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Screening of maize hybrids against stem borer (*Chilo partellus*) Swinhoe at dryland agriculture research station, SKUAST- Kashmir

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Abstract
In order to study the screening of different maize Hybrids against Maize stem borer (*Chilo partellus*), a field experiment was conducted during Kharif 2022-23 at Dryland Agricultural Research Station, SKUAST-Kashmir. Among the different maize hybrids screened against *Chilo partellus*, FSCH-258 (1.83), BIO-9681 (3.23), FSCH-131 (3.89), BIO-9637 (4.24), Vivek-39 (4.77) and DKC9117 (5.65) were were found resistant to *Chilo partellus* while as HQPM-1 Hybrid (8.68) was found susceptible to *Chilo partellus*. The remaning hybrids tested showed intermediate position and were considered as moderately susceptible.

Keywords: Indian mustard, path coefficient analysis

Introduction
Maize is an important cereal crop known as Queen of cereal s grown on approximately 140 million Hectares under diverse climatic conditions worldwide. Maize is attacked by over 250 species of Insect pests (Mathur, 1991) [7]. Of these three species of tissue borers *viz*., Maize stem borer (*Chilo partellus*), Pink stem borer (*Sesamia inference* Walker), Shootfly (*Atherigona soccata* Rondani) are regular and serious pests of Maize usually appears 10-15 days after sowing leading to a loss from 5.14 to 91.22 (Singh and Sajjan, 1982) [8]. Stem borer cause (*Chilo partellus*) causes severe losses in field condition and reported from 26.7 -80.4 % yield losses in different Agro-climatic regions of India (Panwar, 2005) [9]. Stem borer is the Key pest of Kharif maize and most ubiquitous in nature cause severe damage to the various cereal crop from seedling to maturity during different development stages. The larvae bore inside the plant Whorl and cut the growing tip of the central shoot, producing dead hearts (Kumar and Asino, 1993) [10]. *Chilo partellus* is one of the biotic constraints in successful Maize and Sorghum production worldwide (James, 2003) [11] particularly in Asia and Africa (Siddiqui and Marwaha, 1993) [12].

Materials and Methods
The Experiment was conducted at Dryland Agriculture Research station during 2021-22 in an RBD design with 15 number of treatments and replicated thrice. The Maize seeds of different hybrids were sown in plot size of 3mx4m with plant to plant distance of 25 cm and row to row distance of 60 cm. After 20 days of germination (DAG) and 40 days after germination (DAG), Plants were observed for level of infestation. Symptoms like leaf injury rating on 1-9 scale and dead heart percent was recorded. The observation were recorded on randomly selected plants. The percentage of dead hearts were calculated on the basis of total plant observed. The categorization of Maize hybrids on the basis of L I R was done on the basis of scale given by CIMMYT.

Table 1: Leaf injury scale for scoring intensity of damage on leaves (CIMMIYT).

S. No	Visual rating of damage	Numerical score	Resistance reaction
1	No damage	0	Extremely resistant
2	Few pin hole on 1-2 leaves	1	Highly resistant
3	Few small holes on few leaves	2	Resistant
4	Few leaves with several small holes	3	Resistant
5	Several leaves with holes	4	Moderately resistant
6	Few leaves with elongated lesions	5	Moderately resistant
7	Several leaves with elongated lesions	6	Moderately resistant
8	About half of leaves with long lesions /tattering	7	Susceptible
9	Most of leaves with long lesions or severe tattering	8	Highly susceptible
10	Most leaves with long lesions or lodged or plant dying due to severe damage	9	Extremely susceptible

Results and Discussion

The analysis of results showed that Minimum leaf injury rating was recorded (L I R 1-9 Scale) in FSCH-258 with 1.53 at 20 DAG and 2.14 at 40 DAG (Table 2) followed by Bio 9681 with 2.60 at 20 DAG and 3.87 at 40 DAG, FSCH-131 with 3.75 at 20 DAG and 4.03 at 40 DAG, Bio 9637 with 4.40 at 20 DAG and 4.08 at 40 DAG, Vivek -39 with 4.47 at 20 DAG and 5.08 at 40 DAG and DKC 9117 with 5.4 at 20 DAG and 5.90 at 40 DAG. The Maximum leaf injury rating was recorded in HQPM-1 with 8.59 at 20 DAG and with 8.98 at 40 DAG in both the years.

The Hybrids FSCH-258, Bio 9681, FSCH-131 BIO -9637, Vivek-39 and DKC-9117 were categorized as resistant against *Chilo partellus*, wheras other Hybrids (Tab 2 and 3) were recorded as moderately susceptible to Chilo partellus. The minimum dead heart percent were recorded in FSCH-258 with 1.87 (20 DAG) and 2.85 (40 DAG) in both the years followed by Bio-9681 with 2.94 (20 DAG) and 4.76 (40 DAG), FSCH-131 with 3.75 at 20 DAG and 4.03 at 40 DAG, Bio-9637 with 3.41 (20 DAG) and 4.87 (40 DAG), Vivek-39 with 4.47 at 20 DAG and 5.08 at 40 DAG and DKC 9117 with 5.4 at 20 DAG and 5.90 at 40 DAG. (Table 3.). The maximum dead heart percent was recorded in HQPM-1 with 26.48 (20 DAG) and 29.26 (40 DAG) in both the years (Table 3).

The results of the studies have been discussed in detail and the literature pertaining to the finding have been well cited. The screening of the Maize cultivars against *Chilo partellus* on the basis of leaf injury rating and dead heart percent have been discussed in the light of earlier findings. The results of Kundu also support the present findings.

He conducted trial in Somalia on 20 Maize cultivars for resistance against Maize stem borer on the basis of leaf injury rating, dead hearts and stem tunneling and identified least susceptible cultivars.

Vishvendra *et al*. (2017) reported 15 Maize cultivars against *Chilo partellus* on the basis of dead heart percent, pest infestation and leaf injury rating and found PMH-117, BULUND and BIO-9681 cultivars recorded moderately resistant with minimum and maximum dead hearts was recorded in PMH 117 (5.33) and Hybrid Maduri (9.66) respectively after 45 days of Maize sowing which support our present findings.

Table 2: Effect of Maize stem borer (*Chilo partellus*) on mean leaf injury rating (L I R) 1-9 scale at different Hybrids of Maize.

S. No	Treatment	Kharif 2021 (20 DAG)	Kharif 2022 (20 DAG)	Pooled	Kharif 2021 (40 DAG)	Kharif 2022 (40 DAG)	Pooled
1	Vivek-45	7.20	7.21	7.20	7.20	7.25	7.22
2	VPKAS, Almora	7.12	7.22	7.17	7.18	7.25	7.21
3	DKC 9117	5.80	5.00	5.4	5.86	5.95	5.90
4	FSCH-131	3.78	3.73	3.75	3.95	4.12	4.03
5	VIVEK-QPM-9	6.88	7.00	6.94	6.98	7.13	7.05
6	FSCH-258	1.50	1.56	1.53	1.95	2.33	2.14
7	HM-4	7.01	7.11	7.06	7.35	7.99	7.67
8	BIO-9637	4.05	3.75	4.40	3.94	4.22	4.08
9	BIO-9681	2.68	2.53	2.60	4.52	3.22	3.87
10	VIVEK-39	4.48	4.47	4.47	4.95	5.22	5.08
11	HQPM-4	6.88	7.25	7.06	7.12	7.15	7.13
12	DKC-8101	7.88	7.90	7.89	7.00	7.12	7.06
13	HQPM-1	8.57	8.62	8.59	8.77	8.92	8.84
14	HQPM-5	6.77	6.81	6.79	7.22	7.01	7.11
15	NMH -1247	6.87	7.33	7.10	7.12	7.15	7.13
	C D (0.05)	0.36	0.47		0.62	0.77	

Table 3: Effect of Maize stem Borer infestation on mean dead heart % of different Hybrids of Maize.

S.NO	Treatment	Kharif 2021 (20 DAG)	Kharif 2022 (20 DAG)	Pooled	Kharif 2021 (40 DAG)	Kharif 2022 (40 DAG)	Pooled
1	VIVEK-45	14.60	14.87	14.73	16.20	16.80	16.50
2	VPKAS, Almora	8.20	8.33	8.26	8.60	8.79	8.69
3	DKC 9117	11.56	11.92	11.74	14.10	14.60	14.35
4	FSCH-131	2.17	2.55	2.36	3.00	3.15	3.07
5	VIVEKQPM-9	21.10	21.60	21.35	23.11	23.88	23.49
6	FSCH-258	1.78	1.96	1.87	2.80	2.90	2.85
7	HM-4	11.80	12.10	11.95	18.25	18.88	18.56
8	BIO-9637	3.15	3.68	3.41	4.78	4.96	4.87
9	BIO-9681	2.90	2.98	2.94	4.60	4.92	4.76
10	VIVEK-39	3.95	4.12	4.03	4.12	4.33	8.45
11	HQPM-4	13.20	13.71	13.45	15.10	15.25	15.17
12	DKC-9117	13.80	14.10	13.95	21.12	22.40	21.76
13	HQPM-1	26.00	26.96	26.48	29.00	29.52	29.26
14	HQPM-5	18.20	19.00	18.60	15.03	15.48	15.25
15	NMH1247	13.55	13.80	13.67	14.22	14.33	14.27
	C. D (0.05)	0.15	0.22		0.16	0.12	

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