04d |
| Eggplant deep black | 1.95 ± 0.02 d | Eggplant deep black | 1.99±.05d |
| F | 29.637 | F | 33.852 |
| Df | 9, 870 | Df | 9, 870 |
| P | .000 | P | .000 |

Means sharing same letters are non-significantly different from each other at *P=0.05.*

**Table 2: Comparison of Different *S. melongena* Varieties for Yield in Bahawalpur**

| Varieties | Mean yield (Grams/Plot or $4m^2$) | Mean yield (Kg/Ha) |
|---|---|---|
| Shamli | 35984.75a | 89962.50 |
| Eggplant deep black | 35515.00a | 88787.50 |
| Advanta 306 | 32056.25ab | 80140.62 |
| Sandhya F1 | 31687.50ab | 79218.75 |
| Black boy | 30853.75ab | 77132.00 |
| Black nagina | 29365.5ab | 73412.50 |
| Advanta 305 | 28881.25ab | 72202.50 |
| Twinkle star | 26700.00b | 66750.00 |
| Kalash F1 | 25778.00b | 64445.00 |
| Xingchangjishi | 17450.50c | 43626.25 |
| F | 3.36 | |
| Df | 9, 39 | |
| P | 0.000 | |

Means sharing same letters are non-significantly different from each other at *P=0.05.*

(ANOVA) and means were separated by Duncan Test at 0.05 level of probability.

## RESULTS

There was significant difference between the yields of different varieties (Table **2**, *P<0.05*). Maximum yield was obtained in variety Shamli (35984.75 g/plot) or Eggplant deep black (35515.00 g/plot) followed by Advanta 306 with values 32056.25g/plot. Least yield was measured in Xingchangjishi (17450.50g/ plot). The yield in other treatments remained as (Sandhya F1), (Black boy), (Black nagina), (Advanta 305), (Twinkle star) and (Kalash F1) 31687.50 g/plot, 30853.75g/plot, 29365.5g/plot, 28881.25g/plot, 26700.00g/plot and 25778.00g/plot, respectively (Table **2**; F: 3.36; df: 9, 39; P: 0.000).

### Comparison of Jassid (*A. biguttula biguttula*) Population and Correlation with Yield of Brinjal Varieties

Significant difference in population of jassid was observed on different varieties (Table **1**, P < 0.05). Maximum population of jassid was on variety Xingchangjishi (4.01 ± .09) while minimum population was recorded on variety Eggplant deep black (1.95 ± 0.02) (F: 29.637; df: 9, 870; P: .000). Correlation between jassid population and yield showed that there was negative correlation between yield and jassid population (-0.8678). It means varieties which had high population of jassid gave low yield and vice versa. Figure **1** shows comparative yield and pest population in different brinjal varieties.

### Comparison of Whitefly (*B. tabaci*) Population and Correlation with Yield of Brinjal Varieties

Significant difference in population of whiteflies was observed on different varieties (Table **2**, P < 0.05). Maximum population of whiteflies was on variety Xingchangjishi (4.11± .15) while minimum population was recorded on variety Eggplant deep black (1.99±.05) (F: 33.852; df: 9, 870; P: .000). Correlation between whitefly population and yield showed that there is negative correlation between yield and whitefly population (-0.7688). It indicated varieties with high population of whitefly, gave lowest yield and vice versa. Figure **2** shows comparative whitefly population on different brinjal varieties and their yield.

## DISCUSSION

The data regarding brinjal yield showed that maximum yield was obtained from Shamli with 89962.50 kg/ha and Eggplant deep black with value 88787.50 Kg/ha while minimum and significantly less yield was in Xingchangjishi with 43626.25 kg/ha. Varieties *e.g.,* Advanta 306, Sandhya F1, Black boy, Black nagina and Advanta 305 followed Shamli and Eggplant deep black in descending order but statistically with no significant difference among all these varieties. However varieties like Twinkle star, Kalash F1 had significantly less yield compared with

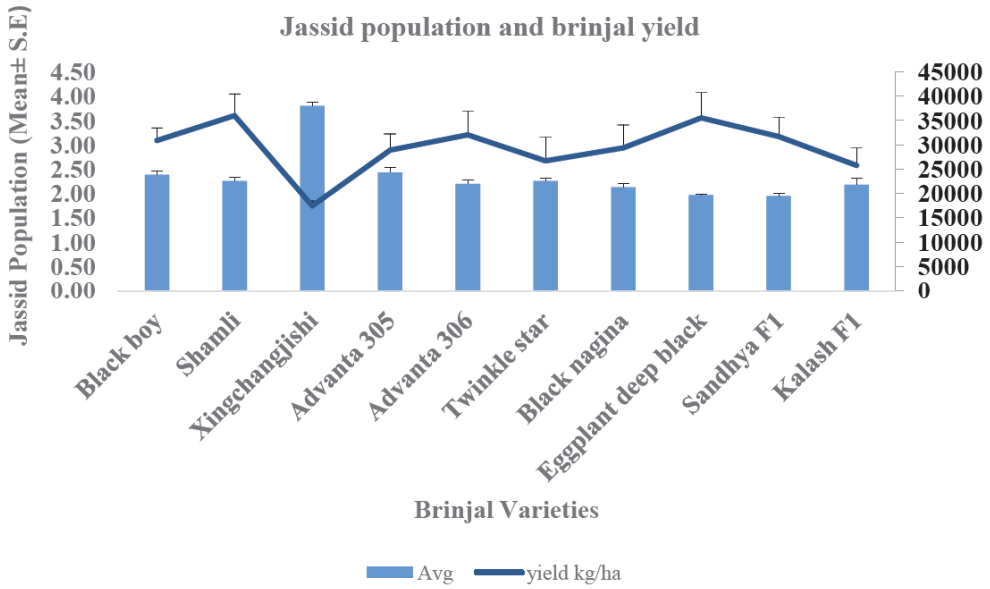


**Figure 1:** Comparison of population of jassid *(Amrasca biguttula biguttula*) with yield on different brinjal (*Solanum melongena)* varieties.

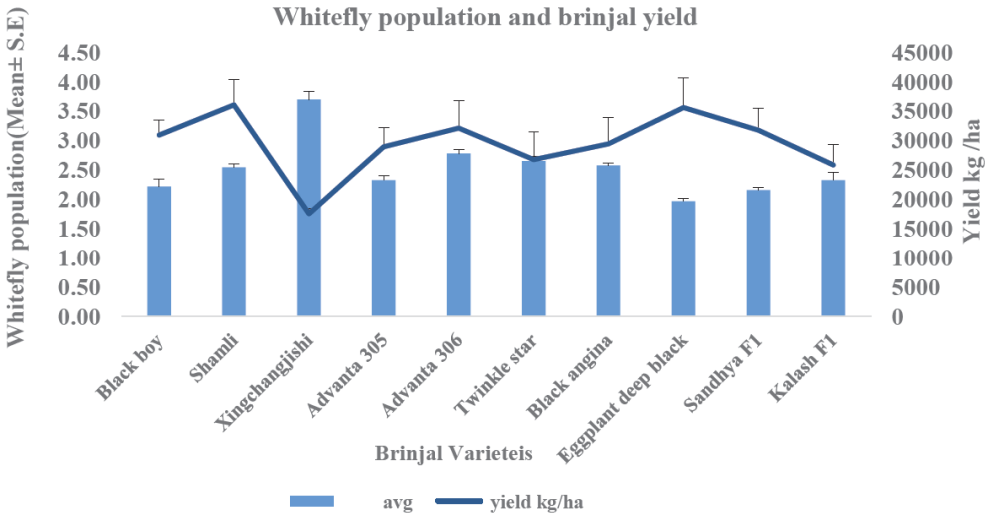


**Figure 2**: Comparison of population of whitefly (*B. tabaci*) with yield on different brinjal (*S. melongena*) varieties.

above mentioned varieties while Xingchangjishi had significantly least yield under these conditions in this area. [13] A study was conducted to screen nine brinal genotypes against jassids. Significantly more population of jassid was recorded on variety Bemissal with 3.36 jassids per leaf whereas the least chosen variety was Rubi with 1.42 jassids/leaf. They further reported that variety Bemissal resulted in least yield 35.25kg/plot and variety Rubi with least jassid population exhibited maximum yield of 85.25 kg/ha. Therefore results of the study [13] are in agreement with our study that showed varieties with more pest population of jassid and whiteflies had least yield like in Xingchangjishi there was significantly less yield than all other varieties of brinjal grown for yield testing in this study. These results are also comparable to findings of another study [14] in which scientists screened three varieties of brinjal namely Shamli, Black beauty and Pearl long against different pest insects. They found that variety Shamli was less preferred by insect pests and it had maximum yield with 4923.1 kg/ha compared with other two varieties which had more pest populations. In our results variety Shamli had significantly more population of pests compared with Egg plant deep black variety and significantly less population than Xingchangjishi while it gave maximum yield like Egg plant deep black which is due to its tolerance ability. Another experiment was conducted [15] in 2013 to screen twelve germplasms of brinjal for their susceptibility to sucking insects including jassids

and whiteflies in field. Based on pest population varieties were regarded as less, moderate and more susceptible against pest insects. It was found that varieties with more pest population had less yields and vice versa. In our results, variety Xingchangjishi generated significantly least yield than all other varieties of brinjal grown. Likewise varieties Twinkle Star and Kalash F1 had significantly less yields than rest of the varieties except Xingchangjishi which was least in the group. Eggplant deep black and Shamli varieties had maximum yields and are recommended for cultivation in this area to get higher yield of brinjal.

A study was conducted [16] to check the effect of different biophysical characters of brinjal varieties and the correlation of pest population was studied with different plant characters. It was concluded based on their findings that varieties with more pests had susceptible characters which favored pest insect populations than does the varieties which had least pest populations. Therefore it was recommended to include resistant varieties in future breeding programs to develop varieties with resistance characters in available varieties. Similarly following our results we conclude varieties like Shamli and Egg plant deep black as recommended varieties in this area to get maximum yield of brinjal.

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