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Genotypic assessment of black gram (*Vigna mungo* L) combating against major insect pests

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Abstract
The field investigation was carried out during *kharif* 2022, on the blackgram the experiment was conducted on research farm of entomology section of Agriculture Research Station, Badnapur in the guidance of research guide, Department of Agricultural Entomology, College of Agriculture, Badnapur, Vasantrao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani with the objective to study population dynamics of major insect pest of black gram, to record the activities of natural enemies in black gram ecosystem and to screen the black gram genotypes against major insect pest. The experiment was conducted under Randomized Block Design (RBD) with the 22 genotypes and three replications. The highlight of findings are given below.

The investigation on population dynamics of major insect pests of blackgram showed that the attack of thrips, whitefly, aphids, leaf hopper, green semilooper, gram pod borer and spotted pod borer commenced from 31th SMW first fortnight of August. The population of insect pest on black gram was observed in the range *viz*., aphid (5.1to 9.0), whiteflies (1.3 to 2.0), thrips (1.2 to 3.6), leaf hopper (1.2 to1.8), *H. Armigera* (0.7 to 1.4), *M. vitrata* (0.7 to 1.2) and green semilooper (2.4 to 3.5). Whereas population of aphid, whitefly, leaf hopper and green semilooper reached at its peak in 33rd SMW (9.0 aphids/trifoliate leaf), (2.0 whiteflies/trifoliate leaf), (1.8 leaf hopper/trifoliate leaf) and (3.5 larve/plant) while thrips reached at its peak in 34th SMW (3.6thrips/trifoliate leaf), M. vatrata at its peak in 35th SMW (1.2 larve/p lant) and *H. armigera* in 36th SMW (1.4 larve/plant) respect-tively.The activities of natural enemy LBB varied from (0.7 to 2.7 LBB/plant) and commenced from 31st SMW. Whereas LBB reached at its peak in 33rd SMW.

In regard correlation among Aphid, white fly, leaf hopper, green semilooper, M. vatrata and LBB had negative significant correlation with relative humidity at morning. The investigation on screening, 22 genotypes were screened against major pest of black gram.ie, aphid, whiteflies, thrips, leaf hopper, *H. armigera*, *M. vitrata* and green semilooper. The lowest population recorded with genotypes AKU 15 (ch) (6.11 aphid/trifoliate leaves), TPU 4 (ch) (0.83 whiteflies/trifoliate leaves), AKU 15 (ch) (0.72 thrips/trifoliate leaves), TPU 4 (ch) (1.27) AKU 15 (ch) (0.93 larvae/pant), AKU 15 (ch) (0.86 larvae/ plant), AKU 15 (ch) (1.38 larvae/plant) respectively. The highest population observed genotypes ATU-2205 (9.55 aphid/trifoliate leaves), PU 62 (2.55 whiteflies/trifoliate leaves), BDU 2021-1 and AKU 11-15 (2.22 thrips/trifoliate leaves) respectively, AKU 18-2 (3.61 leaf hopper/trifoliate leaves), ATU-2205 (3.40 larvae/plant), BDU 2021-1(3.26 larvae/plant) and ATU-2205 (4.50 larvae/plant). In respect percent pod damaged by pod borer ranged between 3.85 to 20.24 percent. The genotypes TPU 4 (ch) recorded the lowest pod damaged (3.85 percent) while BDU 2021-1 recorded highest pod damaged (20.24 percent).

Keywords: Black gram, screening, sucking pest, pod borer, defoliator

Introduction
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The investigation on screening 22 genotypes were screened against major pest of black gram.ie, aphid, whiteflies, thrips, leaf hopper, *H. armigera*, *M. vitrata* and green semilooper. The lowest population recorded with genotypes AKU 15 (ch) (6.11 aphid/trifoliate leaves), TPU 4 (ch) (0.83 whiteflies/trifoliate leaves), AKU 15 (ch) (0.72 thrips/trifoliate leaves), TPU 4 (ch) (1.27) AKU 15 (ch) (0.93 larvae/pant), AKU 15 (ch) (0.86 larvae/plant), AKU 15(ch) (1.38 larvae/plant) respectively. The highest population observed genotypes ATU-2205 (9.55 aphid/trifoliate leaves), PU 62 (2.55 whiteflies/trifoliate leaves), BDU 2021-1 and AKU 11-15 (2.22 thrips/trifoliate leaves) respectively, AKU 18-2 (3.61 leaf hopper/trifoliate leaves), ATU-2205 (3.40 larvae/plant), BDU 2021-1(3.26 larvae/plant) and ATU-2205 (4.50 larvae/plant). In respect percent pod damaged by pod borer ranged between 3.85 to 20.24 percent. The genotypes TPU 4(ch) recorded the lowest pod damaged (3.85 percent) while BDU 2021-1 recorded highest pod damaged (20.24 percent).

Methodology

The material used and methods adopted for screening the different Urdbean genotypes against major insect pests as well as record the activities of natural enemies in black gram ecosystem in relation to weather parameter as well as the to study the population dynamics of major insect pest in black gram are described here in appropriate headings and sub headings.

Method of observation

Sucking pest

Observation on number of sucking pest like Whitefly, Aphids and thrips was recorded weekly from randomly selected ten plants top, middle and bottom trifoliate leaf of the plant and presented as total number of sucking pest per three leaves. The data generated during the season from seedling to harvest was be subjected to appropriate statistical analysis of correlation with weather parameters.

Pod borer pest

The observation on population of pod borers was recorded soon after their appearance. All the observation was recorded early in the morning. The methods used for recording of major pod borer (*Maruca vitrata*) and (*Helicoverpa armigera*). The observation on larval population of *H. armigera* and *M. vitrata* was recorded from their appearance to harvesting of the crop. The incidence of *H. armigera* and *M. vitrata* was determined by counting the population of larvae on ten randomly selected tagged plants at weekly interval. The incidence was also studied in terms of mean pod damage by counting the total number of pods and damaged pods on ten randomly selected tagged plants.

Recording observations

In different blackgram genotypes including check cultivars was screened in the field condition to evaluate their relative resistance/susceptibility against sucking pests and pod borers.

1. Sucking pest's count

Observation, on number of sucking pest like aphids, leaf hopper, thrips and whitefly was recorded weekly per plant from randomly selected five plants *i.e*. top, middle and bottom trifoliate leaf of the plant and present as total number of sucking pests per 3 leaves.

2. Percent pod damage

The total number of pods and the pods damaged by pod borers was recorded at maturity stage, in pods harvested from the randomly selected five plants. Pod borers damage to pods was quantified by expressing the number of pod borer damaged pods as a percentage of total number of pods. Per cent pod damage was worked out and statistical analysis was done after suiTable transformation of values.

3. 100 seed weight and seed per pod

100 seeds were taken at random from each plant and weighed on an electronic weight balance. Number of seeds per pod was be recorded at maturity stage.

4. Grain yield per plot and per hectare

Total grain weight for the plot was calculated as plot yield. Then plot yield was being computed for hectare basis.

Statistical analysis

The data on observation of sucking pest complex and pod borer was be compiled. The data obtained was subjected to $\sqrt{x} + 0.5$ transformations before the analysis work. The percentage of pod damaged by borers was subjected to angular transformation. The data was statistically analyzed and results concluded by standard analysis of variance method suggested by Panse and Sukhatme (1967) [8].

Results and Discussion

The study of population dynamics of insect pest in black gram was caried out during *kharif*-2022 at research farm of Agriculture research station Badnapur. The crop grown on 100m² area. The crop was kept untreated till harvest. To record the activities of major insect pest as well as their natural enemies Weekly observation were recorded since from vegetative growth to till harvest the data generated was correlated with weather parameters using appropriate statistical analysis i.e. Pearson method.

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analysis i.e. Pearson method.

Screening the different blackgram genotypes against whitefly population

The data displayed in Table 2 and graphically presentation in fig 1 indicated that the whitefly population ranged from 0.33 to 2.33/trifoliate leaves and that the whitefly inception was detected during SMW-31st TPU 4 (Ch) (0.33 whitefly/trifoliate leaves) had the lowest whitefly population followed by ATU-2205 (0.67/trifoliate leaves), AKU15(Ch) (0.67/trifoliate leaves), PDKV Black gold(ch) (0.67/trifoliate leaves) Phule vasu (Ch) (0.67/trifoliate leaves), AKU 12.3 (0.67/trifoliate leaves), AKU 18-2 (0.67/trifoliate leaves), BDU 2021-2 (0.67/trifoliate leaves) and ATU-2201 (1.00/trifoliate leaves). Showed negative reaction against whitefly. However ATU-2202(1.33/trifoliate leaves) followed by BDU1(Ch) (1.33/trifoliate Leaves), BDU-2021-1(1.33/trifoliate Leaves), Phule U 813-12(1.33/trifoliate Leaves), PU 62 (1.33/trifoliate leaves), ATU 2203 (1.67/trifoliate leaves, ATU 2204 (1.67/trifoliate leaves),ATU 2206 (1.67/trifoliate leaves) Phule U 819-18(1.67/trifoliate leaves) and Phule U 1018-15 (1.67/trifoliate leaves) entries that were moderately infested the remaining genotypes AKU 11-15,AKU13-2 and BDU 2021-3 were showed positive reaction with highest whitefly population, 2.33, 2.33 and 2.33 respectively. The results obtained from the present investigation are in accordance with earlier works Similarly, Taggar and Gill (2012) [12] who examined nine black gram entries against *B. abaci* in multiple-choice test and reported that two entries, KU-99-20 and NDU 5-7 are secondly resistant recording significantly lowest of whitefly population (egg, nymph and adult) as compared to the susceptible genotypes IPU 02-043, KU-7-602, KU-7-618 and Mash 1-1 and highly susceptible for the genotypes like KU-7-504 and KU-7-505.

The present findings were also in agreement with the results of Kumar and Singh (2014) [5] who observed 25 blackgram genotypes for resistance to major insect pests, including whiteflies (*Bemisia tabaci*), found that VBG10-024 and KU-11-06 had the highest populations of white flies, while ACM05007 and TPU-4 had the lowest populations, followed by UH-08-05Similarly Bhople *et al*., (2017) [2] who evaluated the resistance of the mungbean genotypes to whiteflies. Ten genotypes in total were selected and an experiment using a random block design with three replications was carried out. The mean of whitefly population was lowest for the genotypes PKV Green Gold (1.0 whiteflies/leaf) and highest on genotype AKM 12-14 (1.90 whiteflies/leaf).

Screening the different blackgram genotypes against thrips population

The data presented in Table 3 and graphically presentation in figure 2 indicated that the thrips population engaged from 0.33 to 1.67/trifoliate leaves. and that thrips inception detected during standard meteorological week 31st. The lowest population of thrips 0.33 recorded with AKU 15 (Ch) followed by PDKV Black gold (Ch) (0.67/trifoliate leaves), AKU 12-3 (0.67/trifoliate leaves) AKU 18-2 (0.67/trifoliate leaves), BDU 2021-2 (0.67/trifoliate leaves), Phule U 813-12 (0.67/trifoliate leaves), Phule U 1018-15 (0.67/trifoliate leaves), ATU-2201 (1.33/trifoliate leaves), ATU 2203 (1.33/trifoliate leaves), ATU 2205 (1.33/trifoliate leaves) ATU-2206 (1.33/trifoliate leaves) Phule vasu (ch) (1.33/trifoliate leaves) BDU (ch) (1.33/trifoliate leaves), AKU 11-15 (1.33 trifoliate leaves), BDU 2021-3 (1.33/trifoliate leaves), Phule U 813-18 (1.33/trifoliate leaves) and PU-62 (1.33/trifoliate leaves) and were showed the maximum tolerance as compare to other genotype. The remaining genotypes ATU 2202 (1.67/trifoliate leaves) followed by ATU 2204 (1.67/trifoliate leaves) TPU 4 (Ch), (1.67/trifoliate leaves), AKU 13-2 (1.67/trifoliate leaves) and BDU 2021-1 (1.67/trifoliate leaves) were recorded the susceptible reaction with highest population as compared to earlier genotype.

The data dispensed in Table 3 revealed that the entries AKU 15 (ch) and PDKV Black gold (ch) was exhibited tolerant reaction to thrips throughout the season i.e. 31st to 36th SMW followed by Phule AKU 18-2 was also registered tolerant reaction toward thrips during five SMW. Whereas BDU 2021-1 was the most infested genotypes during all six SMW (31st to 36th) and a secondly AKU 13-2 was identified as a more affected entry with thrips population. The resulting findings were also in the agreement with the previous research which evaluated resistance in eight advance greengram entries in comparison with two check varieties against sucking insect pest under natural field condition at Nuclear Institute for Agriculture and Biology (NIAB), Faisalabad. The findings of the trial showed that no one of the tested genotype has shown the complete resistance against thrips. Number of thrips per leaf observed the lowest (4±1.00) and the highest (12.3±0.67) in cultivar MH-3153 and MH-34143 respectively. Among all the tested cultivars for the pest attack, MH-3153 gave the highest yield (438.7g/plot) with the 129 and 161 increase over check 1 and check 2, respectively.

The experiment conducted by, Singh and Singh (2014) [11] who worked screening 30 genotypes of mungbean [*Vigna radiata* (L.) Wilczek] against flower thrips (*Caliothrips indicus*) revealed that, the minimum population of thrips in the research area was recorded on genotype ML 1628 followed by Pusa 1171, and ML 1464 and maximum in BPMR-145 followed by HUM 12 and Pusa-0672. The observation based on yields obtained at the time of harvesting, highest yield even after the pest attack was recorded in AKM 4, followed by KM 2293, AKM 09-2, IPM 3066, and ML 1628 respectively.

Screening the different blackgram genotypes against leaf hopper population

Data presented in Table 4 and graphically present fig 3 revealed that the inception of leaf hopper observed during standard meteorological week 31st SMW The population ranged between 0.67 to 2.67. The lowest population 0.67 recorded entries with TPU-4 (ch) followed by ATU-2201 (1.33/trifoliate leaves), ATU-2202 (1.33/trifoliate leaves), AKU 15 (ch) (1.33/trifoliate leaves), Phule vasu (ch) (1.33/trifoliate leaves), AKU 12-3 (1.33/trifoliate leaves), AKU 18-2 (1.33/trifoliate leaves) and Phule U 813-12 (1.33/trifoliate leaves), showed lowest population and tolerant to leaf hopper population as compare to other entries. The maximum population observed entries were ATU-2206 (1.67/trifoliate leaves), followed by PDKV black gold (ch) (1.67/trifoliate leaves), BDU 1 (ch) (1.67/trifoliate leaves), AKU 11-15 (1.67/trifoliate leaves), Phule U 819-18 (1.67/trifoliate leaves) AKU 13-2(1.67/leaves) BDU 2021-3(1.67/leaves) and ATU-2203 (2.00/trifoliate leaves). The rest of genotypes ATU-2204 (2.33/trifoliate leaves) followed by BDU 2021-2 (2.33/trifoliate leaves), Phule U1018-15 (2.33/trifoliate leaves), PU-62 (2.33/trifoliate leaves), ATU-2205 (2.67/trifoliate leaves) and BDU-2021-1 (2.67/trifoliate leaves), recorded the highest population of leaf hopper and highly affected entries as compare to earlier entries. Present findings are similar with work of Kumar and Singh (2014) [5] who tested 25 blackgram varieties for resistance against leaf hopper. The results obtained was the minimum damaged s of leaf hopper was in TU-631, followed by ACM05-007 and TPU-4, while it was maximum in RUG-44.

The result concluded that population of leaf hopper was observed with per leaf population of 1.2 and 3.3.
Similarly, Singh and Singh (2014) [11] who conducted experiment for screening 30 genotypes of mungbean [*Vigna radiata* (L.) Wilczek] against the minor pest leaf hopper (*Empoasca kerri*). The minimum population of leaf hopper was recorded on KM2003-2.

Screening the different blackgram genotypes against aphid population

The results mentioned in Table 5 and graphically presented in fig. 4 revealed that the inception of aphid observed during standard meteorological week (SMW 31st) and the population of aphids ranged between 3.67 to 7.67/trifoliate leaves. The lowest population of aphid (3.67 aphid/trifoliate leaves) was recorded with AKU 15(ch) followed PDKV TPU 4 (CH) (4.33 aphid/trifoliate leaves), AKU 18-2 (4.33/trifoliate leaves), ATU 2201 (4.67/trifoliate leaves), Phule U 813-12 (4.67/trifoliate leaves).and referred as tolerant genotype. Moderately infested affected entries were Phule Vasu (Ch) (5.33/trifoliate leaves) followed by BDU 1 (Ch) (5.33/trifoliate leaves). AKU 12-3 (5.33 aphid/trifoliate leaves), BDU-2021-2(5.33 aphid/trifoliate leaves), ATU 2202 (5.67 aphid/trifoliate leaves) and AKU 13-2 (5.67/trifoliate leaves). The maximum population observed genotype were, ATU-2206 (6.33 aphid/trifoliate leaves) PDKV Black gold (Ch) (6.33/trifoliate leaves), AKU 11-15 (6.33/trifoliate leaves), BDU 2021-1 (6.33/trifoliate leaves), BDU 2021-3 (6.33/trifoliate leaves), Phule U 819-18 (6.33/trifoliate leaves) PU 62 (6.33/trifoliate leaves), ATU 2204 (6.67/trifoliate leaves), ATU 2203 (6.67/trifoliate leaves) and Phule U 1018-15 (6.67/trifoliate leaves). The rest of genotypes ATU 2205 recorded highest aphid population *viz*. 7.67/trifoliate leaves.
The results obtained in the present investigation was in accordance with earlier works Sahasrabuddhe and Patil (2000) [10] they evaluated the blackgram cultivar Sindkheda 1-1 was resistant against whitefly (3.71/plant), aphids (5.30/plant) and leaf hoppers (2.92/plant).
The present findings were also in agreement with Tamang *et al*., (2017) [13] he investigated the insect pests' varietal preferences on five distinct mungbean germplasm samples in the field in 2012-2013 at the Uttar Banga Krishi Vishwavidyalaya, Cooch Behar, West Bengal. Sukumar (WBM-29) produced the second-highest grain output during the first season (547.47 k/ha), followed by Bireswar (WBM34-1-1), who was less susceptible to aphid attack. The occurrence of aphids during the second screening season showed the same trend.
Similarly, Abdullah-Al-Rahad *et al.*, (2018) [1] who carried out the experiment for mungbean varietal screening against the aphid (*Aphis gossypii*). in this study, various mungbean cultivars, had the lowest aphid population and the greatest resistance to aphid infestations at various stages.

Screening the different blackgram genotypes against the *H. armigera* population

The data produced in the Table 6 and fig 5 The outset of *H. armigera* is observed during SMW 32nd. The range of Larval population range between 0.67 to 3.67. The lowest Larval 0.67 larvae/plant population of *H. armigera* recorded with AKU 15 (ch) followed by Phule vasu (ch) (1.00 larvae/plant), TPU 4 (ch) (1.00 larvae/plant), ATU-2201 (1.33 larvae/plant), PDKV Black gold (ch) (1.33 larvae/plant), AKU 13-2 (1.33 larvae/plant), BDU-2021-3 (1.33 larvae/plant), Phule U 813-12(1.33 larvae/plant), and Phule U 819-18 (1.33 larvae/plant) it were showed maximum tolerance against *H. armigera* population. The moderately infested entries were ATU-2203 (1.67 larvae/plant) followed by ATU-2206 (1.67 larvae/plant), BDU 1 (ch) (1.67 larvae/plant), BDU-2021-2 (1.67 larvae/plant), AKU 11-15 (2.33 larvae/plant), AKU 18-2 (2.33 larvae/plant) and Phule U 1018-15 (2.33 larvae/plant). The rest of genotypes observed highest Larval population of *H. armigera* that is ATU-2202 (2.67 larvae/plant) followed by ATU-2204 (2.67 larvae/plant), ATU-2205 (3.33 larvae/plant), AKU 12-3 (3.33 larvae/plant), BDU-2021-1(3.67larvae/plant) and PU-62 (3.67 larvae/plant).
The results obtained in the present investigation was in accordance with earlier works Yadav *et al*., (2021) Fifteen black gram genotypes were screened to check the resistance and susceptibility against *H. armigera*. The statistically analysed reveals that the pod infestation by *H. armigera* ranged from 6.33 to 26.67 per cent. all the black gram genotypes minimum pod infestation of 6.33 per cent was recorded in the Azad Urd 1 genotype and followed by KU-99-05, Shekhar-2 and PU-6 with 7.00, 9.33 and 10.67 per cent, respectively and categorized as resistant (R). Whereas, 10 genotypes *viz*., PU 19, PU 35, Azad Urd 2, KU-96-7, PU-40, KU 302, Shekhar-1, PU 30, Azad Urd 3 and KU 719 were observed with pod infestation of 13.33, 15.67, 16.00, 18.67, 19.00, 20.67, 21.33, 22.00, 22.67 and 24.00 per cent, respectively and these genotypes were found moderately resistant.
The results obtained in the present investigation are in accordance with earlier works Rohit Sharama and Ram Keval (2021) [9] that the incidence of Gram pod borer during 2018-19. He found that the *H. armigera* was observed in all genotype except AVT1-708 during the 4th Standard Week. The population of these pest varied significantly among the genotypes screened in the genotype MAL 13(AVT1) with a maximum population of 0.69 larva/plant followed in the first week by AVT1-704 (0.30 larval/plant), AVT1 709 (0.22 larval/plant) AVT1-705 and AVT 1-706 & AVT 2-901 having population (0.20 larvae/plant). In all genotypes from 4th Standard Week to 12th standard Week 2018-19, the *H. armigera* larval population persisted. During the 11th standard week, the population of the Pod borer was reported to be highest in nearly all genotypes.
The present findings were also in agreement with Chandekar *et al.* (2022) [3] The germplasm differed significantly in terms of percent pod damage, which ranged from 0.5 to 9.5 per cent. Among the tested germplasm, the minimum pod damage by *H. armigera* was observed in germplasm DKU116 with 0.5 per cent, which was found at par with Ku 19-10, KPU 405, and LBG 787 with 1.00, 1.5, and 1.5 per cent pod damage, respectively, whereas the maximum pod damage was observed in germplasm BCU 20-10 with 9.5 per cent.

Screening the different blackgram genotypes against *M. vitrata* population

The data produced in Table 7 And graphically present figure 6. Let slip though *M. vitrata* Larval population range from 0.67 to 3.67 larvae/plants and the *M. vitrata* inception was detected during SMW 32nd. ATU 2204, And AKU-15 (ch) had the lowest *M. Vitrata* population (0.67 larvae/plant) and (0.67 larvae/plant)and which stand at par with PDKV Black gold (1.00 larvae/plant), ATU 2206 (1.33 larvae/plant) BDU 2021-2 (1.33 larvae/plant) BDU 2021-3 (1.33 larvae/plant) Phule U 813-18 (1.33 larvae/plant) and TPU 4(ch) (1.33 larvae/plant) besides ATU 2203(1.67 larvae /plant),Phule Vasu (1.67 larvae/plant), BDU 1(ch)(1.67 larvae/plant), AKU 18-2 (1.67 larvae/plant),

Phule U 819-18 (1.67 larvae/plant) ATU 2201(2.00 larvae/plant), ATU 2202 (2.00 larvae/plant) AKU 11-15 (2.33 larvae/plant) Phule 1018-15 (2.33 larvae/plant), PU 62 (2.33 larvae/plant) and AKU 12-3(2.67 larvae/plant) were moderately infested. The rest of genotypes ATU 2205, BDU-2021-1 and AKU 13-2 were more attracted Larval population of *M. vitrata* with 3.33, 3.33,3.67 respectively.

The present findings were also in agreement with Naik and Mallapur (2019) [7] Webs formed by *M. vitrata* were relatively more on susceptible genotypes *viz*., VBG10-024 (5.14 webs/Pl) which was on par with PUSA-9531 (4.98), RUG-10 (4.97) and LBG 631 (4.64). However, the genotypes like WBU-108 (1.51), VBN-05 (1.55), PU-31(1.61), LBG 685 (1.93) and COBG653 (1.96) recorded less web. Similarly, Chandekar *et al.,* (2022) [3] The insect pest incidence was observed in terms of per cent of pod damage at the harvesting of the crop. The germplasm showed significant differences with each other for per cent pod damage, which varied from 3.5 per cent to 26.00 per cent. Among the tested germplasm, the minimum pod damage by *M. vitrata* was observed in germplasm KUG 878 with 3.5 per cent, Whereas the maximum pod damage was observed in IPU 11-02 with 26 per cent.

Screening the different blackgram genotypes against green semilooper population

The data presented in Table 8 and Fig 7 revealed that the inception of semilooper observed during standard meteorological week (SMW 31st) and the larval population of green semilooper ranged between 0.67 to 4.33 larvae/plant. The lowest population of semilooper (0.67 Larvae/plant) was recorded with AKU 15 (ch) followed PDKV Black gold (ch) (1.00 larvae/plant) and were tolerant genotypes. Secondary less affected entry was AKU 12-3 (1.33larvae/plant) followed by AKU 18-2 (1.33 larvae/plant), ATU-2201 (1.33 Larvae/plant), Phule U1018-15 (1.33/plant), Phule Vasu (ch) (1.67larvae/ plant), Phule U 813-12 (1.67larvae/plant) and PU 62 (1.67larvae/plant).The moderately infested genotype were TPU 4 (ch) (2.00larvae/plant), AKU 11-15 (2.0 larvae/plant),ATU 2203 (2.0 larvae/plant), AKU 13-2 (2.33 larvae/plant), Phule U 819-18 (2.33 larvae/plant), ATU-2202 (2.33/plant) and ATU 2204 (2.67larvae/plant) BDU 1 (ch) (2.67/plant). The maximum Larval population of semilooper was recorded with BDU 2201 (3.00 larvae/plant), BDU 2021-3 (3.00/larvae/plant) and BDU-2021-2 (3.33 larvae/plant). The rest of genotypes is ATU-2205 and ATU 2206 were registered as a susceptible genotype with highest larval population of green semilooper *viz*. (4.0) and 4.33 larvae/plant respectively.

Screening of the different black gram genotypes against pod borer

The data dedicated in Table 9 indicates the percent pod damage of different black gram genotypes during crop season and it was found that all the genotypes differed significantly.

Table 1: Reaction of black gram entries against pod borer

Sr. No	Genotype	Percent pod damage by pod borer	Yield (Kg/ha)
1.	ATU 2201	12.69 (20.87)	1005
2.	ATU 2202	15.76 (23.39)	1012
3.	ATU 2203	14.58 (22.45)	978
4.	ATU 2204	18.48 (25.46)	990
5.	ATU 2205	19.50 (26.20)	812
6.	ATU 2206	8.24 (16.69)	910
7.	AKU 15 (Ch)	7.63 (16.03)	1208
8.	PDKV Black gold (Ch)	11.78 (20.07)	1314
9.	Phule Vasu (Ch)	8.64 (17.09)	1060
10.	TPU 4 (Ch)	3.85 (11.31)	1321
11.	BDU 1 (Ch)	12.11 (20.36)	1247
12.	AKU 11-15	12.30 (20.53)	1352
13.	AKU 12-3	10.12 (18.55)	1383
14.	AKU 13-2	7.96 (16.38)	1418
15.	AKU 18-2	11.83 (20.12)	867
16.	BDU 2021-1	20.24 (26.74)	1099
17.	BDU 2021-2	8.18 (16.62)	1443
18.	BDU 2021-3	12.43 (20.64)	1419
19.	Phule U 813-12	10.99 (19.36)	1289
20.	Phule U 819-18	8.45 (16.90)	713
21.	Phule U 1018-15	8.41 (16.86)	1068
22.	PU 62	13.38 (21.46)	994
	SE (m) ±	1.13	55.98
	CD at 5%	3.40	160.00
	Cv %	21.55	11.82

The results in respect of percent pod damage and grain yield were displayed Table 4.9. In respect of percent pod damage due to pod borers ranged between 3.85 to 20.24 per cent and the genotype TPU 4(ch) has recorded the lowest 3.85 per cent pod damage. Secondly pod damaged by pod borer recorded with AKU 15 (Ch) 7.63 per followed by Phule vasu (ch) (8.64 per), AKU 13-2 (7.96 per), BDU 2021-2(8.18 per), ATU-2206(8.24 per), Phule U 1018-15(8.41 per) Phule U 819-18(8.45 per) Moderately pod damaged by pod borer AKU 12-3 (10.12 per) Phule U813-12(10.99 per) Followed by PDKV Black gold (11.78 per), AKU18-2 (11.83 per BDU 1(ch) (12.11 per) ATU-2201(12.69 per) AKU11-15 (12.30 per), PU 62(13.38 per). The maximum percent pod damage was recorded in ATU-2203(14.58 per), ATU-2202(15.76 per). The highest pod damaged by pod borer genotype ATU-2204 (18.48 per) followed by ATU-2205 (19.50 per) and BDU 2021-1 (20.24 per) and as regard highest grain yield recorded with BDU 2021-2 (1443 kg/ha) and lowest grain yield recorded with Phule U 819-18

(713 kg/ha).

The results obtained in the present investigation was in accordance with earlier works *Yadav et al*. (2021) [12]. Also, the results obtained in the present investigation are in accordance with earlier works Rohit *et. al.* (2021) [9].

The present findings were also in agreement with Chandekar *et al.*, (2022) [3] The germplasm differed significantly in terms of percent pod damage, which ranged from 0.5 to 9.5 per cent. Among the tested germplasm, the minimum pod damage by *H. armigera* was observed in germplasm DKU116 with 0.5 per cent, which was found at par with Ku 19-10, KPU 405, and LBG 787 with 1.00, 1.5, and 1.5 per cent pod damage, respectively, whereas the maximum pod damage was observed in germplasm BCU 20-10 with 9.5 per cent.

The present findings were also in agreement with Naik and Mallapur (2019) [7] Webs formed by *M. vitrata* were relatively more on susceptible genotypes *viz*., VBG10-024 (5.14 webs/Pl) which was on par with PUSA-9531 (4.98), RUG-10 (4.97) and LBG 631 (4.64). The results of the present study were also correspond with earlier research carried out similarly by Chandekar *et al.*, (2022) [3].

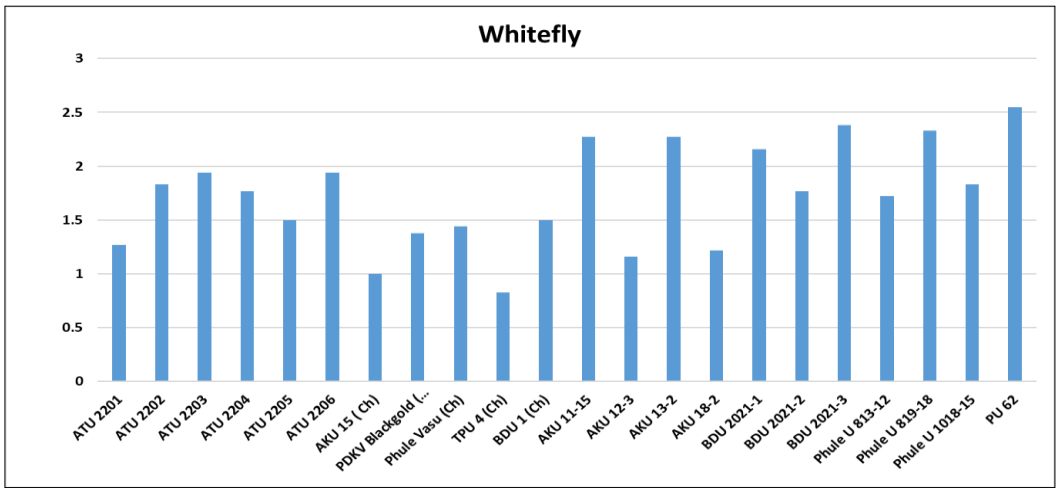

Fig 1: Reaction of Black gram genotypes against whitefly population/trifoliate leaves.

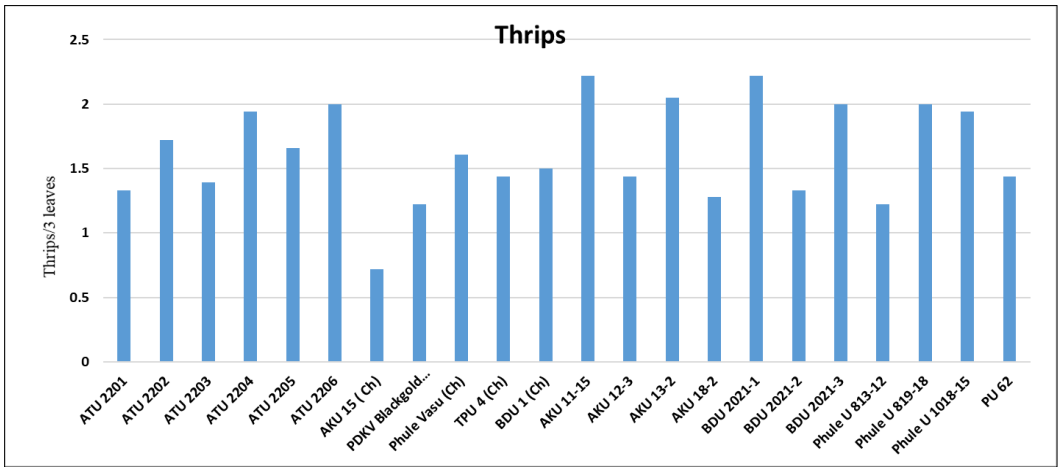

Fig 2: Screening the different blackgram genotypes against thrips population.

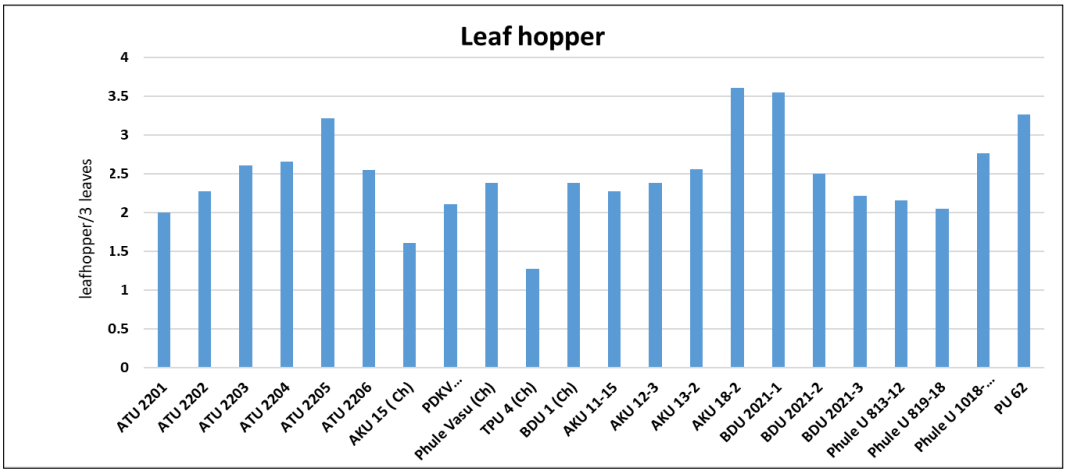

Fig 3: Screening the different blackgram genotypes against leaf hopper population

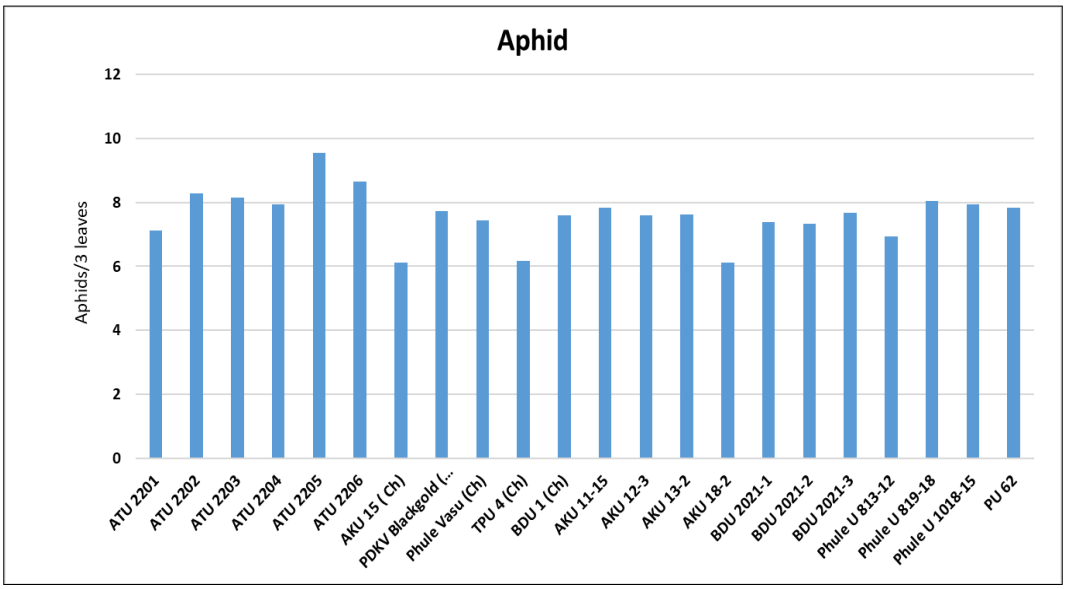

Fig 4: Screening the different blackgram genotypes against aphid population

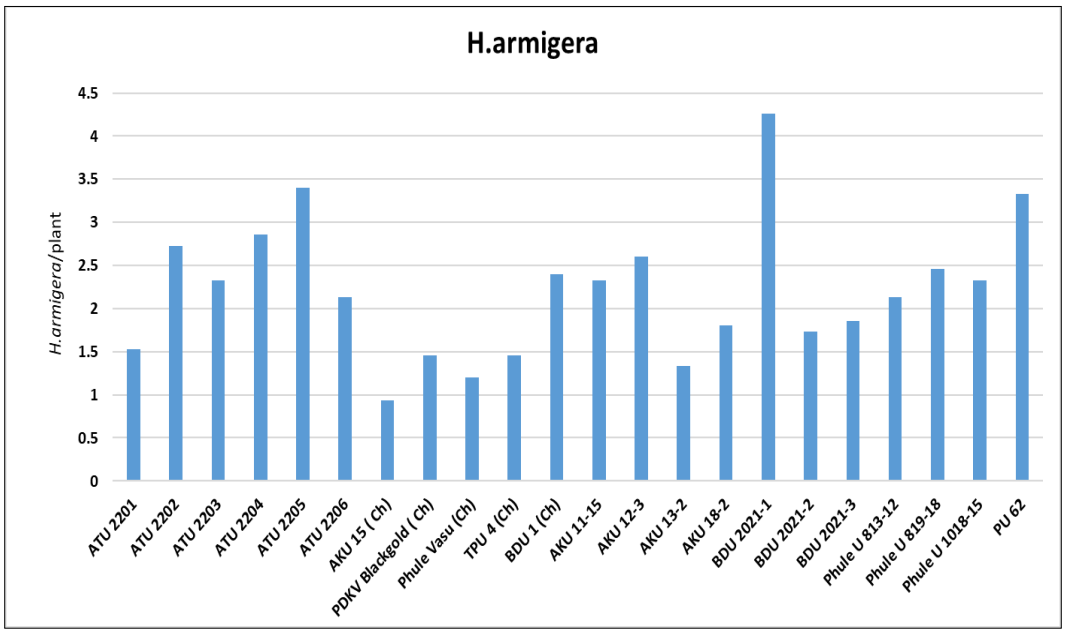

Fig 5: Screening the different blackgram genotypes against *H. armigera* population

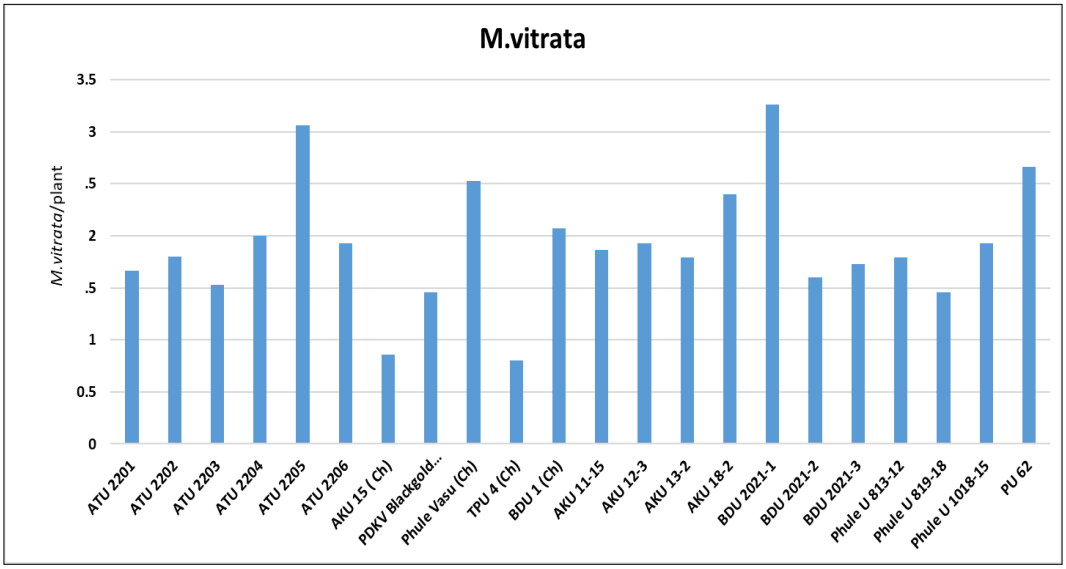

Fig 6: Screening the different blackgram genotypes against *M. vitrata* population

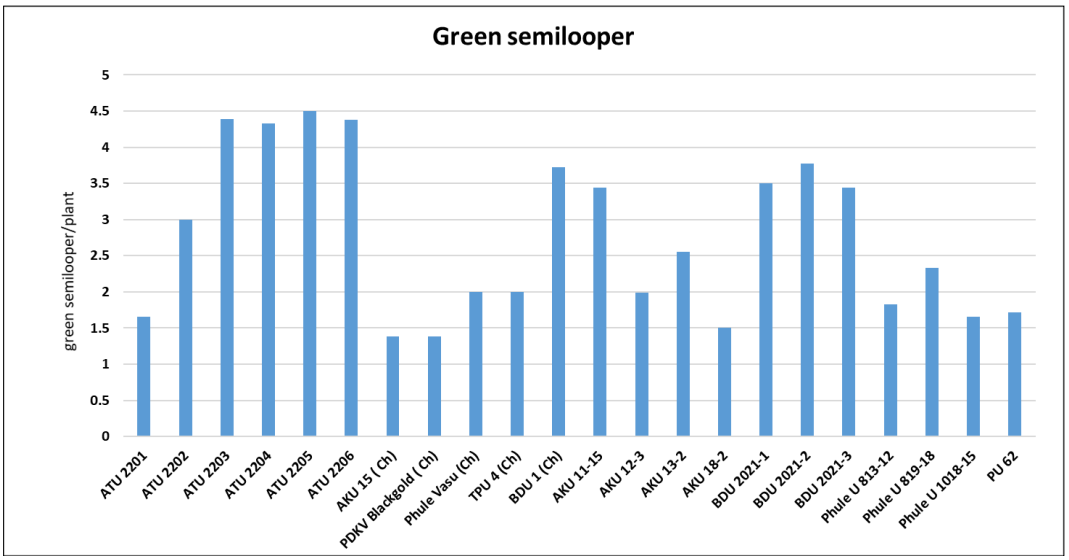

Fig 7: Screening the different blackgram genotypes against green semilooper population

Table 2: Reaction of black gram genotypes against whitefly population/trifoliate leaves

Sr. No	Genotype	Av. whitefly population per/trifoliate leaf						
		31 SMW	32 SMW	33 SMW	34 SMW	35 SMW	36 SMW	Mean
1.	ATU 2201	1.00 (1.17)	1.33 (1.34)	2.67 (1.76)	1.00 (1.17)	1.33 (1.34)	1.33 (1.34)	1.44 (1.35)
2.	ATU 2202	1.33 (1.34)	1.67 (1.44)	2.33 (1.66)	1.67 (1.46)	2.33 (1.68)	1.67 (1.44)	1.83 (1.50)
3.	ATU 2203	1.67 (1.44)	1.33 (1.34)	3.33 (1.95)	2.33 (1.66)	1.67 (1.46)	1.33 (1.34)	1.94 (1.53)
4.	ATU 2204	1.67 (1.46)	1.33 (1.34)	2.33 (1.66)	1.67 (1.46)	2.33 (1.68)	1.33 (1.34)	1.77 (1.49)
5.	ATU 2205	0.67 (1.05)	1.67 (1.46)	2.67 (1.76)	0.67 (1.05)	1.67 (1.46)	1.67 (1.46)	1.50 (1.15)
6.	ATU 2206	1.67 (1.46)	2.33 (1.68)	2.33 (1.66)	1.67 (1.46)	1.33 (1.34)	2.33 (1.68)	1.94 (1.54)
7.	AKU 15 (Ch)	0.67 (1.05)	0.67 (1.05)	2.67 (1.76)	0.67 (1.05)	0.67 (1.05)	0.67 (1.05)	1.00 (1.16)
8.	PDKV Blackgold (Ch)	0.67 (1.05)	1.33 (1.34)	2.33 (1.66)	1.33 (1.27)	1.33 (1.29)	1.33 (1.34)	1.38 (1.32)
9.	Phule Vasu (Ch)	0.67 (1.05)	1.33 (1.34)	3.33 (1.95)	0.67 (1.05)	1.33 (1.27)	1.33 (1.34)	1.44 (1.33)
10.	TPU 4 (Ch)	0.33 (0.88)	0.67 (1.00)	2.67 (1.77)	0.33 (0.88)	0.33 (0.88)	0.67 (1.00)	0.83 (1.06)
11.	BDU 1 (Ch)	1.33 (1.34)	0.67 (1.05)	2.67 (1.77)	1.33 (1.34)	2.33 (1.66)	0.67 (1.05)	1.50 (1.36)
12.	AKU 11-15	2.33 (1.68)	2.33 (1.64)	2.33 (1.64)	2.33 (1.68)	2.00 (1.58)	2.33 (1.64)	2.27 (1.64)
13.	AKU 12-3	0.67 (1.05)	0.67 (1.05)	2.67 (1.77)	1.33 (1.34)	1.00 (1.22)	0.67 (1.05)	1.16 (1.24)
14.	AKU 13-2	2.33 (1.68)	2.33 (1.64)	2.67 (1.77)	2.33 (1.68)	1.67 (1.46)	2.33 (1.64)	2.27 (1.64)
15.	AKU 18-2	0.67 (1.05)	0.67 (1.05)	3.33 (1.95)	0.67 (1.05)	1.33 (1.34)	0.67 (1.05)	1.22 (1.24)
16.	BDU 2021-1	1.33 (1.29)	2.33 (1.64)	2.33 (1.68)	1.33 (1.29)	3.33 (1.95)	2.33 (1.64)	2.16 (1.58)
17.	BDU 2021-2	0.67 (1.05)	2.33 (1.54)	3.67 (2.04)	0.67 (1.05)	1.00 (1.22)	2.33 (1.54)	1.77 (1.40)
18.	BDU 2021-3	2.33 (1.68)	2.67 (1.74)	3.33 (1.93)	2.33 (1.68)	1.00 (1.22)	2.67 (1.74)	2.38 (1.66)
19.	Phule U 813-12	1.33 (1.34)	0.67 (1.05)	4.33 (2.18)	1.33 (1.34)	2.00 (1.56)	0.67 (1.05)	1.72 (1.42)
20.	Phule U 819-18	1.67 (1.46)	2.67 (1.77)	3.33 (1.93)	1.67 (1.46)	2.00 (1.58)	2.67 (1.77)	2.33 (1.66)
21.	Phule U 1018-15	1.67 (1.46)	1.67 (1.44)	3.33 (1.95)	1.67 (1.46)	1.00 (1.22)	1.67 (1.44)	1.83 (1.49)
22.	PU 62	1.33 (1.34)	3.33 (1.95)	4.33 (2.18)	1.33 (1.34)	1.67 (1.46)	3.33 (1.95)	2.55 (1.70)
SE (m)		0.11	0.14	0.11	0.13	0.11	0.14	0.12
CD at 5%		0.36	0.47	0.38	0.42	0.36	0.47	0.41
Cv %		15.20	18.62	11.35	17.33	14.02	18.62	15.85

Table 3: Reaction of black gram genotypes against thrips population/trifoliate leaves

Sr. No	Genotype	Av. thrips population per/trifoliate leaf						
		31 SMW	32 SMW	33 SMW	34 SMW	35 SMW	36 SMW	Mean
1.	ATU 2201	1.33 (1.34)	0.67 (1.05)	1.67 (1.46)	1.67 (1.46)	1.33 (1.34)	1.33 (1.34)	1.33 (1.33)
2.	ATU 2202	1.67 (1.46)	1.33 (1.34)	2.67 (1.77)	1.67 (1.46)	1.67 (1.46)	2.33 (1.68)	1.72 (1.52)
3.	ATU 2203	1.33 (1.34)	1.67 (1.46)	1.33 (1.29)	0.67 (1.05)	1.67 (1.44)	1.67 (1.39)	1.39 (1.32)
4.	ATU 2204	1.67 (1.46)	1.33 (1.34)	2.67 (1.77)	2.33 (1.68)	1.33 (1.34)	2.33 (1.66)	1.94 (1.54)
5.	ATU 2205	1.33 (1.34)	0.67 (1.05)	2.33 (1.68)	1.67 (1.46)	1.67 (1.46)	2.33 (1.68)	1.66 (1.44)
6.	ATU 2206	1.33 (1.34)	1.33 (1.34)	2.67 (1.77)	1.67 (1.39)	2.33 (1.68)	2.67 (1.77)	2.00 (1.54)
7.	AKU 15 (Ch)	0.33 (0.88)	0.67 (1.05)	0.67 (1.05)	1.33 (1.34)	0.67 (1.05)	0.67 (1.05)	0.72 (1.07)
8.	PDKV Blackgold (Ch)	0.67 (1.05)	1.33 (1.34)	0.67 (1.05)	2.33 (1.68)	0.67 (1.05)	1.67 (1.44)	1.22 (1.26)
9.	Phule Vasu (Ch)	1.33 (1.34)	1.67 (1.44)	1.67 (1.46)	1.33 (1.34)	1.33 (1.34)	2.33 (1.68)	1.61 (1.43)
10.	TPU 4 (Ch)	1.67 (1.46)	1.33 (1.34)	1.33 (1.34	1.33 (1.34)	2.33 (1.68)	1.67 (1.44)	1.44 (1.43)
11.	BDU 1 (Ch)	1.33 (1.27)	1.33 (1.34)	1.67 (1.46)	1.67 (1.46)	1.33 (1.34)	1.67 (1.46)	1.50 (1.38)
12.	AKU 11-15	1.33 (1.34)	1.67 (1.46)	2.67 (1.77)	2.33 (1.68)	2.67 (1.77)	2.67 (1.77)	2.22 (1.58)
13.	AKU 12-3	0.67 (1.05)	1.33 (4.34)	1.33 (1.34)	2.33 (1.68)	1.33 (1.34)	1.67 (1.46)	1.44 (1.36)

14.	AKU 13-2	1.67 (1.46)	1.33 (1.29)	2.67 (1.77)	1.67 (1.39)	2.67 (1.77)	2.33 (1.66)	2.05 (1.55)
15.	AKU 18-2	0.67 (1.05)	1.33 (1.34)	0.67 (1.05)	1.67(1.46)	1.67 (1.46)	1.67 (1.46)	1.28 (1.30)
16.	BDU 2021-1	1.67 (1.46)	1.67 (1.46)	2.67 (1.77)	2.33 (1.68)	2.67 (1.77)	2.33 (1.66)	2.22 (1.63)
17.	BDU 2021-2	0.67 (1.05)	1.33 (1.34)	1.67 (1.46)	1.33 (1.34)	1.33 (1.34)	1.67(1.46)	1.33 (1.31)
18.	BDU 2021-3	1.33 (1.34)	1.33 (1.29)	2.67 (1.77)	2.33 (1.68)	1.67 (1.46)	2.67 (1.77)	2.00 (1.55)
19.	Phule U 813-12	0.67 (105)	1.67 (1.46)	0.67 (1.05)	1.33 (1.34)	1.33 (1.34)	1.67 (1.46)	1.22 (1.28)
20.	Phule U 819-18	1.33 (1.29)	1.33 (1.34)	2.67 (1.77)	2.33 (1.68)	1.67 (1.46)	2.67 (1.77)	2.00 (1.55)
21.	Phule U 1018-15	0.67 (1.05)	2.33 (1.64)	2.33 (1.68)	1.33 (1.34)	2.67 (1.77)	2.33 (1.68)	1.94 (1.52)
22.	PU 62	1.33 (1.34)	1.67 (1.44)	1.33 (1.34)	1.67 (1.39)	1.33 (1.34)	1.33 (1.34)	1.44 (1.36)
SE (m)		0.12	0.12	0.10	0.12	0.08	0.12	0.11
CD at 5%		0.40	0.38	0.34	0.38	0.28	0.40	0.36
Cv %		17.48	15.66	12.28	14.08	10.41	14.16	14.01

Figures in parenthesis are square root transformed value

Table 4: Reaction of black gram genotypes against Leaf hopper population/trifoliate leaves

Sr. No	Genotype	Av. Leaf hopper population per/trifoliate leaf						
		31 SMW	32 SMW	33 SMW	34 SMW	35 SMW	36 SMW	Mean
1.	ATU 2201	1.33 (1.34)	2.00 (1.56)	2.67 (1.77)	3.00 (1.86)	1.67 (1.46)	1.33 (1.34)	2.00 (1.55)
2.	ATU 2202	1.33 (1.34)	2.67 (1.77)	2.33 (1.68)	3.67 (2.04)	2.33 (1.68)	1.33 (1.34)	2.27 (1.64)
3.	ATU 2203	2.00 (1.56)	2.33 (1.66)	3.00 (1.87)	4.33 (2.20)	2.00 (1.58)	2.00 (1.56)	2.61(1.73)
4.	ATU 2204	2.33 (1.68)	2.67 (1.76)	3.00 (1.86)	3.33 (1.94)	2.33 (1.68)	2.33 (1.68)	2.66 (1.76)
5.	ATU 2205	2.67 (1.77)	3.33 (1.95)	3.33 (1.95)	4.67 (1.27)	2.67 (1.77)	2.67 (1.77)	3.22 (1.74)
6.	ATU 2206	1.67 (1.46)	2.67 (1.76)	2.33 (1.68)	4.00 (2.12)	3.00 (1.87)	1.67 (1.46)	2.55 (1.72)
7.	AKU 15 (Ch)	1.33 (1.27)	1.67 (1.46)	1.67 (1.46)	2.33 (1.68)	1.33 (1.34)	1.33 (1.27)	1.61 (1.41)
8.	PDKV Blackgold (Ch)	1.67 (1.46)	2.33 (1.64)	2.67 (1.76)	2.67 (1.77)	1.67 (1.46)	1.67 (1.46)	2.11 (1.59)
9.	Phule Vasu (Ch)	1.33 (1.34)	3.00 (1.84)	3.00 (1.87)	3.00 (1.87)	2.67 (1.77)	1.33 (1.34)	2.38 (1.67)
10.	TPU 4 (Ch)	0.67 (1.05)	1.33 (1.34)	2.00 (1.58)	2.00 (1.58)	1.00 (1.22)	0.67 (1.05)	1.27 (1.30)
11.	BDU 1 (Ch)	1.67 (1.46)	2.33 (1.66)	3.33 (1.95)	3.00 (1.87)	2.33 (1.68)	1.67 (1.46)	2.38 (1.68)
12.	AKU 11-15	1.67 (1.46)	2.67 (1.76)	2.33 (1.68)	4.00 (2.12)	1.33 (1.34)	1.67 (1.46)	2.27 (1.63)
13.	AKU 12-3	1.33 (1.34)	2.33 (1.68)	3.33 (1.95)	4.33 (2.19)	1.67 (1.46)	1.33 (1.34)	2.38 (1.66)
14.	AKU 13-2	1.67 (1.46)	3.67 (2.04)	2.33 (1.68)	3.67 (2.04)	2.33 (1.68)	1.67 (1.46)	2.56 (1.72)
15.	AKU 18-2	1.33 (1.34)	2.67 (1.77)	3.33 (1.95)	4.00 (2.11)	3.00 (1.87)	1.33 (1.34)	3.61 (1.73)
16.	BDU 2021-1	2.67 (1.77)	4.00 (2.11)	4.33 (2.20)	5.00 (2.35)	2.67 (1.77)	2.67 (1.77)	3.55 (1.99)
17.	BDU 2021-2	2.33 (1.68)	2.67 (1.77)	3.33 (1.95)	2.67 (1.77)	1.67 (1.46)	2.33 (1.68)	2.50 (1.71)
18.	BDU 2021-3	1.67 (1.44)	2.33 (1.68)	2.33 (1.68)	3.33 (1.95)	2.00 (1.56)	1.67 (1.44)	2.22 (1.62)
19.	Phule U 813-12	1.33 (1.34)	1.67 (1.46)	3.33 (1.95)	3.67 (2.04)	1.67 (1.46)	1.33 (1.34)	2.16 (1.59)
20.	Phule U 819-18	1.67 (1.46)	2.00 (1.56)	2.33 (1.68)	3.33 (1.95)	1.33 (1.34)	1.67 (1.46)	2.05 (1.57)
21.	Phule U 1018-15	2.33 (1.68)	2.67 (1.77)	3.33 (1.95)	3.67 (2.04)	2.33 (1.68)	2.33 (1.68)	2.77 (1.80)
22.	PU 62	2.33 (1.68)	3.67 (2.04)	3.67 (2.04)	4.33 (2.20)	3.33 (1.94)	2.33 (1.68)	3.27 (1.93)
SE (m)		0.09	0.08	0.05	0.07	0.08	0.09	0.07
CD at 5%		0.30	0.27	0.18	0.24	0.27	0.30	0.25
Cv %		11.43	8.80	6.97	6.54	9.59	11.43	8.79

Figures in parenthesis are square root transformed value

Table 5: Reaction of black gram genotypes against Aphids population//trifoliate leaves

Sr. No	Genotype	Av. Aphids population per/trifoliate leaf						
		31 SMW	32 SMW	33 SMW	34 SMW	35 SMW	36 SMW	Mean
1.	ATU 2201	4.67 (2.26)	7.67 (2.86)	11.33 (3.44)	7.67 (2.86)	6.67 (2.67)	4.67 (2.26)	7.11 (2.72)
2.	ATU 2202	5.67 (2.48)	9.67 (3.19)	12.00 (3.53)	9.67 (3.19)	7.00 (2.74)	5.67 (2.46)	8.28 (2.93)
3.	ATU 2203	6.67 (2.67)	8.33 (2.97)	11.67 (3.49)	8.33 (2.97)	7.33 (2.79)	6.67 (2.67)	8.16 (2.92)
4.	ATU 2204	6.67 (2.67)	7.67 (2.86)	12.33 (3.58)	7.67 (2.86)	6.67 (2.68)	6.67 (2.67)	7.94 (2.88)
5.	ATU 2205	7.67 (2.86)	12.33 (3.58)	12.67 (3.62)	12.33 (3.58)	5.67 (2.48)	7.67 (2.86)	9.55 (3.16)
6.	ATU 2206	6.33 (2.61)	9.33 (3.13)	13.33 (3.72)	9.33 (3.13)	7.33 (2.80)	6.33 (2.61)	8.66 (3.00)
7.	AKU 15 (Ch)	3.67 (2.04)	6.67 (2.68)	10.67 (3.34)	6.67 (2.68)	5.33 (2.41)	3.67 (2.04)	6.11 (2.53)
8.	PDKV Blackgold (Ch)	6.33 (2.61)	8.00 (2.91)	9.33 (3.13)	8.00 (2.98)	8.33 (2.97)	6.33 (2.61)	7.72 (2.86)
9.	Phule Vasu (Ch)	5.33 (2.41)	8.33 (2.97)	11.00 (3.39)	8.33 (2.97)	6.33 (2.61)	5.33 (2.41)	7.44 (2.79)
10.	TPU 4 (Ch)	4.33 (2.20)	6.00 (2.41)	10.67 (3.34)	6.00 (2.41)	5.67 (2.48)	4.33 (2.20)	6.16 (2.50)
11.	BDU 1 (Ch)	5.33 (2.40)	7.67 (2.86)	13.33 (3.72)	7.67 (2.86)	6.67 (2.68)	5.33 (2.40)	7.66 (2.82)
12.	AKU 11-15	6.33 (2.60)	7.33 (2.80)	13.33 (3.72)	7.33 (2.80)	6.33 (2.61)	6.33 (2.60)	7.83 (2.85)
13.	AKU 12-3	5.33 (2.41)	7.33 (2.79)	14.00 (3.81)	7.33 (2.79)	6.33 (2.61)	5.33 (2.41)	7.60 (2.80)
14.	AKU 13-2	5.67 (2.48)	7.33 (2.79)	12.33 (3.58)	7.33 (2.79)	7.33 (2.80)	5.67 (2.48)	7.61 (2.82)
15.	AKU 18-2	4.33 (2.20)	7.67 (2.86)	5.33 (2.09)	7.67 (2.86)	7.33 (2.80)	4.33 (2.20)	6.11 (2.50)
16.	BDU 2021-1	6.33 (2.60)	7.33 (2.79)	10.67 (3.21)	7.33 (2.79)	6.33 (2.60)	6.33 (2.60)	7.38 (2.76)
17.	BDU 2021-2	5.33 (2.41)	6.67 (2.68)	13.33 (3.72)	6.67 (2.68)	6.67 (2.68)	5.33 (2.41)	7.33 (2.76)
18.	BDU 2021-3	6.33 (2.60)	8.00 (2.91)	9.67 (2.95)	8.00 (2.91)	7.67 (2.86)	6.33 (2.60)	7.66 (2.80)

19.	Phule U 813-12	4.67 (2.27)	7.67 (2.86)	9.67 (2.95)	7.67 (2.86)	7.33 (2.80)	4.67 (2.27)	6.94 (2.66)
20.	Phule U 819-18	6.33 (2.60)	8.33 (2.97)	11.67 (3.49)	8.33 (2.97)	7.33 (2.80)	6.33 (2.60)	8.05 (2.90)
21.	Phule U 1018-15	6.67 (2.68)	7.33 (2.80)	13.33 (3.72)	7.33 (2.80)	6.33 (2.61)	6.67 (2.68)	7.94 (2.88)
22.	PU 62	6.33 (2.61)	7.00 (2.73)	13.67 (3.76)	7.00 (2.73)	6.67 (2.67)	6.33 (2.61)	7.83 (2.85)
SE (m)		0.07	0.12	0.27	0.12	0.06	0.07	0.11
CD at 5%		0.23	0.38	0.87	0.38	0.37	0.23	0.38
Cv %		5.17	7.19	13.83	7.19	7.12	5.17	7.09

Figures in parenthesis are square root transformed value

Table 6: Reaction of black gram genotypes against *H. armigera* larvae/plant

Sr. No	Genotype	Av. *H. armigera* larvae/plant					
		32 SMW	33 SMW	34 SMW	35 SMW	36 SMW	Mean
1.	ATU 2201	1.33 (1.34)	2.00 (1.56)	1.33 (1.34)	1.67 (1.46)	1.33 (1.34)	1.53 (1.40)
2.	ATU 2202	2.67 (1.77)	2.67 (1.77)	2.33 (1.68)	3.33 (1.95)	2.67 (1.77)	2.73 (2.18)
3.	ATU 2203	1.67 (1.46)	2.33 (1.68)	1.67 (1.46)	2.67 (1.77)	3.33 (1.95)	2.33 (1.66)
4.	ATU 2204	2.67 (1.77)	3.33 (1.95)	2.67 (1.77)	4.33 (2.20)	1.33 (1.29)	2.86 (1.79)
5.	ATU 2205	3.33 (1.95)	3.33 (1.95)	3.33 (1.95)	3.67 (2.04)	3.67 (2.04)	3.40 (2.13)
6.	ATU 2206	1.67 (1.46)	2.33 (1.68)	1.67 (1.46)	2.67 (1.77)	2.33 (1.68)	2.13 (1.61)
7.	AKU 15 (Ch)	0.67 (1.05)	0.67 (1.05)	1.33 (1.34)	1.33 (1.34)	0.67 (1.05)	0.93 (1.16)
8.	PDKV Blackgold (Ch)	1.33 (1.34)	1.33 (1.33)	1.67 (1.46)	1.67 (1.46)	1.33 (1.34)	1.46 (1.38)
9.	Phule Vasu (Ch)	1.00 (1.22)	1.33 (1.34)	0.67 (1.05)	1.33 (1.34)	1.67 (1.46)	1.20 (1.28)
10.	TPU 4 (Ch)	1.00 (1.17)	1.67 (1.46)	1.33 (1.34)	1.67 (1.46)	1.67 (1.46)	1.46 (1.37)
11.	BDU 1 (Ch)	1.67 (1.46)	2.67 (1.77)	2.67 (1.77)	3.33 (1.95)	1.67 (1.46)	2.40 (1.68)
12.	AKU 11-15	2.33 (1.68)	1.67 (1.46)	2.33 (1.68)	2.67 (1.77)	2.67 (1.77)	2.33 (1.67)
13.	AKU 12-3	3.33 (1.95)	1.67 (1.46)	2.67 (1.77)	2.67 (1.77)	2.67 (1.77)	2.60 (1.74)
14.	AKU 13-2	1.33 (1.34)	1.00 (1.22)	1.67 (1.46)	1.67 (1.46)	1.00 (1.17)	1.33 (1.33)
15.	AKU 18-2	2.33 (1.68)	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	1.80 (1.50)
16.	BDU 2021-1	3.67 (2.04)	4.33 (2.20)	3.67 (2.04)	4.33 (2.20)	5.33 (2.41)	4.26 (2.17)
17.	BDU 2021-2	1.67 (1.46)	1.67 (1.46)	1.33 (1.29)	2.33 (1.68)	2.67 (1.77)	1.73 (1.53)
18.	BDU 2021-3	1.33 (1.29)	2.33 (1.68)	2.33 (1.66)	1.67 (1.46)	1.67 (1.44)	1.86 (1.50)
19.	Phule U 813-12	1.33 (1.34)	1.33 (1.34)	2.67 (1.77)	2.67 (1.77)	2.67 (1.76)	2.13 (1.59)
20.	Phule U 819-18	1.33 (1.34)	2.33 (1.68)	2.33 (1.68)	2.67 (1.77)	3.67 (2.04)	2.46 (1.70)
21.	Phule U 1018-15	2.33 (1.68)	2.67 (1.77)	2.33 (1.68)	1.67 (1.46)	2.67 (1.77)	2.33 (1.67)
22.	PU 62	3.67 (2.04)	3.33 (1.95)	2.67 (1.76)	3.67 (2.04)	3.33 (1.95)	3.33 (1.94)
SE (m)±		0.10	0.08	0.10	0.08	0.10	0.09
CD at 5%		0.33	0.27	0.34	0.27	0.34	0.31
CV %		11.90	9.43	11.78	8.81	11.50	10.68

Table 7: Reaction of black gram genotypes against *M. vitrata* larvae/plant

Sr. No	Genotype	Av. *M. vitrata* larvae/plant					
		32 SMW	33 SMW	34 SMW	35 SMW	36 SMW	Mean
1.	ATU 2201	2.00 (1.56)	1.33 (1.34)	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	1.66 (1.45)
2.	ATU 2202	2.00 (1.56)	1.67 (1.46)	1.33 (1.34)	2.33 (1.68)	1.67 (1.46)	1.80 (1.50)
3.	ATU 2203	1.67 (1.46)	1.67 (1.46)	1.33 (1.29)	1.67 (1.46)	1.33 (1.29)	1.53 (1.39)
4.	ATU 2204	0.67 (1.05)	2.67 (1.77)	1.67 (1.46)	2.33 (1.68)	2.67 (1.76)	2.00 (1.54)
5.	ATU 2205	3.33 (1.95)	3.33 (1.93)	2.33 (1.68)	2.67 (1.77)	3.67 (2.04)	3.06 (1.87)
6.	ATU 2206	1.33 (1.29)	2.67 (1.77)	2.67 (1.77)	1.33 (1.34)	1.67 (1.46)	1.93 (1.52)
7.	AKU 15 (Ch)	0.67 (1.05)	0.67 (1.05)	0.67 (1.05)	1.33 (1.34)	1.00 (1.22)	0.86 (1.14)
8.	PDKV Blackgold (Ch)	1.00 (1.22)	1.67 (1.46)	1.33 (1.34)	1.33 (1.34)	2.00 (1.58)	1.46 (1.38)
9.	Phule Vasu (Ch)	1.67 (1.46)	3.33 (1.95)	3.33 (1.95)	1.67 (1.39)	2.67 (1.77)	2.53 (1.70)
10.	TPU 4 (Ch)	1.33 (1.34)	0.67 (1.05)	0.33 (0.88)	1.00 (1.22)	0.67 (1.05)	0.80 (1.10)
11.	BDU 1 (Ch)	1.67 (1.46)	1.67 (1.46)	2.67 (1.74)	1.67 (1.46)	2.67 (1.77)	2.07 (1.57)
12.	AKU 11-15	2.33 (1.68)	1.33 (1.34)	2.33 (1.68)	1.67 (1.46)	1.67 (1.46)	1.86 (1.52)
13.	AKU 12-3	2.67 (1.77)	1.67 (1.46)	1.33 (1.34)	2.33 (1.68)	1.67 (1.39)	1.93 (1.52)
14.	AKU 13-2	3.67 (2.03)	1.33 (1.34)	1.33 (1.34)	1.33 (1.34)	1.33 (1.34)	1.79 (1.47)
15.	AKU 18-2	1.67 (1.46)	2.67 (1.77)	2.67 (1.77)	2.67 (1.77)	2.33 (1.68)	2.40 (1.69)
16.	BDU 2021-1	3.33 (1.95)	3.33 (1.94)	3.67 (2.04)	3.33 (1.95)	2.67 (1.77)	3.26 (1.93)
17.	BDU 2021-2	1.33 (1.34)	1.67(1.46)	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	1.60 (1.43)
18.	BDU 2021-3	1.33 (1.29)	1.33 (1.34)	1.67 (1.46)	1.67 (1.39)	2.67 (1.77)	1.73 (1.45)
19.	Phule U 813-12	1.33 (1.34)	1.67 (1.46)	2.33 (1.68)	1.33 (1.29)	2.33 (1.68)	1.79 (1.49)
20.	Phule U 819-18	1.67 (1.44)	1.33 (1.29)	1.67 (1.46)	1.33 (1.34)	1.33 (1.34)	1.46 (1.37)
21.	Phule U 1018-15	2.33 (1.68)	1.00 (1.17)	2.33 (1.68)	1.33 (1.34)	2.67 (1.77)	1.93 (1.52)
22.	PU 62	2.33 (1.68)	3.33 (1.95)	2.67 (1.77)	2.33 (1.68)	2.67 (1.77)	2.66 (1.77)
SE (m)±		0.11	0.09	0.11	0.12	0.10	0.10
CD at 5%		0.36	0.28	0.35	0.40	0.33	0.34
CV %		13.12	10.50	12.75	14.62	11.56	12.51

Table 8: Reaction of black gram genotypes against green semilooper population/trifoliate leaves

Sr. No	Genotype	Av. Green semilooper population per/trifoliate leaf						
		31 SMW	32 SMW	33 SMW	34 SMW	35 SMW	36 SMW	Mean
1.	ATU 2201	1.33 (1.34)	1.67 (1.46)	1.67 (1.46)	2.00 (1.58)	1.67 (1.46)	1.67 (1.46)	1.66 (1.46)
2.	ATU 2202	2.33 (1.68)	2.67 (1.77)	2.67 (1.77)	3.33 (1.95)	3.33 (1.95)	3.67 (2.03)	3.00 (1.85)
3.	ATU 2203	2.00 (1.58)	3.67 (2.04)	3.67 (2.04)	5.67 (2.48)	5.67 (2.48)	5.67 (2.48)	4.39 (2.18)
4.	ATU 2204	2.67 (1.77)	4.33 (2.20)	5.33 (2.41)	5.00 (2.35)	4.33 (2.20)	4.33 (2.20)	4.33 (2.18)
5.	ATU 2205	4.00 (2.12)	4.00 (2.12)	5.00 (2.35)	4.67 (2.27)	4.67 (2.27)	4.67 (2.27)	4.50 (2.23)
6.	ATU 2206	4.33 (2.20)	4.33 (2.20)	4.33 (2.20)	5.33 (2.41)	4.00 (2.12)	4.00 (2.12)	4.38 (2.20)
7.	AKU 15 (Ch)	0.67 (1.05)	1.00 (1.22)	1.67 (1.46)	2.33 (1.68)	1.33 (1.34)	1.33 (1.34)	1.38 (1.34)
8.	PDKV Blackgold (Ch)	1.00 (1.22)	1.33 (1.34)	1.33 (1.34)	1.33 (1.34)	1.67 (1.46)	1.67 (1.46)	1.38 (1.36)
9.	Phule Vasu (Ch)	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	2.00 (1.57)
10.	TPU 4 (Ch)	2.00 (1.58)	2.00 (1.58)	2.00 (1.58)	2.00 (1.58)	2.00 (1.58)	2.00 (1.58)	2.00 (1.58)
11.	BDU 1 (Ch)	2.67 (1.77)	2.67 (1.77)	3.67 (2.04)	4.67 (2.26)	4.33 (2.20)	4.33 (2.20)	3.72 (2.04)
12.	AKU 11-15	2.00 (1.58)	2.00 (1.58)	4.33 (2.20)	5.00 (2.34)	3.67 (2.04)	3.67 (2.04)	3.44 (1.96)
13.	AKU 12-3	1.33 (1.34)	1.33 (1.34)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	1.99 (1.53)
14.	AKU 13-2	2.33 (1.68)	2.33 (1.68)	2.67 (1.77)	2.67 (1.77)	2.67 (1.77)	2.67 (1.77)	2.55 (1.74)
15.	AKU 18-2	1.33 (1.34)	1.33 (1.34)	1.33 (1.34)	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	1.50 (1.40)
16.	BDU 2021-1	3.00 (1.86)	3.33 (1.95)	3.67 (2.04)	3.67 (2.04)	3.67 (2.04)	3.67 (2.04)	3.50 (1.99)
17.	BDU 2021-2	3.33 (1.95)	3.33 (1.95)	4.00 (2.11)	4.00 (2.11)	4.00 (2.11)	4.00 (2.11)	3.77 (2.05)
18.	BDU 2021-3	3.00 (1.86)	3.00 (1.86)	3.67 (2.04)	3.67 (2.04)	3.67 (2.04)	3.67 (2.04)	3.44 (1.98)
19.	Phule U 813-12	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	2.00 (1.58)	2.00 (1.58)	2.00 (1.58)	1.83 (1.52)
20.	Phule U 819-18	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)
21.	Phule U 1018-15	1.33 (1.34)	1.33 (1.34)	1.33 (1.34)	2.33 (1.68)	2.33 (1.68)	2.33 (1.68)	1.66 (1.51)
22.	PU 62	1.67 (1.46)	1.67 (1.46)	1.67 (1.46)	2.00 (1.58)	1.67 (1.46)	1.67 (1.46)	1.72 (1.48)
SE (m)		0.08	0.07	0.07	0.07	0.07	0.07	0.07
CD at 5%		0.26	0.24	0.23	0.25	0.23	0.24	0.24
Cv %		9.03	7.84	7.08	7.18	6.88	7.16	7.52

Figures in parenthesis are square root transformed value

Table 9: Reaction of black gram entries against pod borer

Sr. No	Genotype	Percent pod damage by pod borer	Yield (Kg/ha)
1.	ATU 2201	12.69 (20.87)	1005
2.	ATU 2202	15.76 (23.39)	1012
3.	ATU 2203	14.58 (22.45)	978
4.	ATU 2204	18.48 (25.46)	990
5.	ATU 2205	19.50 (26.20)	812
6.	ATU 2206	8.24 (16.69)	910
7.	AKU 15 (Ch)	7.63 (16.03)	1208
8.	PDKV Blackgold (Ch)	11.78 (20.07)	1314
9.	Phule Vasu (Ch)	8.64 (17.09)	1060
10.	TPU 4 (Ch)	3.85 (11.31)	1321
11.	BDU 1 (Ch)	12.11 (20.36)	1247
12.	AKU 11-15	12.30 (20.53)	1352
13.	AKU 12-3	10.12 (18.55)	1383
14.	AKU 13-2	7.96 (16.38)	1418
15.	AKU 18-2	11.83 (20.12)	867
16.	BDU 2021-1	20.24 (26.74)	1099
17.	BDU 2021-2	8.18 (16.62)	1443
18.	BDU 2021-3	12.43 (20.64)	1419
19.	Phule U 813-12	10.99 (19.36)	1289
20.	Phule U 819-18	8.45 (16.90)	713
21.	Phule U 1018-15	8.41 (16.86)	1068
22.	PU 62	13.38 (21.46)	994
SE (m) ±		1.13	55.98
CD at 5%		3.40	160.00
Cv %		21.55	11.82

Conclusions

The field investigation on black gram during kharif 2022 at the Agriculture Research Station, Badnapur, aimed to study insect pest dynamics, record natural enemy activities, and screen black gram genotypes against major pests. The study revealed peak pest populations between SMW 31st and 36th, with specific genotypes showing resistance. AKU 15 (ch) and TPU 4 (ch) had the lowest pest populations, while ATU-2205 and BDU 2021-1 had the highest. This research provides valuable insights into pest management and genotype resistance in black gram cultivation.

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