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SCREENING OF ELITE BREAD WHEAT GERMPLASM AGAINST SHOOT *FLY ATHERIGONA APPROXIMATA* MALLOCH

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ABSTRACT

Shoot flies (Diptera: Muscidae) of *Atherigona* spp. are the major insect pests in several cereals and millets causing significant yield loss. Usually, bread wheat (*Triticum aestivum* L.) is less attacked by insect pest, however under changed climate-pest scenario, shoot fly has become a major insect pest. Present study observed the shoot fly *Atherigona approximata* Malloch as major species under wheat ecosystem. Among the 30 wheat genotypes screened, none of them were found to be highly resistant except for two advanced ones, UAS BW-12417 and UAS BW-11110 found resistant (3.13 and 5.00% deadheart). By this screening, 16 entries are categorised as moderately resistant, eight are grouped under susceptible and four genotypes are classified as highly susceptible.

Key words: *Atherigona approximata,* deadheart, frequency, *Triticum aestivum,* wheat, genotypes, screening, category, resistance, susceptibly highly susceptible

Bread wheat (*Triticum aestivum*) is a worldwide staple food occupying the largest cultivable area among the food grain crops (222.68 m ha) with production of about 756 mt (Anon., 2020). In India, wheat is the second major cereal crop next to rice with a total production of 107.18 mt from 31.05 million ha and productivity of 3.5 t/ ha (Anon., 2020). The main wheat-growing states in India includes Uttar Pradesh, Madhya Pradesh, Rajasthan, Punjab, Maharashtra, Haryana, Bihar, Karnataka, Gujarat and Uttarakhand (Ramadas et al., 2019). Karnataka state has a unique way of wheat cultivation where the major three cultivated species are being grown in hot tropical climate which is characterized by high temperature during the crop growth. It is one of the important rabi crop grown under both rainfed and irrigated condition in northern Karnataka with the annual production of about 2.3 lakh mt from 1.93 lakh ha (Anon., 2019), but the productivity is very low (1193 kg/ ha). It is due to several reasons and includes the insect pests like termites, aphids and shoot fly. The peak infestation of shoot fly was noticed in irrigated belts of Karnataka than in the rainfed crop. Therefore, present study evaluated some genotypes to identify the resistant germplasm.

MATERIALS AND METHODS

The field experiment on genotype screening was conducted at the Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad (15.4889° N, 74.9813° E) during rabi 2019-20 under the All India Coordinated Research Project (AICRP) on wheat in irrigated condition. Totally, 30 genotypes were evaluated, with each germplasm sown in two rows of 3 m length with 23 cm spacing (row to row). All the package of practices were adopted except plant protection measures and observations on deadheart due to shoot fly made from two rows at 15 days after emergence (DAE) and 30 DAE, and % deadheart computed and the genotypes were categorised adopting the scale used by Kalappanavar et al. (2010). The mean and standard deviation were calculated by using IBM-SPSS software 23.

RESULTS AND DISCUSSION

The data on deadheart recorded at 15 and 30 days after emergence (DAE) of wheat revealed significant difference among the genotypes with respect to deadheart incidence both at 15 and 30 DAE. The evaluated genotypes were categorised into highly resistant (Mean – 2SD), resistant (Mean – SD), moderately resistant (Mean), susceptible (Mean + SD) and highly susceptible (Mean + 2SD) based on deadheart incidence. Among 30 genotypes screened, none were found highly resistant (deadheart score below -1.49%); two advanced genotypes, UAS BW-12417 and UAS BW-11110 were found to be resistant (3.13 and 5.00%). Sixteen entries were moderately resistant, and eight were found to be susceptible. Four

Table 1. Deadheart incidence due to *A. approximata* and categorisation of wheat genotypes (rabi 2019-20)

S. No.	Germplasm	Deadheart (%)		
		15 DAE	30 DAE	Mean
1	DWR-162	13.39	24.55	18.97
2	MACS-2496	7.78	13.89	10.83
3	GW-322	10.48	19.05	14.76
4	UAS-342	4.92	7.38	6.15
5	MACS-6222	8.75	15.83	12.29
6	UAS-334	9.14	16.57	12.86
7	DBW-168	12.33	21.92	17.12
8	HD-3090	9.68	16.67	13.17
9	NIAW-1415	6.32	10.53	8.42
10	UAS-347	11.43	20.00	15.71
11	UAS-304	20.63	36.83	28.73
12	UAS BW-10486	6.25	9.38	7.81
13	UAS BW-10237	13.24	23.53	18.38
14	UAS BW-11430	6.77	10.53	8.65
15	UAS BW-11371	7.14	13.39	10.27
16	UAS BW-11114	6.25	8.75	7.50
17	UAS BW-11110	3.85	6.15	5.00
18	UAS BW-11142	7.81	15.63	11.72
19	UAS BW-11048	18.42	33.33	25.88
20	UAS BW-11256	14.81	26.54	20.68
21	UAS BW-11257	15.49	26.76	21.13
22	UAS BW-12711	6.48	11.11	8.80
23	UAS BW-12707	6.35	9.52	7.94
24	UAS BW-12417	3.13	3.13	3.13
25	UAS BW-12309	10.32	17.46	13.89
26	UAS BW-12436	4.41	7.35	5.88
27	UAS BW-12373	6.45	9.68	8.06
28	UAS BW-12407	5.75	8.05	6.90
29	UAS BW-12409	4.81	7.69	6.25
30	UAS BW-12432	7.94	11.11	9.52
	Mean ± SD	9.09 ± 4.55	15.77 ± 9.40	12.43 ± 6.96

Categorisation

S. No.	Category	Score	Genotypes	
1	Highly resistant [HR] (Mean – 2 SD)	-1.49	Nil	
2	Resistant [R] (Mean – SD)	-1.50 to 5.47	UAS BW-12417, UAS BW-11110	2
3	Moderately resistant [MR] (Mean)	5.48 to 12.43	UAS BW-12436, UAS 342, UAS BW-12409, UAS BW-12407, UAS BW-11114, UAS BW-10486, UAS BW-12707, UAS BW-12373, NIAW-1415, UAS BW-11430, UAS BW-12711, UAS BW-12432, UAS BW-11371, MACS-2496, UAS BW-11142, MACS-6222	16
4	Susceptible [S] (Mean + SD)	12.44 to 19.39	UAS-334, HD-3090, UAS BW-12309, GW-322, UAS-347, DBW-168, UAS BW-10237, DWR-162	8
5	Highly susceptible [HS] (Mean + 2 SD)	19.40 to 26.35	UAS BW-11256, UAS BW-11257, UAS BW-11048, UAS-304	4

DAE: Days After Emergence; Mean: 12.43; SD: 6.96

wheat genotypes were confirmed as highly susceptible (UAS BW-11256- 20.68%; UAS BW-11257- 21.13%; UAS BW-11048 -25.88%; and UAS-304 (SC)- 28.73%) (Table 1).

In wheat, there is a scanty research and literature pertaining to utilisation of resistant germplasms to tackle shoot pests like shootfly which has been a minor pest. But now, it is attaining major pest status (Jambagi et al., 2021). In the earlier reports (Anon., 2008; Anon., 2009), PBW-550 and K- 0343 wheat genotypes were found to be promising against shoot fly when they tested in three locations for three seasons. Among the 41 varieties screened by Kalappanavar et al. (2010), HI-8682, HP-1913, HI-8680 and HD-2987 genotypes were found to be resistant against shoot fly *Atherigona oryzae*. Kumar et al. (2010) concluded that NIDW-309, HW-3070, PBW-525, MACS-6165, NIDW-295, AKDW-2997-16, PBW-52 were categorised as resistant against shoot fly, *Atherigona naqvii*.

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AUTHOR CONTRIBUTION STATEMENT

SRJ and DNK together planned the experiment, executed, analyzed and prepared the draft. Both the authors read and approved the manuscript.

CONFLICT OF INTEREST

No conflict of interest.

REFERENCES

Anonymous. 2008. Crop Protection Report, Directorate of Wheat Research, Karnal, p. E-4.

Anonymous. 2009. Annual Report. Directorate of Wheat Research, Karnal. p.1.

Anonymous. 2019. Ministry of Agriculture and Farmers Welfare, Govt. of India.

Anonymous. 2020. World agricultural production report. United States Department of Agriculture. p. 21.

Jambagi S R, Kambrekar D N, Mallapur C P, Naik VR. 2021. Status of shoot fly (*Atherigona* spp.) incidence in wheat in major wheat growing districts of North Karnataka. Journal of Pharmaceutical Innovation SP-10 (11): 2032-2035.

Kalappanavar I K, Patil R K, Babu K S. 2010. Evaluation of elite wheat genotypes against shoot fly (*Atherigona oryzae* Malloch). Karnataka Journal of Agricultural Sciences 23(4): 656-657.

Kumar J, Kanchan C, Bahar J, Singh N B, Shukla I N, Singh D K, Sing R. 2010. Screening of wheat varieties against shoot fly (*Atherigona naqvii* Steyskal), Current Advances in Agricultural Sciences 2(1): 57-58.

Ramadas S, Kirankumar T M, Singh G P. 2019. Wheat production in India: Trends and prospects. Recent Advances in Grain Crops Research 1: 1-16.

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