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Varietal susceptibility of different maize varieties/ genotypes against maize stem borer, *Chilo partellus* Swinhoe

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Abstract
The investigations were carried out at the Agronomy Instructional Farm, C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar during *kharif*, 2017 on screening of 15 maize varieties/ genotypes for resistance to maize stem borer, *Chilo partellus* infesting maize under field condition on basis of per cent damaged plants, per cent dead heart and leaf injury scale. Based on per cent damaged plants varieties/genotypes of maize GAYMH 1 and HQPM 1 was found to be resistant; GM 2, HQPM 5, P 3502, BYMH 14-18, BYMH 13-3, P 3507, P 740 and Prabal as moderately resistant; BYMH 14-20, BYMH 14-22 and BYMH 13-7 as moderately susceptible; BYMH 14-21 and BYMH 13-5 as susceptible to *C. partellus.* None of the varieties/genotypes were found highly resistant or highly susceptible to the pest. The leaf injury scale due to *C. partellus* was ranged from 3.06 to 4.27 among different varieties/genotypes. None of the varieties/genotypes were found highly resistant or highly susceptible. GM 2, GAYMH 1, HQPM 1 and HQPM 5 were found resistant; BYMH 13-5, P 3507, P 3502 and Prabal were found moderately resistant; BYMH 14-21, BYMH 13-3 and BYMH 13-7 were found moderately susceptible; BYMH 14-21, BYMH 14-20 and BYMH 14-22 were found susceptible to *C. partellus.* Based on per cent dead heart none of the varieties/genotypes were found highly resistant or highly susceptible to the pest. GAYMH 1, HQPM 1 were found resistant; GM 2, HQPM 5, P 3507 and P 740 were found moderately resistant; BYMH 14-20, BYMH 13-7, P-3502, BYMH 14-18, BYMH 13-3 and Prabal were found moderately susceptible; BYMH 14-22, BYMH 13-5 and BYMH 14-21 were found susceptible to *C. partellus*. Stem tunneling made by the *C. partellus* were comparatively higher in susceptible varieties than resistant varieties.

Keywords: *Chilo partellus*, screening, maize, genotypes/ varieties, resistant

Introduction
Maize (*Zea mays* Linnaeus), a cereal crop belonging to family Gramineae, is referred to as the "Queen of Cereals" due to its inherent high genetic yield potentials. Maize is a staple food of Asian people and it is used as the major cereal in the traditional areas by the local population in the form of chapatti. The use of processed foods for breakfast and snacks is very little. In addition, green ears are consumed in roasted form. Popping the corn is a method of starch cookery. Maize is a raw material for a number of products *viz.,* starch, glucose, dextrose, sorbitol, dextrin, high fructose syrup, maltodextrin, germ oil, germ meal, fiber and gluten products which are used in the industries such as alcohol, textile, paper and pharmaceuticals.

Maize is attacked by about 140 species of insect pests causing varying degree of damage from sowing till storage Arabjafari and Jalali, (2007) [2]. However, only a few insect pests viz., stem borer [*Chilo partellus* (Swinhoe), *Diatraea* spp. and *Sesamia inferens* (Walker.)], army worm [*Mythimna separate* (Walker.)], bark beetle [*Anthracophora crucifera* (Olivier)], blister beetle [*Cylindrothorax audouini* (Hag-Rutenberg.)], grasshopper [*Epacromia dorsalis* (Thunberg) and *Hieroglyphus banian* (Fabricius)], aphid [*Rhopalosiphum maidis* (Fitch)], surface grasshopper [*Chrotogonus* sp.], white grub [*Holotrichia consanguinea* (Blanchard)], cob borer [*Helicoverpa armigera* (Hubner) Hardwick], leaf eating caterpillar [*Spodoptera litura* (Fabricius)] and white ants [*Odontotermes* sp. and *Microterms* sp.] cause economic loss and are more common over the large area Patel and Patel, (1970) [11] and Atwal and Dhaliwal, (2002) [3].

Among these, maize stem borer, *C. partellus* (Crambidae; Lepidoptera) is one of the most important pest in Asian and African countries. Larvae of *C. partellus* after hatching feed on the soft surface of the leaves and then enter in to the stem through whorl and feeding on the pith of

the stem. The growth of the plants becomes stunted and results into dead hearts when attacked by *C. partellus* at their initial stages. The larvae also enter in to the stem through lower nodes by making the holes. Yield losses of 24 to 75 per cent have been reported by the attack of this pest alone Khan, (1983) [6]. Sharma and Gautam, (2010) [15] reported that yield loss due to this pest is about 28 per cent. This being an internal borer, it is difficult to control with a single method of pest control practices. Resistant varieties play an important role to save the crop from such notorious pest and to minimize the use of insecticides leading to environmentally safe, economically feasible and socially acceptable as a tactic of pest management.

Materials & Methods

To screen the relative susceptibility of different maize varieties (Table 2) to *C. partellus* under field condition, the experiment was carried out in a Randomized block design during *kharif* season of 2017 at the Agronomy Instructional Farm, C. P. College of Agriculture, SDAU, Sardarkrushinagar. Maize seeds were sown with the spacing 60 × 15 cm. The gross and net plot size was 2.4 × 4.0 m and 1.2 × 3.0 m, respectively. Each treatment was replicated twice.

The varieties were screened based on per cent damaged plants and leaf injury scale. From each plot, 10 plants were selected randomly for recording the observations on number of damaged plants and leaf injury scale. The above observations recorded at weekly interval starting from one week of germination to harvest. The leaf injury was recorded following visual rating scale (1 to 9) given by Tefera *et al.* (2013) [16] as mentioned in Table 1. Number of dead heart was also recorded. The effect of different varieties/genotypes of maize on per cent stem tunneling was also studied. For this purpose ten plants per plot were selected randomly after harvesting. Total stem length (cm) and total length of the tunnel made by *C. partellus* per ten plants was measured.

The per cent stem tunneling was worked out by the formula Dindor, (2016) [4].

$$\text{Per cent stem tunneling} = \frac{\text{Total length of stem tunnel by } C.\ partellus \text{ in 10 plants}}{\text{Total stem length of 10 plants}}$$

Table 1: Stem borer leaf damage assessment using the 1-9 visual rating scale

Scale (1-9)	Description
1	No visible leaf feeding damage
2	Few pin holes on older leaves
3	Several shot-holes injury on a few leaves
4	Several shot-holes injury common on several leaves or small lesions
5	Elongated lesions (> 2 cm long) on a few leaves
6	Elongated lesions on several leaves
7	Several leaves with elongated lesions or tattering
8	Most leaves with elongated lesions or severe tattering
9	Plant dying as a result of foliar damage

Table 2: Different varieties/genotypes of maize

Sr. No.	Varieties/genotypes	Sr. No.	Varieties/genotypes
1	GM 2	9	BYMH 13-3
2	GAYMH 1	10	BYMH 13-5
3	HQPM 1	11	BYMH 13-7
4	HQPM 5	12	P 3507
5	BYMH 14-18	13	P 3502
6	BYMH 14-20	14	P 740
7	BYMH 14-21	15	Prabal
8	BYMH 14-22		

The different maize varieties/genotypes were also categorised into Highly Resistant (HR), Resistant (R), Moderately Resistant (MR), Moderately Susceptible (MS), Susceptible (S) and Highly Susceptible (HS) following statistical scale given in Table. For the purpose, mean value and Standard Deviation Patel *et al.* (2002) [10].

Category of resistance	Scale for resistance
Highly Resistant (HR)	$< \overline{X} - 2SD$
Resistant (R)	$\overline{X} - SD$ to $\overline{X} - 2SD$
Moderately Resistant (MR)	$\overline{X}$ to $\overline{X} - SD$
Moderately Susceptible (MS)	$\overline{X}$ to $\overline{X} + SD$
Susceptible (S)	$\overline{X} + SD$ to $\overline{X} + 2SD$
Highly Susceptible (HS)	$> \overline{X} + 2SD$

Results and Discussion

Susceptibility based on per cent damaged plants

The periodical data on per cent damaged plants due to *C. partellus* are presented in Table 3. The per cent damaged plants ranged from 33.33 to 46.67 per cent among different varieties/genotypes. The highest (46.67%) damage was recorded in genotypes BYMH 14-21 and BYMH 13-5 whereas, it was lowest (33.33%) in GAYMH 1 and HQPM 1.

Different varieties/genotypes of maize were also categorized for their susceptibility or resistance to *C. partellus* based on per cent damaged plants (Table 4). None of the varieties/genotypes were found highly resistant or highly susceptible to. The varieties GAYMH 1 (33.33%) and HQPM 1 (33.33%) recorded less than 35.82 per cent, but more than 31.64 per cent damaged plants and falls under resistant (R) category; varieties/genotypes GM 2 (36.67%), HQPM 5 (36.67%), P 3502 (36.67%), BYMH 14-18 (40%), BYMH 13-3 (40%), P 3507 (40%), P 740 (40%) and Prabal recorded less

than 40 per cent, but more than 35.84 per cent damaged plants and falls under category moderately resistant (MR) and genotypes BYMH 14-20 (43.33%) and BYMH 13-7 (43.33%) recorded less than 44.18 per cent, but more than 40 per cent damaged plants falls under category moderately susceptible (MS); genotypes BYMH 14-21 (46.67%) and BYMH 13-5 (46.67%) recorded less than 48.36 per cent, but more than 44.18 per cent damaged plants falls under category susceptible (S).

Susceptibility based on leaf injury scale

The periodical data on leaf injury scale due *C. partellus* are presented in Table 5. The leaf injury scale ranged from 3.06 to 4.27 among different varieties/genotypes. The highest (4.27) leaf injury scale was recorded in genotypes BYMH 14-18 and lowest (3.06) in HQPM 1.

Different varieties/genotypes of maize were also categorized for their susceptibility or resistance to *C. partellus* based on leaf injury scale (Table 6). None of the varieties/genotypes were found highly resistant or highly susceptible. The varieties GM 2 (3.33), GAYMH 1 (3.13), HQPM 1 (3.06) and HQPM 5 (3.23) recorded less than 3.24, but more than 2.84 leaf injury rating were found resistant (R); varieties/genotypes BYMH 13-5 (3.56), P 3507 (3.67), P 3502 (3.3), P 740 (3.67) and Prabal (3.37) recorded less than 3.64 but more than 3.24 leaf injury rating were found moderately resistant (MR); and genotypes BYMH 14-21 (4.00), BYMH 13-3 (3.97) and BYMH 13-7 (3.73) recorded less than 4.04, but more than 3.64 leaf injury rating were found moderately susceptible (S); genotypes BYMH 14-20 (4.13) and BYMH 14-22 (4.2) recorded less than 4.44, but more than 4.04 leaf injury rating were found susceptible (S).

Susceptibility based on per cent dead heart

The periodical data on per cent dead heart due *C. partellus* are presented in Table 7. The per cent dead heart ranged from 1.28 to 5.14 among different varieties/genotypes. The highest (5.14%) damage was recorded in genotypes BYMH 14-21 and lowest (1.28%) in GAYMH 1 and HQPM 5.

Different varieties/genotypes of maize were also categorized for their susceptibility or resistance to *C. partellus* based per cent dead heart (Table 8). None of the varieties/genotypes were found highly resistant or highly susceptible. The varieties GAYMH 1 (1.28%), HQPM 1 (1.28%) recorded less than 1.91, but more than 0.66 per cent dead heart were found resistant (R); varieties/genotypes GM 2 (1.92%), HQPM 5 (1.98%), P 3507 (2.56%) and P 740 (2.56%) recorded less than 3.16, but more than 1.91 per cent dead heart were found moderately resistant (MR) and genotypes/varieties BYMH 14-20 (3.20%), BYMH 13-7 (3.20%), P 3502 (3.20%), BYMH 14-18 (3.84%), BYMH 13-3 (3.84%) and Prabal (3.84%) recorded less than 4.41 but more than 3.16 per cent dead heart were found moderately susceptible (MS), genotypes BYMH 14-22 (4.49%), BYMH 13-5 (5.13) and BYMH 14-21 (5.14) recorded less than 5.66, but more than 4.41 per cent dead heart were found susceptible (S).

Stem tunneling caused by *C. partellus* in different varieties/genotypes of maize

The stem tunneling made by the larva of *C. partellus* (Table 7) was the lowest (2.75%) in varieties HQPM 1, which was found resistant (R) on the basis of leaf injury scale, and it was at par with GM 2, GAYMH 1 and HQPM 5. Stem tunneling was found maximum in BYMH 13-3 (5.46%) and it was at par BYMH 13-7 (5.32%), BYMH 13-5 (5.07%), BYMH 14-22 (5.03%), BYMH 14-21 (5.01%), P 3507 (4.97%), BYMH 14-18 (4.87%) and BYMH 14-20 (4.78). Among the moderately resistant varieties on the basis of leaf injury scale, less per cent stem tunneling was found except P 3507.

Thus, the higher per cent stem tunneling was recorded in moderately susceptible and susceptible varieties whereas; lower in highly resistant and moderately resistant varieties with lower leaf injury. It indicated that larva was not able to make a long tunnel in resistant varieties while, it could easily make the long tunnel length in susceptible varieties.

Table 3: Per cent damaged plants caused by *C. partellus* in different varieties/genotypes of maize

Sr. No.	Name of variety/ replication	Damaged plant (%) caused by *C. partellus* at weekly interval														
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	MAX.
1	GM 2	0	3.33	6.67	13.33	16.67	16.67	20.00	20.00	23.33	26.67	26.67	33.33	33.33	36.67	36.67
2	GAYMH 1	0	0.00	6.67	13.33	13.33	16.67	20.00	20.00	23.33	23.33	26.67	26.67	33.33	33.33	33.33
3	HQPM 1	0	3.33	6.67	10.00	13.33	16.67	16.67	23.33	26.67	26.67	30.00	30.00	33.33	33.33	33.33
4	HQPM 5	0	3.33	6.67	16.67	16.67	20.00	20.00	23.33	23.33	26.67	30.00	33.33	36.67	36.67	36.67
5	BYMH 14-18	0	6.67	13.33	16.67	20.00	23.33	23.33	23.33	26.67	30.00	33.33	36.67	40.00	40.00	40.00
6	BYMH 14-20	0	10.0	20.00	23.33	26.67	26.67	30.00	30.00	33.33	36.67	36.67	40.00	43.33	43.33	43.33
7	BYMH 14-21	3.33	10.0	16.67	23.33	26.67	30.00	33.33	33.33	36.67	36.67	40.00	43.33	43.33	46.67	46.67
8	BYMH 14-22	0	3.33	10.00	16.67	23.33	26.67	26.67	26.67	33.33	36.67	36.67	40.00	43.33	43.33	43.33
9	BYMH 13-3	0	10.00	16.67	23.33	23.33	30.00	30.00	33.33	33.33	36.67	36.67	40.00	40.00	40.00	40.00
10	BYMH 13-5	3.33	13.33	20.00	23.33	26.67	33.33	33.33	33.33	36.67	40.00	43.33	43.33	46.67	46.67	46.67
11	BYMH 13-7	0	6.67	13.33	16.67	20.00	23.33	26.67	30.00	33.33	36.67	36.67	40.00	43.33	43.33	43.33
12	P 3507	0	10.00	16.67	20.00	23.33	26.67	26.67	30.00	30.00	36.67	36.67	36.67	40.00	40.00	40.00
13	P 3502	0	3.33	13.33	16.67	20.00	23.33	26.67	26.67	30.00	33.33	33.33	36.67	36.67	36.67	36.67
14	P 740	0	10.0	20.0	23.33	26.67	30.00	30.00	30.00	33.33	33.33	36.67	36.67	40.00	40.00	40.00
15	Prabal	0	10.0	16.67	20.00	23.33	23.33	30.00	30.00	30.00	33.33	36.67	36.67	40.00	40.00	40.00
Max. : Maximum per cent damaged plants ℘ = 40.0; S.D. = 4.18																

Table 4: Categorization of maize varieties/genotypes against *C. partellus* based on per cent damaged plants

Category of resistance	Scale	Varieties/genotypes
Highly Resistant (HR)	$X_i < 31.64$	-
Resistant (R)	$31.64 \leq X_i < 35.82$	GAYMH 1, HQPM 1
Moderately Resistant (MR)	$35.82 \leq X_i < 40$	GM 2, HQPM 5, P 3502, BYMH 14-18, BYMH 13-3, P 3507, P 740, Prabal
Moderately Susceptible (MS)	$40 \leq X_i < 44.18$	BYMH 14-20, BYMH 14-22, BYMH 13-7
Susceptible (S)	$44.18 \leq X_i < 48.36$	BYMH 14-21, BYMH 13-5
Highly Susceptible (HS)	$X_i \geq 48.36$	-

Table 6: Categorization of maize varieties/genotypes for their susceptibility against *C. partellus* based on maximum value of leaf injury scale

Category of resistance	Scale	Varieties/genotypes
Highly Resistant (HR)	$X_i < 2.84$	-
Resistant (R)	$2.84 \leq X_i < 3.24$	GAYMH 1, GM 2, HQPM 1, HQPM 5
Moderately Resistant (MR)	$3.24 \leq X_i < 3.64$	BYMH 13-5, P 3507, P 3502, P 740, Prabal
Moderately Susceptible (MS)	$3.64 \leq X_i < 4.04$	BYMH 14-21, BYMH 13-3, BYMH 13-7
Susceptible (S)	$4.04 \leq X_i < 4.44$	BYMH 14-18, BYMH 14-20, BYMH 14-22
Highly Susceptible (HS)	$X_i \geq 4.44$	-

Table 7: Dead heart and stem tunneling caused by *C. partellus* in different varieties/genotypes of maize and its effect on yield

Tr. No.	Name of variety	Dead heart (%)	Stem tunneling (%)	Yield (q/ha)
T_1	GM 2	1.92	3.58	19.5
T_2	GAYMH 1	1.28	2.99	24.0
T_3	HQPM 1	1.92	2.75	25.1
T_4	HQPM 5	1.28	3.06	23.3
T_5	BYMH 14-18	3.84	4.87	17.7
T_6	BYMH 14-20	3.20	4.78	17.0
T_7	BYMH 14-21	5.14	5.01	17.3
T_8	BYMH 14-22	4.49	5.03	17.9
T_9	BYMH 13-3	3.84	5.46	18.0
T_{10}	BYMH 13-5	5.13	5.07	16.6
T_{11}	BYMH 13-7	3.20	5.32	18.0
T_{12}	P 3507	2.56	4.97	18.2
T_{13}	P 3502	3.20	3.95	20.1
T_{14}	P 740	2.56	3.79	18.8
T_{15}	Prabal	3.84	3.98	18.6
S.Em.		0.24	0.34	1.41
C. D.		0.74	1.02	4.29
C. V. %		10.87	11.06	10.34

Table 5: Leaf injury caused by *C. partellus* in different varieties/genotypes of maize

Tr. No.	Name of variety/ replication	Leaf injury (scale : 1-9) caused by *C. partellus* recorded at indicated week after germination														
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	Max.
1	GM 2	0	1.06	1.30	1.40	1.43	1.70	1.87	2.07	2.13	2.27	2.43	2.73	3.00	3.33	3.33
2	GAYMH 1	0	1.10	1.37	1.33	1.53	1.67	1.77	1.93	2.27	2.40	2.50	2.83	2.93	3.13	3.13
3	HQPM 1	0	1.10	1.23	1.37	1.47	1.67	1.90	1.97	2.07	2.23	2.27	2.73	3.06	3.06	3.06
4	HQPM 5	0	1.07	1.43	1.40	1.63	1.87	1.97	2.10	2.23	2.40	2.73	2.90	3.23	3.23	3.23
5	BYMH 14-18	0	1.17	1.23	1.33	1.63	2.10	2.20	2.33	2.57	2.80	3.13	3.67	4.03	4.27	4.27
6	BYMH 14-20	0	1.13	1.27	1.50	1.60	1.87	2.00	2.33	2.53	2.83	2.97	3.27	3.63	4.13	4.13
7	BYMH 14-21	1.03	1.17	1.33	1.43	1.57	2.40	2.43	2.50	2.73	3.06	3.43	3.67	3.87	4.00	4.00
8	BYMH 14-22	0	1.10	1.40	1.40	1.53	1.70	2.13	2.37	2.53	2.83	3.53	3.77	3.93	4.20	4.20
9	BYMH 13-3	0	1.13	1.37	1.40	1.67	2.47	2.50	2.53	2.73	3.20	3.40	3.63	3.80	3.97	3.97
10	BYMH 13-5	1.07	1.10	1.37	1.47	1.70	1.97	2.33	2.63	2.87	3.30	3.37	3.43	3.50	3.56	3.56
11	BYMH 13-7	0	1.13	1.47	1.40	1.60	1.90	2.23	2.40	2.60	3.10	3.20	3.43	3.67	3.73	3.73
12	P 3507	0	1.10	1.37	1.37	1.90	2.33	2.40	2.47	2.83	3.17	3.37	3.50	3.57	3.67	3.67
13	P 3502	0	1.13	1.47	1.40	1.67	1.97	2.13	2.37	2.53	3.03	3.13	3.17	3.23	3.30	3.30
14	P 740	0	1.17	1.33	1.43	1.50	2.33	2.40	2.47	2.63	2.80	3.07	3.37	3.53	3.67	3.67
15	Prabal	0	1.10	1.40	1.63	1.60	1.87	1.93	2.13	2.47	2.73	2.87	3.13	3.37	3.37	3.37

Max = Maximum per cent damaged plants: $\wp$ = 3.64; S.D. = 0.40

Table 8: Categorization of maize varieties/genotypes for their susceptibility against *C. partellus* based on per cent dead heart

Category of resistance	Scale	Varieties/genotypes
Highly Resistant (HR)	$X_i < 0.66$	-
Resistant (R)	$0.66 \leq X_i < 1.91$	GAYMH 1, HQPM 5
Moderately Resistant (MR)	$1.91 \leq X_i < 3.16$	GM 2, HQPM 1, P 3507, P 740,
Moderately Susceptible (MS)	$3.16 \leq X_i < 4.41$	BYMH 14-18, BYMH 14-20, BYMH 13-3, BYMH 13-7, P 3502, Prabal
Susceptible (S)	$4.41 \leq X_i < 5.66$	BYMH 14-21, BYMH 13-5, BYMH 14-22
Highly Susceptible (HS)	$X_i \geq 5.66$	-

SD = 1.25; X_i = 3.16

Conclusion

Overall, it can be concluded that on the basis of per cent damaged plants and leaf injury scale the maize varieties GAYMH 1, GM 2, HQPM 1, HQPM 5, P 3507, P 3502, P 740, Prabal were found moderately to highly resistant; BYMH 14-21, BYMH 13-7, BYMH 14-20 and BYMH 14-22 were susceptible to moderately susceptible. On the basis of per cent dead heart in genotypes/ varieties GAYMH 1, HQPM 1 found resistant; GM 2, HQPM 5, P 3507 and P 740 recorded moderately resistant; BYMH 14-20, BYMH 13-7, P-3502, BYMH 14-18, BYMH 13-3 and Prabal were found moderately susceptible; genotypes BYMH 14-22, BYMH 13-5 and BYMH 14-21 recorded susceptible. None of the varieties/genotypes were found highly resistant or highly susceptible to the pest.

The susceptibility to *C. partellus* was also reflected on per cent stem tunneling. The variety HQPM 5 and GAYMH 1 were found resistant, while BYMH 13-3 was found moderately susceptible on the basis of per cent stem tunneling. The grain yield is concerned, HQPM 1 (25.1 q/ha) and GAYMH 1 (24 q/ha) HQPM 5 (23.3 q/ha) were proved to be the high yielding varieties/genotypes of maize. The susceptibility of maize varieties/genotypes to *C. partellus* was studied by many workers *viz.*, Patel and Patel (2012) [11], Kanta and Kaur (2000) [5], Khan and Monobrullah (2003) [7], Patel (2005) [12], Shahzad *et al*. (2006), Arabjafari and Jalali (2007) [2], Afzal *et al*. (2009) [1] and Ngongwa (2011) [8] at different places. The present findings are in accordance with Rajsekhar and Srivastav (2013) [13] who reported that dead heart formation and leaf injury were higher in more susceptible genotypes than least susceptible genotypes. Ngongwa (2011) [8] reported GM 2 as moderately resistant to *C. partellus.* Screening of 10 varieties of *kharif* maize for their resistance to the maize stem borer, *C. partellus* was carried out at Anand on basis of per cent damaged plants and leaf injury scale. Maize varieties GAYMH 1 were found moderately to highly resistant Dindor *et al*., (2016) [4].

References

1. Afzal M, Nazir Z, Bashir MH, Khan BS *et al.* Analysis of host plant resistance and some genotypes of maize against *Chilo partellus* (Swinhoe) (Pyralidae : Lepidoptera). Pakistan Journal of Botany. 2009; 41(1):421-428.
2. Arabjafari KH, Jalali SK. Identification and analysis of host plant resistance in leading maize genotypes against spotted stem borer, *Chilo partellus* (Swinhoe). Pakistan Journal of Biological Science. 2007; 10(11):1885-95.
3. Atwal AS, Dhaliwal GS. Agricultural Pest of South Asia and Their Management. Kalyani Publishers, New Delhi. 2002, 189-192.
4. Dindor MU, Chaudhary RI, Patel RJ, Bharpoda TM *et al.* Screening of maize cultivar for resistance to maize stem borer, *Chilo partellus*. International Journal of Agricultural Science and Research. 2016; 6(5):233-242.
5. Kanta U, Kaur R. Response of maize germplasms to maize stem borer under field condition. Insect Environment. 2000; 6(2):91.
6. Khan BM. Effect of sowing date on the infestation of maize stem borer. Pakistan Journal of Agricultural Research. 1983; 4(2):139-140.
7. Khan MS, Monobrullah M. Preliminary screening of maize germplasm against maize stem borer, *Chilo partellus* Swinhoe at intermediate zone of Rajouri (J&K). Insect Environment. 2003; 9(1):45-46.
8. Ngongwa V. Morphological and biochemical basis of resistance to stem borer, *Chilo partellus* Swinhoe (Lepidoptera : Pyralidae) infesting forage maize *Zea mays* L. M.Sc (Agri.) Thesis (Unpublished), submitted to B. A. College of Agriculture, Anand Agricultural University, Anand, 2011.
9. Patel HK, Patel JR. Catalogue of Crop Pests of Gujarat State Technical Bulletin. 1970; 6:4-5.
10. Patel IS, Prajapati BG, Patel GM, Pathak AR *et al.* Response of castor genotypes to castor semi looper, *Achaea janata* Fab. J Oilseeds Res. 2002; 19(1):153.
11. Patel JR, Patel IS. Reaction of Certain Genotypes of Maize against Stem Borer, *Chilo partellus* Swinhoe. In: North Gujarat. Trends in Bioscience. 2012; 5(2):157-159.
12. Patel PJ. Bio-ecology and management of stem borer, *Chilo partellus* Swinhoe infesting maize. M. Sc. (Agri.) Thesis (Unpublished), submitted to B. A. College of Agriculture, Anand Agricultural University, Anand, 2005.
13. Rajsekhar L, Srivastav CP. Screening of maize genotypes against stem borer *Chilo partellus* in *kharif* season. International Journal of Applied Biology and Pharmaceutical Technology. 2013; 4(4):394-403.
14. Shahzad MA, Shaheen MS, Khan MTH, Iqbal B. *et al.* Field screening of promising cultivars of maize against shootfly, *Atherigona soccata* (Rond) and *Chilo partellus* (Swinhoe) during spring season. *Pakistan Entomologist.* 2006; 28(2):15-17.
15. Sharma PN, Gautam P. Assessment of yield loss in maize due to attack by the maize borer, *Chilo partellus* (Swinhoe). Nepal Journal of Science and Technology. 2010; 11:25-30.
16. Tefera T, Mugo S, Tende R, Likhayo P *et al*. Methods of screening maize for resistant to stem borer and post-harvest insect pests. CIMMYT, Nairobi, Kenya, 2013.