Plant Archives Vol. 25, Supplement 1, 2025 pp. 167-175 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.supplement-1.023

EVALUATION OF PIGEON PEA INTERSPECIFIC DERIVATIVES FOR RESISTANCE TO SPOTTED POD BORER, *MARUCA VITRATA* (FABRICIUS)

Nilesh Chauhan*, Inderjit Singh, Gaurav Kumar Taggar and Suruchi Vij
Department of Plant Breeding and Genetics, Punjab Agricultural University,
Ludhiana-141004, Punjab, India
*Corresponding author E-mail: njc.nilesh@gmail.com
(Date of Receiving : 21-10-2024; Date of Acceptance : 24-12-2024)

ABSTRACT

The present study was carried out to screen 40 advance BC_1F_8/F_9 pigeon pea interspecific derivatives of *C. scarabaeoides* (ICP 15683) × *C. cajan* (ICPL 20329) for resistance to spotted pod borer, *Maruca vitrata* during *kharif* 2022 at Ludhiana. The population of *M. vitrata* peaked during the 41st Standard Meteorological Week (SMW), coinciding with Pigeon pea flowering. The pod damage ranged from 3.66 per cent to 25.41 per cent in different interspecific derivatives. Among 40 derivatives, seven (AL 2593, AL 2609, AL 2610, AL 2611, AL 2612, AL 2613 and AL 2614) showed resistance to *M. vitrata*, owing to indeterminate growth, higher pod count, seed yield and wild introgression.
Keywords **:** *Maruca vitrata*, interspecific derivatives, field screening, pigeon pea

Introduction

Worldwide, Pigeon pea (*Cajanus cajan* (L.) Millspaugh) ranks third, occupying 6.03 m ha with a production of 5.32 m tonnes and productivity 883 kg per ha of which the Indian subcontinent accounts for almost 79 per cent of the world's crop production (FAO STAT, 2022). It is India's second most important legume after chickpea occupying 4.13 m ha with a production of 3.42 m tonnes and productivity of 827 kg per ha (Sarkar *et al.,* 2020; INDIASTAT, 2024). In Punjab, the area under Pigeon pea crop is estimated to be 1200 ha with production of 1350 tonnes and average yield of 1127 kg per ha during 2023-24 (INDIASTAT, 2024).

Pigeon pea production and productivity are influenced by various factors, primarily including agronomic, pathological, entomological, and genetic aspects, along with their interactions with the environment (Malik *et al.,* 2013). Around 200 insect-pests feeds on Pigeon pea, and the economically important pests include *M. vitrata* (spotted pod borer), *Helicoverpa armigera* (gram pod borer), *Melanagromyza obtusa* (pod fly), *Exelastis atamosa* (plume moth), *Lampides boeticus* (blue butterfly), *Mylabris* spp. (blister beetle) (Sujithra and Chander, 2014). In India, *M. vitrata* is a major pest of Pigeon pea causing 26-28 per cent damage to flower (Randhawa and Verma, 2011) and yield losses up to 84 per cent (Mahalle and Taggar, 2018) have been reported.

The primary method of controlling this pest involves the application of chemical insecticides. However, relying solely on insecticides can result in issues like the development of resistance, appearance of secondary pests and pesticide residues in agricultural products. To address these concerns, the use of host plant resistance is imperative and therefore, the development of insect-pest resistant varieties and their inclusion into Integrated Pest Management (IPM) strategies is crucial. This approach is more effective, durable, cost-efficient and environmentally friendly.

For developing pod borer resistant varieties, unfortunately, stable sources of resistance are not available in cultivated Pigeon pea. The wild Pigeon pea exhibits a promising potential as a reservoir of host plant resistance against various pests such as pod borer, pod fly, pod wasp and Phytophthora blight (Sharma, 2001). Resistance mechanisms against pod borer encompass antixenosis (non-preference), antibiosis (negative impacts on insect biology), and deterred oviposition due to trichomes and exudates (Sharma, 2001). *C. scarabaeoides*, one of the wild relatives of Pigeon pea, exhibits several desirable traits, including dwarf stature, increased number of fruiting branches and higher pod production per plant. Additionally, it demonstrates resistance to key biotic stresses such as pod borers and Phytophthora stem blight (Mallikarjuna *et al.,* 2011; Upadhyaya *et al.,* 2013).

The degree of resistance to pests, including pod borer, exhibits significant variation among different accessions. Hence, the present study was carried out to screen and evaluate advanced interspecific derivatives derived from a cross between *C. scarabaeoides* and *C. cajan* for spotted pod borer resistance.

Materials and Methods

The study was conducted during the *kharif* 2022 season at the field experimental area of the Department of Plant Breeding and Genetics, Punjab Agricultural University (PAU), Ludhiana (30°54'41.4"N, 75°47'08.4"E). The experimental material comprised 40 advanced BC_1F_8/F_9 interspecific derivatives derived from a cross between *C. scarabaeoides* (ICP 15683) and *C. cajan* (ICPL 20329), along with three standard checks (PAU 881, AL 882, and MN-1). The derivatives were planted in single-row plots, each four meters in length, with inter-row and intra-row spacings of 50 cm and 25 cm, respectively. The experiment followed a randomized complete block design (RCBD) with two replications and was subjected to recommended agronomic practices under un-sprayed conditions.

The observations on *M. vitrata* larval population and damage were recorded at weekly intervals 37-42 SMW (Standard Meteorological Week) during *kharif* 2022. The days taken for initiation as well as 50 per cent flowering after sowing was recorded for each derivative line. Starting at flower initiation, the number of *M. vitrata* webs were recorded on per plant basis from three tagged plants from each test entry per replication. Assessment of pod damage due to *M. vitrata* was carried out from the damaged clustered pods from each of the test plants just before the harvest. The number of damaged pods (having clearcut round holes) as well as entire pods per plant were counted. The per cent pod damage was calculated using the formula:

$$\text{Pod damage (\%)} = \frac{\text{Number of damaged pods}}{\text{Total number of pods}} \times 100$$

The data on prevailing weather parameters were obtained from the Agrometeorological Observatory, Punjab Agricultural University, Ludhiana. The collected data for various traits were analysed using analysis of variance (ANOVA) with CPCS1 software (Cheema and Singh, 1991) following appropriate data transformations. Genotypic differences were assessed for statistical significance using the F-test and treatment mean differences were evaluated using the least significant difference (LSD) test at the 5% significance level.

Results and Discussion

In the present study, *M. vitrata* inflicted substantial damage to Pigeon pea lines in the form of larval webs and pod damage (Figure 1). Significant differences were observed for all the parameters related to pod borer resistance among the derivatives. The prevailing weather parameters during the pest incidence are presented in Figure 2. The data on the number of days to flower initiation in the interspecific derivatives, standard checks and susceptible check have been presented in Table 1. The number of days to flower initiation ranged from 69 days (AL 2577) to 87 days (AL 2575) in different interspecific derivatives. The check cultivars (PAU 881, AL 882) and the susceptible check (MN 1) took 87, 66 and 65 days for flower initiation, respectively. The number of days to 50 per cent flowering ranged from 87 days (AL 2577 and AL 2579) to 103 days (AL 2602) in different interspecific derivatives. The check cultivars (PAU 881, AL 882) and the susceptible check (MN 1) took 93, 84 and 82 days for 50 per cent flowering, respectively.

The mean larval webs of *M. vitrata* in different interspecific derivatives, standard checks, and susceptible check of Pigeon pea at Ludhiana during *kharif* 2022 have been presented in Table 2 and Figure 3. The average number of *Maruca* webs per plant ranged from 1.98 (AL 2612) to 11.72 (AL 2586) in different interspecific derivatives. The check cultivars (PAU 881, AL 882) and the susceptible check (MN 1) recorded 9.24, 13.72 and 16.18 *Maruca* webs per plant, respectively. The lesser number of webs per plant in check PAU 881 compared with other checks is due to the indeterminate growth habit. Peak mean larval webs of *Maruca* were recorded in SMW 41, after which there was a gradual decline in mean larval webs.

In SMW 37, AL 2609 had the lowest number of webs (0.57 webs per plant), while AL 2578 had the highest (7.14 webs per plant). Similarly, in SMW 38, AL 2609 had the lowest count (1.24 webs per plant), while AL 2602 had the highest (8.78 webs per plant). During SMW 39, AL 2593 had the lowest count (2.89 webs per plant) and AL 2576 had the highest (11.24

webs per plant). AL 2611 showed the least webs (1.32 webs per plant) and AL 2590 exhibited the highest (12.40 webs per plant) during SMW 40. In SMW 41, AL 2611 had the lowest (1.66 webs per plant), whereas AL 2588 had the highest (21.70 webs per plant). During SMW 42, AL 2611 showed the least (0.46 webs per plant), while AL 2600 had the highest (21.95 webs per plant). Nine derivatives *viz.* AL 2612 (1.98 webs per plant), AL 2611 (2.12 webs per plant), AL 2609 (2.31 webs per plant), AL 2613 (2.95 webs per plant), AL 2610 (3.15 webs per plant), AL 2593 (3.48 webs per plant), AL 2614 (3.81 webs per plant), AL 2591 (4.41 webs per plant) and AL 2589 (4.52 webs per plant), recorded less than five *Maruca* webs per plant.

The population of *M. vitrata* reached its highest point during the 41st SMW, with a recorded count of 12.07 webs per plant. This peak population coincided with the peak flowering stage of the Pigeon pea crop. Subsequently, as most of the flowers transformed into pods, the pest population began to decline gradually. The results indicate a correlation between the abundance of the pest and the flowering stage of the crop, with the population peaking during the flowering period and declining as the crop progressed to pod formation.

Khokhar *et al.* (2024) initially observed *M. vitrata* incidence during the 36th SMW in the early flowering genotypes, the pest population progressively increased, peaking across all genotypes during the 40th SMW, and then gradually declined, with no pests observed beyond the 43rd SMW. Imosanen and Singh (2005), Chittibabu et al. (2009), Srivastava *et al.* (1992), Taggar *et al.* (2019) and Sujayanand *et al.* (2021) also reported peak activity of *M. vitrata* during the 40th SMW, coinciding with the peak flowering of Pigeon pea. Gopali *et al.* (2010) also recorded peak incidence of the pest during September to October, which aligned with the maximum flowering in Pigeon pea. Overall, the results suggest a consistent pattern of *M. vitrata* activity during the peak flowering period of Pigeon pea, with a single peak observed in a crop season.

The data on per cent pod damage in the interspecific derivatives, standard checks and susceptible check have been presented in Table 1 and Figure 4. The pod damage ranged from 3.66 per cent (AL 2611) to 25.41 per cent (AL 2576) in different interspecific derivatives. The check cultivars (PAU 881, AL 882) and the susceptible check (MN 1) recorded 16.33 per cent, 29.67 per cent and 34.07 per cent pod damage, respectively. The seven derivatives *viz.* AL 2611 (3.66 per cent), AL 2612 (3.85 per cent), AL 2613 (4.06 per cent), AL 2609 (4.13 per cent), AL 2610 (4.24 per cent), AL 2593 (4.70 per cent) and AL 2614 (4.99 per cent) recorded less than five per cent pod damage.

From the above results it could be inferred that out of 40 interspecific derivatives screened for *M. vitrata* resistance, seven derivative lines (AL 2593, AL 2609, AL 2610, AL 2611, AL 2612, AL 2613, AL 2614) were found to be resistant to *M. vitrata*. All the lines that showed resistance to *M. vitrata* had indeterminate growth habit. The derivative lines AL 2610, AL 2611, AL 2612 and AL 2613 had a greater number of pods and higher seed yield per plant and reported introgression from the wild parent *C. scarabaeoides* hence showed lesser *M. vitrata* infestation (Chauhan, 2023).

Sharma *et al.* (2022) successfully introgressed pod borer resistance from *C. acutifolius* and *C. scarabaeoides* into popular Pigeon pea cultivars ICP 8863 and ICPL 87119. Twenty-one (21) introgression lines (ILs) consistently displayed low pod borer damage (< 50 per cent) across different years and locations. These ILs exhibited higher resistance compared to the recipient parents, and their resistance originated from wild *Cajanus* species, indicating the presence of distinct alleles related to pod borer resistance.

The variations in plant architecture, particularly branching and flowering patterns, have been identified as factors influencing the extent of *M. vitrata* infestation in Pigeon pea. The study by Mahalle and Taggar (2018) concluded that the determinate varieties of Pigeon pea experienced higher pod damage by *M. vitrata* compared to indeterminate types. Lateef and Reed (1980) and Wubneh and Taggar (2016) also reported similar results, with determinate varieties showing significantly higher mean pod damage. Saxena *et al.* (1996) and Choudhary *et al.* (2013) also supported these findings, reporting that determinate Pigeon pea genotypes with clustered inflorescence were more susceptible to *M. vitrata* as compared to indeterminate types.

Conclusion

The incidence of *M. vitrata* larvae was initially observed on the genotype that flowered earlier than others and peaked during the 41st SMW, highlighting the critical need for pest management during the bud initiation and flowering stages in Pigeon pea. The larvae and the number of webs produced by *M. vitrata* were higher on genotypes with determinate growth habits compared to indeterminate ones. It was concluded that genotypes with clustered inflorescences were more prone to damage by *M. vitrata* than those with non-clustered inflorescences. The derivate lines exhibiting resistance to *M. vitrata* can serve as valuable donors in the resistance breeding programs following a comprehensive evaluation and validation of their resistance under controlled environments and validation through insect assays. Furthermore, comprehending the precise mechanism through which resistance operates in these chosen lines is pivotal. This understanding will help in the incorporation of *M. vitrata* resistant traits into high-yielding Pigeon pea varieties, thereby enhancing their overall effectiveness.

Table 1 : Performance of interspecific derivatives of Pigeon pea against *M. vitrata* under field conditions at Ludhiana during *kharif* 2022

Derivative	Days to flower initiation	Days to 50% flowering	Pod damage (%)
AL 2575	87	102	6.94 (15.26)
AL 2576	78	95	25.41 (30.24)
AL 2577	69	87	7.29 (15.61)
AL 2578	76	93	17.90 (25.02)
AL 2579	70	87	13.84 (21.79)
AL 2580	82	100	11.34 (19.47)
AL 2581	79	95	8.44 (16.81)
AL 2582	84	101	5.73 (13.84)
AL 2583	77	93	6.50 (14.71)
AL 2584	80	98	14.33 (21.97)
AL 2585	78	96	16.65 (24.07)
AL 2586	85	100	20.44 (26.86)
AL 2587	76	95	14.58 (22.35)
AL 2588	86	102	21.54 (27.64)
AL 2589	82	98	6.00 (14.12)
AL 2590	81	99	22.22 (28.03)
AL 2591	79	98	5.42 (13.45)
AL 2592	84	100	8.74 (17.17)
AL 2593	78	96	4.70 (12.49)
AL 2594	82	100	17.01 (24.34)
AL 2595	72	91	7.12 (15.46)
AL 2596	80	96	8.70 (17.15)
AL 2597	73	93	13.23 (20.91)
AL 2598	81	99	11.50 (19.81)
AL 2599	75	93	9.02 (17.40)
AL 2600	83	101	24.11 (29.37)
AL 2601	79	97	8.18 (16.61)
AL 2602	86	103	17.24 (24.50)
AL 2603	80	96	10.72 (19.10)
AL 2604	76	94	11.70 (19.88)
AL 2605	78	97	23.44 (28.94)
AL 2606	75	91	12.77 (20.81)
AL 2607	71	88	15.97 (23.51)
AL 2608	70	88	12.81 (20.96)
AL 2609	81	99	4.13 (11.70)
AL 2610	82	99	4.24 (11.86)
AL 2611	76	91	3.66 (11.00)
AL 2612	85	101	3.85 (11.28)
AL 2613	82	101	4.06 (11.61)
AL 2614	81	99	4.99 (12.90)
AL 882 (C)	66	84	29.67 (32.98)
PAU 881 (C)	87	93	16.33 (23.74)
MN-1 (SC)	65	82	34.07 (35.69)
CD (5%)			**(4.45)**

Figures in parentheses are arc sine transformed values.
C-Check, SC-Susceptible check

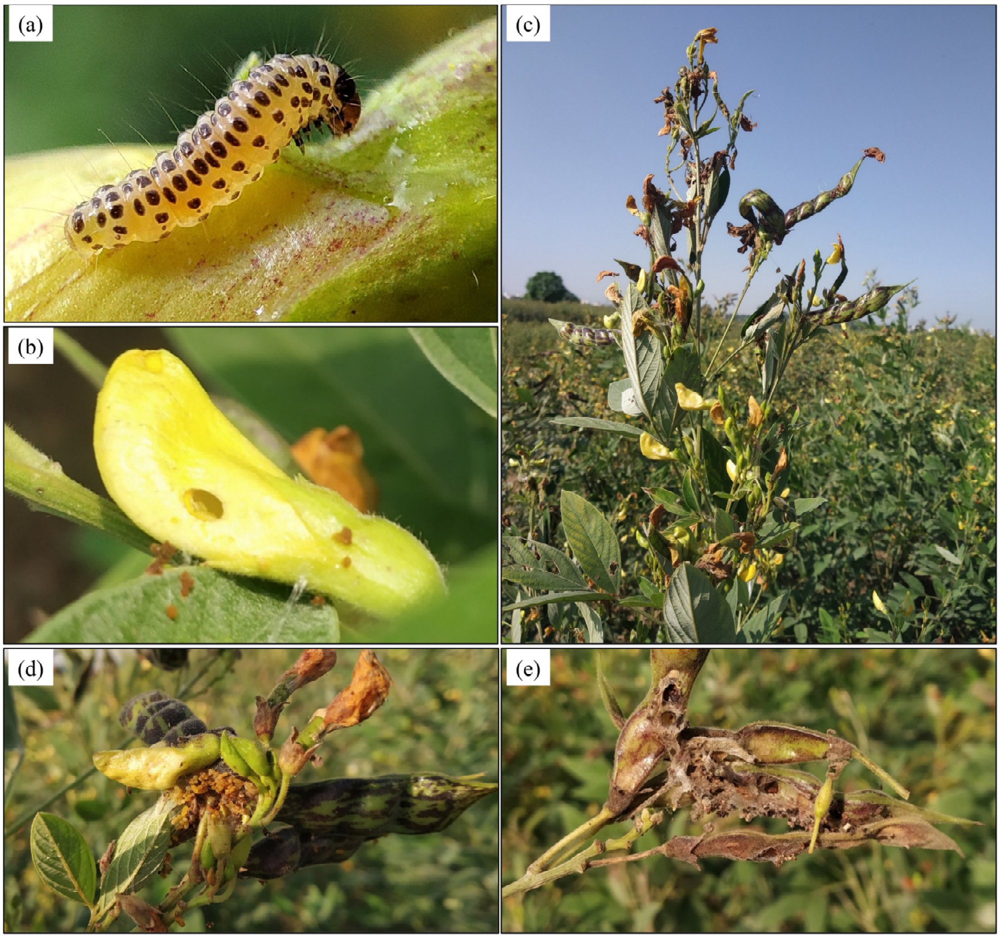

Fig. 1 : Typical damage symptoms of *M. vitrata* observed in Pigeon pea derivatives (a): *M. vitrata* larva (b): Floral damage (c, d): Inflorescence webbing (e): Pod damage

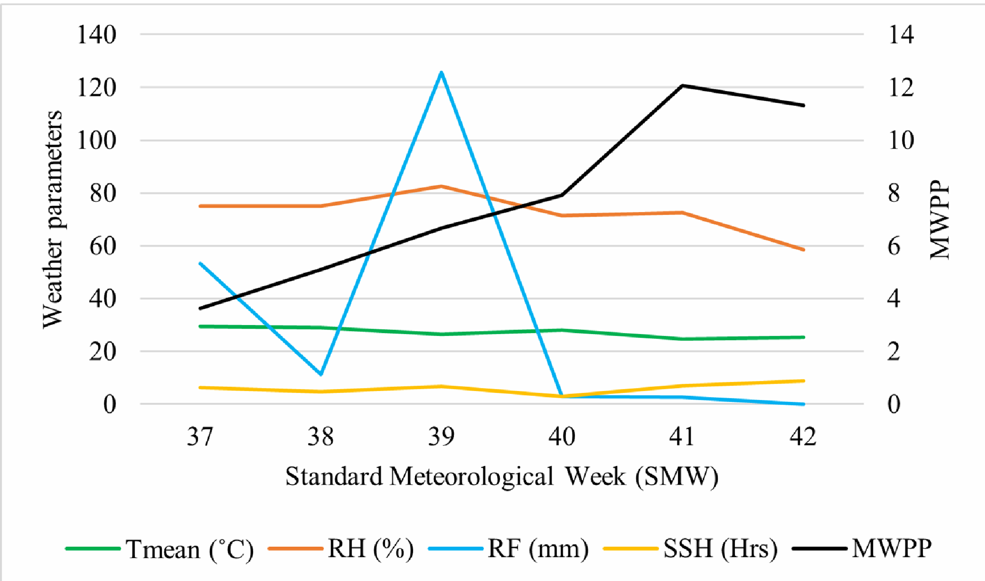

Fig. 2 : Mean larval webs of *M. vitrata* on Pigeon pea genotype MN-1 and prevailing weather parameters. Tmean (˚C)- mean temperature; RH (%)- relative humidity; RF (mm)- total rainfall; SSH (Hrs)- sunshine hours; MWPP- *Maruca* webs per plant

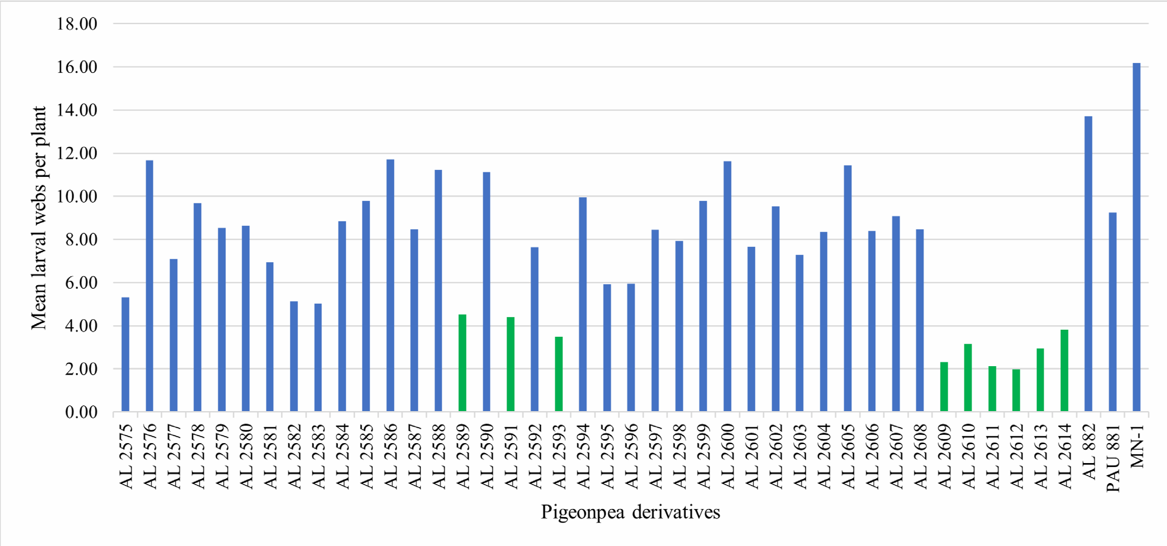

Fig. 3 : Mean larval webs of *M. vitrata* in different interspecific derivatives and standard checks of Pigeon pea

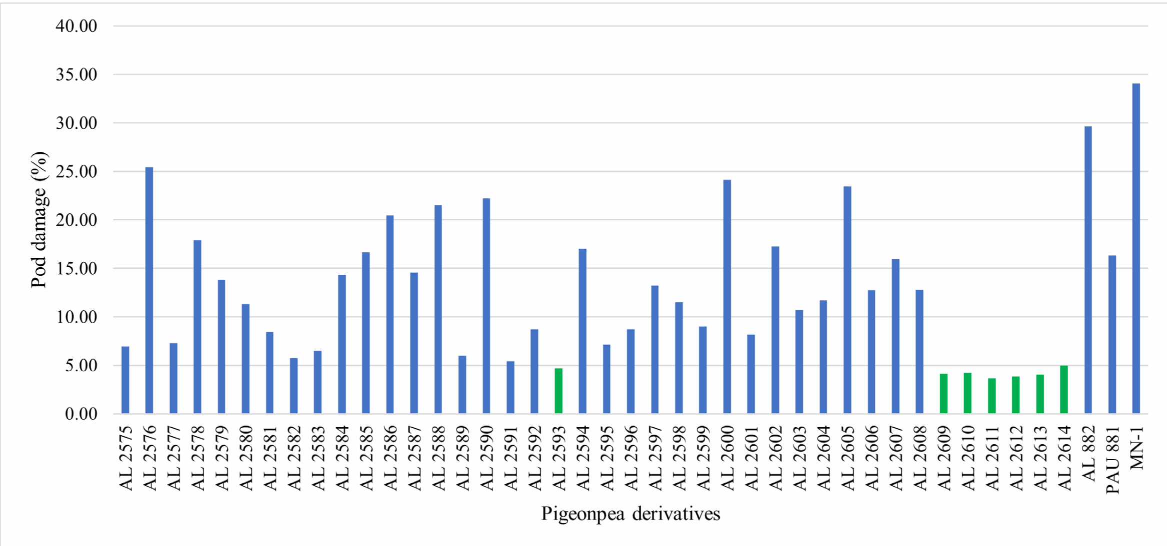

Fig. 4 : Pod damage of *M. vitrata* in different interspecific derivatives and standard checks of Pigeon pea

Table 2 : Mean larval webs of *M. vitrata* in different interspecific derivatives of Pigeon pea at Ludhiana during *kharif* 2022

Mean number of *M. vitrata* webs per plant							
Derivative	**SMW 37**	**SMW 38**	**SMW 39**	**SMW 40**	**SMW 41**	**SMW 42**	**Grand mean**
AL 2575	1.44 (1.56)	3.44 (2.09)	5.11 (2.47)	8.94 (3.14)	7.29 (2.87)	5.64 (2.58)	5.31 (2.51)
AL 2576	6.57 (2.71)	6.57 (2.75)	11.24 (3.50)	12.07 (3.61)	16.30 (4.16)	17.27 (4.27)	11.67 (3.56)
AL 2577	2.87 (1.97)	3.37 (2.09)	4.87 (2.42)	6.54 (2.75)	7.82 (2.95)	17.12 (4.26)	7.10 (2.85)
AL 2578	7.14 (2.85)	7.47 (2.91)	7.14 (2.85)	6.97 (2.82)	17.72 (4.33)	11.72 (3.57)	9.69 (3.27)
AL 2579	3.77 (2.17)	8.10 (3.02)	10.1 (3.32)	7.77 (2.96)	13.06 (3.75)	8.48 (3.08)	8.54 (3.09)
AL 2580	3.00 (2.00)	5.84 (2.59)	8.84 (3.13)	10.67 (3.41)	10.88 (3.44)	12.68 (3.70)	8.65 (3.11)

AL 2581	3.65 (2.15)	3.49 (2.12)	3.99 (2.23)	6.15 (2.67)	10.11 (3.33)	14.31 (3.91)	6.95 (2.82)
AL 2582	1.83 (1.68)	3.16 (2.03)	5.16 (2.47)	7.83 (2.97)	6.18 (2.67)	6.71 (2.78)	5.14 (2.48)
AL 2583	4.07 (2.24)	3.40 (2.10)	4.07 (2.23)	6.07 (2.66)	7.20 (2.85)	5.40 (2.53)	5.03 (2.46)
AL 2584	3.76 (2.18)	4.93 (2.43)	7.10 (2.84)	10.26 (3.35)	13.09 (3.75)	13.91 (3.86)	8.84 (3.14)
AL 2585	4.96 (2.43)	6.29 (2.70)	6.46 (2.73)	8.79 (3.13)	13.99 (3.87)	18.27 (4.39)	9.79 (3.29)
AL 2586	4.90 (2.43)	6.74 (2.78)	8.90 (3.15)	10.90 (3.45)	18.08 (4.37)	20.78 (4.67)	11.72 (3.57)
AL 2587	3.64 (2.15)	6.80 (2.79)	9.64 (3.26)	9.47 (3.23)	15.17 (4.02)	6.17 (2.68)	8.48 (3.08)
AL 2588	4.90 (2.43)	6.24 (2.68)	6.74 (2.78)	8.57 (3.09)	21.70 (4.76)	19.15 (4.49)	11.22 (3.50)
AL 2589	1.53 (1.59)	3.03 (2.00)	5.03 (2.44)	4.87 (2.42)	6.86 (2.79)	5.81 (2.61)	4.52 (2.35)
AL 2590	5.40 (2.53)	6.06 (2.66)	8.56 (3.07)	12.40 (3.66)	17.71 (4.33)	16.59 (4.19)	11.12 (3.48)
AL 2591	1.56 (1.6)	3.56 (2.11)	4.73 (2.39)	5.39 (2.53)	5.76 (2.60)	5.46 (2.54)	4.41 (2.33)
AL 2592	3.21 (2.05)	5.88 (2.62)	6.04 (2.65)	8.54 (3.09)	10.86 (3.44)	11.31 (3.51)	7.64 (2.94)
AL 2593	1.22 (1.49)	2.56 (1.88)	2.89 (1.97)	5.22 (2.49)	3.92 (2.22)	5.05 (2.46)	3.48 (2.12)
AL 2594	4.37 (2.32)	5.04 (2.46)	6.20 (2.68)	7.70 (2.95)	19.50 (4.53)	16.95 (4.24)	9.96 (3.31)
AL 2595	4.25 (2.24)	6.33 (2.71)	4.17 (2.27)	5.17 (2.48)	7.91 (2.98)	7.68 (2.95)	5.92 (2.63)
AL 2596	3.10 (2.00)	5.27 (2.5)	5.10 (2.46)	5.10 (2.47)	11.08 (3.48)	6.06 (2.65)	5.95 (2.64)
AL 2597	4.97 (2.44)	7.13 (2.85)	7.14 (2.84)	9.80 (3.28)	13.90 (3.83)	7.83 (2.97)	8.46 (3.08)
AL 2598	3.26 (2.06)	4.09 (2.25)	5.26 (2.50)	8.25 (3.04)	12.47 (3.67)	14.27 (3.91)	7.93 (2.99)
AL 2599	3.46 (2.11)	6.13 (2.67)	7.79 (2.94)	11.79 (3.58)	9.24 (3.20)	20.34 (4.62)	9.79 (3.28)
AL 2600	6.52 (2.72)	7.18 (2.86)	6.69 (2.77)	7.69 (2.95)	19.70 (4.55)	21.95 (4.79)	11.62 (3.55)
AL 2601	3.79 (2.18)	3.29 (2.07)	5.63 (2.57)	6.96 (2.79)	10.84 (3.44)	15.41 (4.05)	7.65 (2.94)
AL 2602	3.79 (2.19)	8.78 (3.11)	7.12 (2.84)	7.79 (2.96)	17.10 (4.25)	12.60 (3.69)	9.53 (3.24)
AL 2603	3.76 (2.15)	3.76 (2.18)	8.60 (3.07)	7.93 (2.99)	11.71 (3.57)	7.96 (2.99)	7.29 (2.88)
AL 2604	3.01 (2.00)	6.51 (2.74)	7.51 (2.91)	8.68 (3.11)	11.79 (3.57)	12.54 (3.68)	8.34 (3.06)
AL 2605	4.43 (2.33)	7.27 (2.88)	9.77 (3.28)	11.10 (3.47)	17.63 (4.32)	18.38 (4.40)	11.43 (3.53)
AL 2606	3.28 (2.07)	5.11 (2.47)	6.11 (2.66)	8.78 (3.13)	12.86 (3.72)	14.14 (3.89)	8.38 (3.06)
AL 2607	3.92 (2.22)	4.92 (2.43)	5.76 (2.58)	8.75 (3.12)	16.50 (4.18)	14.63 (3.95)	9.08 (3.18)
AL 2608	3.57 (2.14)	4.40 (2.32)	4.74 (2.40)	8.24 (3.04)	21.35 (4.73)	8.60 (3.10)	8.48 (3.08)
AL 2609	0.57 (1.25)	1.24 (1.49)	6.07 (2.66)	3.07 (1.98)	2.03 (1.74)	0.91 (1.38)	2.31 (1.82)

AL 2610	2.20 (1.79)	2.37 (1.83)	4.37 (2.31)	4.70 (2.39)	2.93 (1.98)	2.33 (1.83)	3.15 (2.04)
AL 2611	2.65 (1.91)	2.65 (1.91)	3.98 (2.23)	1.32 (1.51)	1.66 (1.63)	0.46 (1.21)	2.12 (1.77)
AL 2612	1.33 (1.52)	1.50 (1.58)	3.67 (2.15)	2.16 (1.77)	1.91 (1.70)	1.31 (1.51)	1.98 (1.73)
AL 2613	3.08 (2.02)	3.24 (2.06)	6.58 (2.75)	1.91 (1.70)	2.04 (1.74)	0.84 (1.36)	2.95 (1.99)
AL 2614	1.06 (1.43)	2.23 (1.80)	6.39 (2.72)	6.39 (2.71)	3.73 (2.17)	3.06 (2.01)	3.81 (2.19)
PAU 881 (C)	3.33 (2.08)	6.67 (2.76)	9.00 (3.16)	8.83 (3.13)	13.76 (3.84)	13.83 (3.85)	9.24 (3.20)
AL 882 (C)	5.98 (2.64)	7.99 (3.00)	8.65 (3.10)	14.99 (4.00)	26.86 (5.28)	17.86 (4.34)	13.72 (3.84)
MN-1 (SC)	6.78 (2.79)	9.78 (3.28)	13.61 (3.82)	15.61 (4.08)	26.9 (5.28)	24.44 (5.04)	16.18 (4.15)
CD (5%)	**(0.44)**	**(0.39)**	**(0.45)**	**(0.41)**	**(0.42)**	**(0.19)**	**(0.13)**

Mean of three observations; Figures in parentheses are square root transformed values; SMW-Standard Meteorological Week
C-Check; SC-Susceptible check

Acknowledgements

The first author, Nilesh Chauhan thankfully acknowledges the financial assistance provided by ICAR in the form of a PG Scholarship during his master studies. Financial assistance received from Indian Council of Agricultural Research (ICAR) under the project Consortia for Research Platform (CRP) on Hybrid Technology for Higher Productivity in Selected Field and Horticultural Crops-Pigeon pea, ICAR 80 (PC 2341) is gratefully acknowledged.

Author's contribution

Conceptualization and designing of the research work (IS, GKT); Execution of field experiments and data collection (NC, SV); Analysis of data and interpretation (NC); Preparation of manuscript (NC, GKT, IS).

Declaration

The authors declare that they do not have any conflict of interest.

References

Chauhan, N. J. (2023). *Morphological characterization and introgression profiling of Pigeon pea [Cajanus cajan (L.) Millspaugh] interspecific derivatives* (Master’s thesis). Punjab Agricultural University, Ludhiana, India.

Cheema, H., & Singh, B. (1991). *Software Statistical Package CPCS-1*. Department of Statistics, Punjab Agricultural University, Ludhiana.

Chittibabu, G., Madhumathi, T., Arjun Rao, P., & Srinivasa Rao, V. (2009). Seasonal incidence of spotted pod borer [*Maruca vitrata* (Geyer); Pyralidae; Lepidoptera] on blackgram. *Andhra Agricultural Journal, **56***: 31–33.

Choudhary, A. K., Raje, R. S., Datta, S., Sultana, R., & Ontagodi, T. (2013). Conventional and molecular approaches towards genetic improvement in Pigeon pea for insect resistance. *American Journal of Plant Sciences, **4***: 372–385.

FAOSTAT. (2024). Food and Agriculture Organization of the United Nations (FAO) statistical databases. (Retrieved May 2, 2024, from https://www.fao.org/statistics/en/)

Gopali, J. B., Teggelli, R., Mannur, D. M., & Yelshetty, S. (2010). Web-forming lepidopteran, *Maruca vitrata* (Geyer): An emerging and destructive pest in Pigeon pea. *Karnataka Journal of Agricultural Sciences, **23***: 35–38.

Imosanen, & Singh, H. K. B. (2005). Incidence of *Helicoverpa armigera* (Hub.) and *Maruca vitrata* (Geyer) on Pigeon pea under Medziphema conditions of Nagaland. *Journal of Applied Zoological Research, **16***: 85–86.

INDIASTAT. (2024). Area under cultivation foodgrains India. Statistics. (Retrieved October 16, 2024, from https://www.indiastat.com/)

Khokhar, S., Taggar, G. K., & Singh, R. (2024). *Maruca vitrata* (Fabricius) (Lepidoptera: Crambidae): Comparative infestation and seasonal population fluctuations on different Pigeon pea genotypes in Punjab, India. *International Journal of Tropical Insect Science, **44***: 901–912.

Lateef, S. S., & Reed, W. (1980). Development of a methodology for open field screening for insect pest resistance in Pigeon pea. In *Proceedings of the International Workshop on Pigeon pea* (Vol. 2, pp. 15–19). ICRISAT, Patancheru, Andhra Pradesh.

Mahalle, R. M., & Taggar, G. K. (2018). Yield loss assessment and establishment of economic threshold level of *Maruca vitrata* in Pigeon pea. *Journal of Food Legumes, **31***: 36–44.

Malik, J. K., Singh, R., Thenua, O. V. S., & Kumar, A. (2013). Response of Pigeon pea (*Cajanus cajan*) + mungbean (*Phaseolus radiatus*) intercropping system to phosphorus and biofertilizers. *Legume Research, **36***: 323–330.

Mallikarjuna, N., Saxena, K. B., & Jadhav, D. R. (2011). *Cajanus*. In Kole, C. (Ed.), *Wild Crop Relatives: Genomic and Breeding Resources, Legume Crops and Forages* (pp. 21–33). Springer, Berlin.

Randhawa, H. S., & Verma, A. K. (2011). Evaluation of Pigeon pea genotypes for their resistance against pod borer, *Maruca testulatis* Geyer under natural conditions. In *3rd Insect Science Congress*. Indian Society for the Advancement of Insect Science, Punjab Agricultural University, Ludhiana.

Sarkar, S., Panda, S., Yadav, K. K., & Kandasamy, P. (2020). Pigeon pea (*Cajanus cajan*): An important food legume in Indian scenario—A review. *Legume Research, **43***: 601–610.

Saxena, K. B., Lateef, S. S., Fonseka, H. H. D., Ariyaratne, H. P., & Dharamsena, C. M. D. (1996). *Maruca testulalis* damage in determinate and indeterminate lines of Pigeon pea in Sri Lanka. *International Chickpea and Pigeon pea Newsletter, **3***: 91–93.

Sharma, H. (2001). Crop protection compendium: *Helicoverpa armigera*. In *Electronic Compendium of Crop Protection*. CAB International: Wallingford, UK. (Retrieved April 2, 2022, from www.cabi.org/cpc)

Sharma, S., Jaba, J., Rao, P. J., Prasad, S., Gopal, N. T. V. V., Sharma, H. C., & Kilian, B. (2022). Reaping the potential of wild *Cajanus* species through pre-breeding for improving resistance to pod borer, *Helicoverpa armigera*, in cultivated Pigeon pea (*Cajanus cajan* (L.) Millsp.). *Biology, **11***(1): 1–20.

Srivastava, C. P., Pimbert, M. P., & Jadhav, D. R. (1992). Monitoring of adult population of *Maruca testulalis* (Geyer) with light traps at Patancheru and Hisar in India. *International Pigeon pea Newsletter, **15***: 27–28.

Sujayanand, G. K., Chandra, A., Pandey, S., & Bhatt, S. (2021). Seasonal abundance of spotted pod borer, *Maruca vitrata* Fabricius in early Pigeon pea (*Cajanus cajan* (L.) Millsp.) and its management through farmscaping in Uttar Pradesh. *Legume Research, **44**:* 233–239.

Sujithra, M., & Chander, S. (2014). Seasonal incidence and damage of major insect pests of Pigeon pea (*Cajanus cajan* (L.)). *Indian Journal of Entomology, **76***: 202–206.

Sunitha, V., Lakshmi, K. V., & Ranga Rao, G. V. (2008). Screening of Pigeon pea genotypes against *Maruca vitrata* (Geyer). *Journal of Food Legumes, **21***: 193–195.

Taggar, G. K., Singh, R., Cheema, H. K., & Singh, P. (2019). Relative abundance, population dynamics, and damage potential of spotted pod borer, *Maruca vitrata* (Fabricius) on early Pigeon pea in Punjab. *International Journal of Tropical Insect Science, **39***: 229–234.

Upadhyaya, H. D., Reddy, K. N., Pundir, R. P. S., Singh, S., Gowda, C. L. L., & Ahmad, M. I. (2013). Diversity and geographical gaps in *Cajanus scarabaeoides* (L.) Thou. germplasm conserved at the ICRISAT gene bank. *Plant Genetic Resources, **11***: 3–14.

Wubneh, Y. W., & Taggar, G. K. (2016). Evaluation of Pigeon pea genotypes for resistance to spotted pod borer, *Maruca vitrata* (Geyer) (Lepidoptera: Crambidae) under net house and field conditions. *Journal of Insect Science, **29***: 32–36.