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Seasonal incidence of maize aphids and it's correlation with weather parameters

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Abstract
Studies were carried out on seasonal incidence of aphids of maize at the Department of Agricultural Entomology, College of Agriculture, Parbhani during *Rabi* 2018.Experiment was laid out in unprotected condition with net plot size 10 x 10 m2 in non-replicated and divided in four quadrants. Five plants or 1 m row was randomly selected from each quadrant for recording aphids observations. 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. The analysis brought out correlation with weather parameters of aphid showed non-significant negative correlation with maximum temperature and minimum temperature while morning relative humidity and evening relative humidity showed significant positive correlation with aphid.

Introduction

Maize (*Zea mays* L) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. Maize can be grown successfully in variety of soils ranging from loamy sand to clay loam. However, soils with good organic matter content having high water holding capacity with neutral pH are considered good for higher productivity. Being a sensitive crop to moisture stress particularly excess soil moisture and salinity stresses; it is desirable to avoid low lying fields having poor drainage and also the field having higher salinity. Therefore, the fields having provision of proper drainage should be selected for cultivation of maize. It is cultivated on nearly 150 m ha in about 160 countries having wider diversity of soil, climate, biodiversity and management practices that contributes 36% (782 m t) in the global grain production. Maize in India, contributes nearly 9% in the national food basket. In addition to staple food for human being and quality feed for animals, maize serves as a basic raw material as an ingredient to thousands of industrial products that includes starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries etc. The maize is cultivated throughout the year in all states of the country for various purposes including grain, fodder, green cobs, sweet corn, baby corn, popcorn in peri-urban areas. The predominant maize growing states that contributes more than 80% of the total maize production are Andhra Pradesh (20.9%), Karnataka (16.5%), Rajasthan (9.9%), Maharashtra (9.1%), Bihar (8.9%), Uttar Pradesh (6.1%), Madhya Pradesh (5.7%), Himachal Pradesh (4.4%). Apart from these states maize is also grown in Jammu and Kashmir and North-Eastern states. Hence, the maize has emerged as important crop in the non-traditional regions i.e. peninsular India as the state like Andhra Pradesh which ranks 5th in area (0.79 m ha) has recorded the highest production (4.14 m t) and productivity (5.26 t ha^{-1}) in the country although the productivity in some of the districts of Andhra Pradesh is more or equal to the USA. Though the productivity in India is almost half of the world the average per day productivity of Indian maize is at par with many lead maize producing countries. The United States of America (USA) is the largest producer of maize contributes nearly 35% of the total production in the world and maize is the driver of the US economy. The USA has the highest productivity (> 9.6 t ha^{-1}) which is double than the global average (4.92 t ha^{-1}). Whereas, the average productivity in India is 2.43 t ha^{-1} In India, maize is the third most important food crops after rice and wheat. Mainly during Kharif season which

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covers 80% area. (Anonymous 2023)
Large number of factors are responsible for low productivity, out of which insect-pests and diseases are among major constrains.

In India, about 13.2 percent economical yield losses have been reported due to insect pest attack and diseases incidence. Maize is attacked by about 139 species of insect pests with varying degree of damage; however, only about a dozen are quite serious. Economically important pest is corn leaf aphid *Rhopalosiphum maidis* (Fitch) causing considerable yield loss. Lisowicz (2001) [3] reported that aphids is one of the major pests responsible for damage to maize. Feeding of aphids disturbs water transport in plants, which is extremely dangerous in periods of draught, and decreases the level of chlorophyll in tissues, which in turn affects photosynthesis and nutrient uptake by plants (Mrowczynski *et al*., 2004, Sytykiewicz *et al*,. 2013) [4, 9]. The indirect harmfulness of aphids is associated with the fact that by sucking tissue fluids they increase plant susceptibility to infection of pathogens (Lisowicz 1996) [2]. Some aphid species can also be vectors for viruses infecting maize plants e.g. maize dwarf mosaic virus (MDMV) and also viruses infecting cereals e.g. barley yellow dwarf virus (BYDY).

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 population dynamics studies that provide accurate estimates of field population densities of pests that are primarily required for pest management. It also gives an understanding of population trends and seasonal activities.

Therefore, current studies have been planned to study seasonal incidence and correlation aphids on maize with weather parameter.

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.
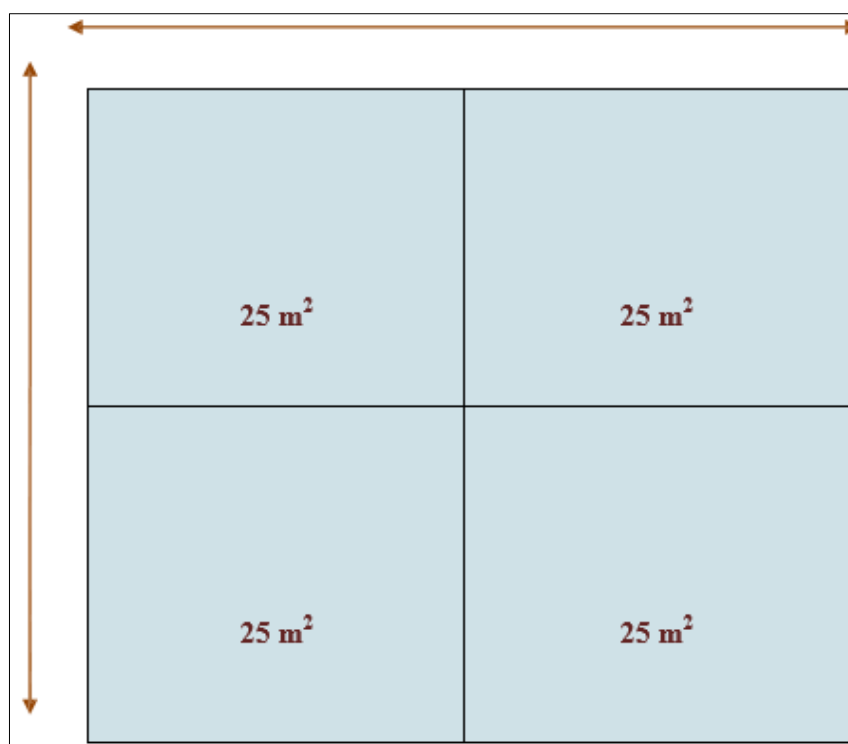

Fig 1: Experimental plot for seasonal incidence

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 25m2 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/ 3 leaf. 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	
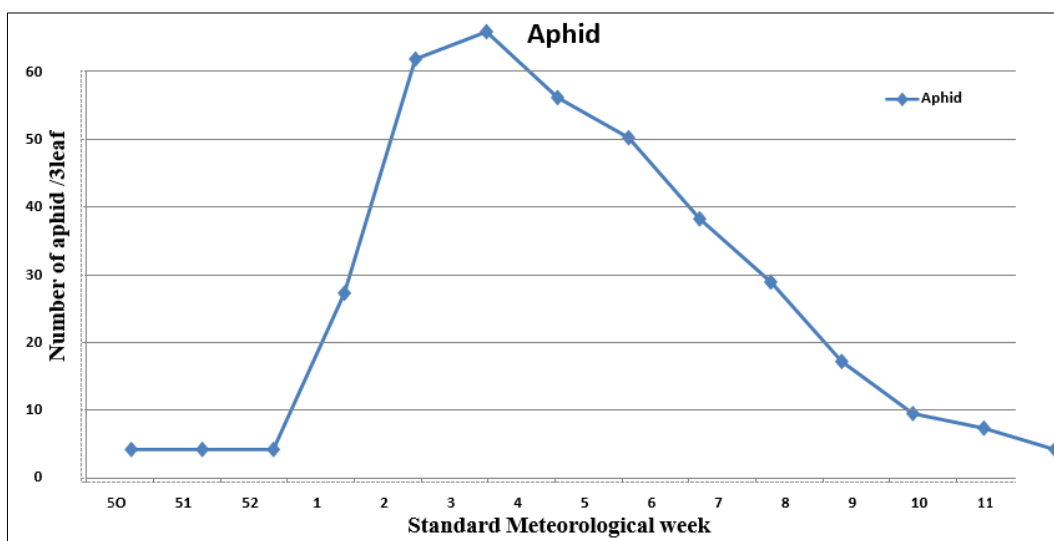
Fig 2: Seasonal incidence of aphid on maize

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.

References

1. Anonymous 2023 https://farmer.gov.in/
2. Lisowicz F. Teoretyczne i praktyczne podstawy zastosowań metod integrowanych w ochronie kukurydzy przed szkodnikami. Prace Nauk. Inst. Ochr. Roślin. 1996;36(1/2):5-46.
3. Lisowicz F. The occurrence of economically important maize pests in south-eastern Poland. J Plant Prot Res. 2001;4(3):250-255.
4. Mrówczyński M, Boroń M, Wachowiak H, Zielińska W.

Atlas szkodników kukurydzy. Poznań: Wyd. Inst. Ochr. Roślin; c2004. p. 78.

5. Ramesh M, Maradi K, Rajashekharappa K, Shivanna BK, Veeranna HK, Nagarajappa Adivappar. Seasonal incidence of aphid, Aphis craccivora (Koch) infecting yard long bean, Vigna unguiculata sub spp. sesquipedalis. Int J Curr Microbiol App Sci. 2019;8(12):2197-2203.

6. Sidar, Sonali Deole, Yadu YK, Ganguli RN. Seasonal incidence of major insect pests in maize crop (*Zea mays* L.) under Chhattisgarh Plains. Trends in Biosciences. 2015;8(18):4848-4854.

7. Singh, Jaglan MS. Seasonal incidence of different insect-pests in Kharif maize. J Pharmacogn Phytochem. 2018;7(3):3666-3669.

8. Sytykiewicz H, Czerniewicz P, Sprawka I, Krzyżanowski R. Chlorophyll content of aphid-infested seedling leaves of fifteen maize genotypes. Acta Biol Cracov. ser. Bot. 2013;55(2):51-60.