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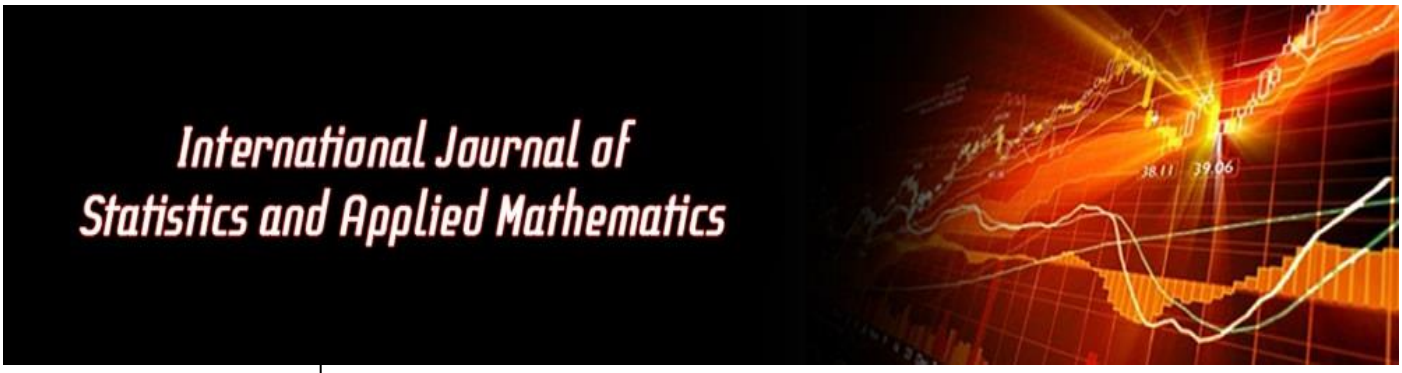

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Varietal evaluation of sorghum cultivars against lepidopteran insect pests of sorghum

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Abstract
Studies were carried out on to study the performance of promising lines against the lepidopteran insect pests of sorghum at Sorghum Research Station, VNMKV, Parbhani during *Kharif* 2019-2020. Experiment was laid out in unprotected condition with two rows of 4m length with 45 x 15 cm spacing in to evaluate around 24 (Kharif B and R lines). Different lines of sorghum were sown in randomized block design, all these entries screened against lepidopteran insects pests of sorghum. The observations on damaged plants and number of larvae were recorded from each plot at weekly interval. The dead hearts caused by stem borer *Chilo partellus* revealed that minimum percentage of dead hearts were observed in genotypes 42 whereas the maximum percentage of dead hearts were indicated among the genotype susceptible to DJ6514 check (64.29) The lowest larval population of earhead worm on genotype 42 B was recorded which was at par with genotype KR 215, KR 199, 28 B, KR 125 and 99 B. Whereas the higher larval, observed in the susceptible control genotype DJ6514, was significantly higher than that of the remaining genotypes.

Keywords: Stem borer, earhead worm, sorghum, lines and screening

Introduction
Sorghum is an important crop of resource poor, small and marginal farmers in semi-arid regions. The rainy season (Kharif) sorghum grain is used both for human consumption and livestock feed and post-rainy season (Rabi) produce is used primarily for human consumption in our country. Thus, it is the key for the sustenance of human and livestock population. However, the area under sorghum in India has declined drastically from 10.25 m ha in 1999-2000 to 5.82 m ha in 2014-15. The total production also declined from 8.68 m t to 5.39 m t. whereas, the productivity has increased from 847 kg /ha to 907 kg /ha during the same period mainly due to adoption of improved production technologies by the farmers (Anonymous 2023) [1]. In India sorghum occupies area was 4.96 million hectares with production of 4.95 million tones and productivity of 998kg/ha. In Maharashtra region during 2017-18 area was 4.10 lakh hectares with production of 4.17 and productivity of 1018 kg/ ha. In Marathwada predominant kharif sorghum growing districts are Parbhani, Nanded, Latur and Hingoli, (Annonymous 2018). Large number of factors are responsible for low productivity, out of which insect-pests and diseases are among major constrains. Nearly 150 pest species have been reported as pests of sorghum worldwide (Harris, 1995) In Maharashtra, about 18 important insect pests have been recorded on sorghum crop but very few have economic importance. But over a dozen insect pests such as stem borer *Chilo partellus*, Swinhoe, army worm *Mythimna separata*, fall army worm *Spodoptera frugiperda*, (J. E. Smith) gram caterpillar and ear head caterpillar *Helicoverpa armigera* Hubner are important lepidopteran insect pests and constitute a major constraint in sorghum production. Among the important sorghum earhead insect-pests damaging sorghum reported are sorghum midge, earhead bugs and earhead caterpillars. Earhead caterpillar (*H. armigera* Hubner) is one of the serious polyphagous pest attacking more than 180 plants. The caterpillar cause major damage to the crops as it attacks reproductive parts and growing tips. The damaged ears have chalky appearance. The management of *H. armigera* is very difficult in many crops, including sorghum, cotton, pigeon pea, and relies heavily on the use of chemical insecticides (Romeis *et al*., 1999) [10].

Balikai and Sajjanar, (2012) [11] has stated that spotted stem borer, (*C. partellus*, Swinhoe) infests the sorghum crop from second week till maturity. Initially, the larvae feed on the axial surface of the whorl leaves, leaving the lower surface intact as transparent windows. As the severity of the feeding increases, the plant becomes ragged in appearance. When the larvae damage the growing point, typical deadheart symptom develops in younger plants (The entire whorl dries up) and also pinholes on the whorl of newly opened leaves are seen. Subsequently, the older larvae leave the whorl and bore into the stem at the base resulting in extensive tunneling. Peduncle tunneling results either in its breakage or complete or partial chaffy panicles affecting grain development. The yield losses of 55 to 83 per cent due to stem borer infestation have been recorded in Northern India in sorghum by Jotwani and Young (1971) [12]. Seshu Reddy (1988) [12] observed even up to 88 per cent loss due to C. *partellus*, Swinhoe in sorghum.

For the management of pests, farmers mostly rely on synthetic insecticides. The indiscriminate use of insecticides causes the development of resistance in insects. It is therefore important to take advantage of supporting studies such as host plant resistance to pests.

Therefore considering above and the importance of major pests of *kharif* sorghum under field condition, the investigation on screening the promising lines or varieties against the lepidopteran insect pests of sorghum were undertaken.

Materials and Methods

Experimental details of the material used, methods adopted during the course of experimentation during Rabi 2018-19 at the experimental farm of Department of Agril. Entomology, Vasantaro Naik Marathwada Krishi Vidyapeeth, Parbhani.

For seasonal incidence the experiment was conducted in unprotected condition with net plot size 10 x 10 m^2 which will be non-replicated and divided in four quadrants. The seeds of variety komal were sown by dibbling, two to three seeds per hill were dibbled and covered with thin layer of moist soil and with seed rate of 15-20 kg /ha. The sowing was done on 12th December, 2018. Five plants or 1 m row was randomly selected from each quadrant for recording pest wise observations. All recommended agronomical practices were followed from time to time to raise the crop successfully to have full benefits. Observation on aphids recorded by entering the field from the corner and observed 10 plants randomly moving diagonally at regular intervals and counted the number of aphids present on one top, middle and bottom leaf with the help of the 25m^2 quadrant and calculated the population of aphid per plant. Weekly data on different weather parameters during experimental period was collected from central meteorological observatory of VNMKV, Parbhani. The data obtained was averaged. Then it was subjected to statistical analysis after suitable transformation for interpretation of the results. The correlation and stepwise regression was done using SAS software.

Results and Discussion

Seasonal incidence of aphids on maize

In present investigation number of aphid/3 leaf was recorded from 50th MW (10-16 DEC) to 14th MW (12-18 MAR). The aphid incidence was ranged from 00 –48.9 aphids/3 leaf. The first appearance of aphid was observed on 1st MW (01-07 Jan) i.e 18.3 aphids/3leaf. However the aphid incidence increased significantly for next two MW and reached at its peak at 3rd MW (15-21 JAN) i.e. 48.9 aphids/3 leaf. However from 4th MW aphid population started in declining order i.e. 41.2 aphids/ 3leaf. The least aphid incidence was observed on 11th MW (12-18 MAR) i.e. 0.0 aphids/3leaf as crop was in maturity stage. After 11th MW (12-18 MAR) aphid incidence was not noticed.

Correlation between weather parameters and aphids on maize

In present piece of investigation, the maize aphid population showed non- significant negative correlation with maximum temperature (r= -0.213) and minimum temperature (r= -0.306). While morning relative humidity (r= 0.493) and evening relative humidity (r= 0.303) showed significant positive correlation with aphid population (Table No. 2)

The present finding are more less parallel to the finding of other workers like Ramesh *et al.* (2019) [5] During *Rabi* the aphid population ranged from 1.20 to 79.57 aphids per leaf and it was significant and positively correlated with the maximum and minimum temperature, rainfall and maximum relative humidity. Whereas, minimum relative humidity shows a non-significant negative correlation with the aphid population.

Singh *et al*., (2018) [8] Results of the study revealed that, *R. maidis* population was maximum during 3rd week of September (38th SMW) with 17.1 aphid per plant.

Sidar *et al*., (2015) [7] Results showed that during the crop growing season, the incidence of black aphid (*Rhopalosiphum maidis*) was seen on maize crops. The average peak black aphid population (30 plants^{-1}) was recorded in the third week of September.

Table 2: Seasonal incidence of aphid (*Rhopalosiphum maidis*) on maize

Sr. No	SMW	Period	Humidity (%)		Temperature (°C)		No. of Aphid/3 Leaf
			RH1	RH2	Max	Mini	
1	50	10-16 Dec	75	34	29.5	13.5	0
2	51	17-23 Dec	76	34	27.4	9.9	0
3	52	24-31 Dec	75	20	27.9	8.3	0
4	1	01-07 Jan	75	19	30.4	7.9	18.3
5	2	08-14 Jan	76	28	29.5	9.5	45.7
6	3	15-21 Jan	77	25	31.0	11.0	48.9
7	4	22-28 Jan	75	37	30.1	13.8	41.2
8	5	29-04 Feb	76	22	29.4	10.7	36.5
9	6	05-11 Feb	73	20	30.8	9.8	27.0
10	7	12-18 Feb	73	21	33.7	13.1	19.6
11	8	19-25 Feb	70	19	36.4	16.2	10.3
12	9	26-04 Mar	55	15	29.9	12.5	4.2
13	10	05-11 Mar	65	15	35.5	14.9	2.5
14	11	12-18 Mar	63	15	38.1	18.8	0.0
		Correlation Coefficient @ 5%	0.493	0.303	-0.213	-0.306	

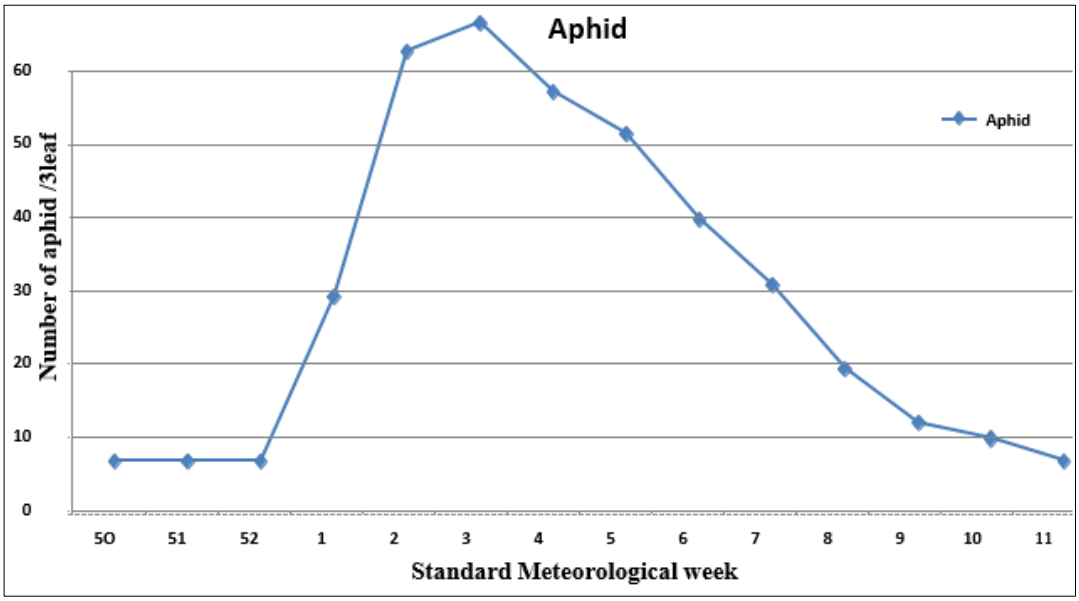

Fig 2: Seasonal incidence of aphid on maize

Conclusion

The population of aphid ranged between 0 – 48.9 per three leaf respectively and first appearance was noticed in 1st SMW whereas reached at its peak at 3rd SMW (15-21 JAN) i.e. 48.9 aphids/3leaf. In present piece of investigation, the maize aphid population showed non- significant negative correlation with maximum temperature (r= -0.213) and minimum temperature (r= -0.306). While morning relative humidity (r= 0.493) and evening relative humidity (r= 0.303) showed significant positive correlation with aphid population.

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