

# Seasonal incidence of insect pests and their natural enemies on maize



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## SUMMARY

The higher number of shoot fly eggs per leaf was noticed during the month of September, March and April (3.00 eggs/sq cm leaf area). The higher number of pin holes due to stem borer was noticed during the months of August and lower during the months of December and June. Similarly, maximum deadhearts due to stem borer were noticed during the month of July (62%) and minimum during the month of June, December and January (32%). The peak population of aphids was observed during the month of April, but least activity of aphids was recorded during the months of November and December. The peak activity of hairy caterpillar was noticed only during the August irrespective of different dates of sowing. Higher larval population of cobworm was noticed during April, while lower population was during June. Correspondingly, maximum damage by cobworm was during February and minimum damage was observed during June.

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## Key words :

Seasonal incidence, Maize pests, Resistance, Susceptible

Maize (*Zea mays* L.) is one of the most important cereal crops in the world's agricultural economy both as a food and fodder crop. Maize grains are used for human consumption, as feed for poultry birds and livestock, for extraction of edible oil and also for starch and glucose industry. The countries with large maize growing areas include Argentina, Brazil, China, Hungary, India, Indonesia, Italy, Mexico, Philippines, South Africa, Rumania, United States and Yugoslavia. It was introduced to India from Central America in the beginning of seventeenth century. It is a miracle crop with very high yield potential. In India maize is grown over an area of 8.26 million ha with an annual production of about 19.31 million tonnes and an average productivity of about 1900 kg/ha.

Important maize growing states in India are Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Karnataka, Punjab, Rajasthan, and West Bengal. In Karnataka, maize occupies an area of 9.60 lakh ha with annual production of about 27.20 lakh tonnes and an average productivity of 2833 kg/ha (Anonymous, 2009). Presently, maize

cultivation is gaining importance in Karnataka particularly in rainfed tracts of northern and southern transitional zones due to its increasing demand as animal feed and raw material for industry. Therefore, there is a need to explore the possibilities of increasing the productivity through better understanding of constraints in its production.

## MATERIALS AND METHODS

Field experiment was conducted to seasonal incidence of insect pests and their natural enemies on maize at the Agricultural Research Station, Bagalkot. The crop was raised by staggered sowing at monthly interval over an area of 5 guntas in ARS, Bagalkot during 2008-09 to record the incidence of pests at fortnightly interval through out the year. On 15<sup>th</sup> day for shoot fly, 30<sup>th</sup> day for aphids, 45<sup>th</sup> day for stem borer, 60<sup>th</sup> day for armyworm, 75<sup>th</sup> day for cob worms and hairy caterpillars. Similarly, the natural enemies were also collected on maize pests, by confirming their feeding habit and host-range. Incidence of the stem borer, aphids, shoot fly, armyworm, cobworm and hairy caterpillar was recorded

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by using set standard procedure. Maize was sown throughout the year at monthly interval, commencing from 24 June 2008 in an area of 5 guntas.

Observations were commenced after 15 days of sowing. The observations on per cent infestation by various pests were recorded from 25 randomly selected plants and number of aphids was counted from one sq cm leaf area. The observations were also made for natural enemies simultaneously.

$$\text{Per cent infestation} = \frac{\text{Number of infested plants}}{\text{Total no. of plants}} \times 100$$

**RESULTS AND DISCUSSION**

The results obtained from the present investigation as well as relevant discussion have been presented under following heads:

**Insect pests:**

The status of insect pests on maize sown during different months of the year is presented in Table 1.

**Shoot fly (*Atherigona* sp.):**

The higher number of eggs per leaf area was noticed in the month of September (3.0 eggs/ sq.cm leaf area), March (3.0) and April (3.0), but eggs were not seen in the month of June (0.0). The maximum dead heart damage by shoot fly was noticed in the month of May (13%) and March (13%), and no dead hearts were seen in the month of June. These present studies are in accordance with Sithole (1987) who reported highest infestation by shoot fly in mid March. This slight variation may be due to late sowing in that location.

**Aphid (*Rhopalosiphum maidis* Fitch):**

The peak incidence of aphids was seen in the month of April, and the least activity of aphids was recorded in November and December, but on an average 16.07 aphids per sq.cm leaf area were noticed irrespective dates of sowing. These results are in accordance with the findings of Harjit and Deol (1999), who reported the highest population build up in mid March at heading stage both on wheat and maize. Similar results were reported by Ding *et al.* (2002) on maize. The population fluctuation might be attributed to time of planting, local climatic conditions and natural enemy activity.

**Stem borer (*Chilo partellus* Swinhoe):**

The higher number of pinholes per plant was recorded

Date of sowing	Days after sowing	Number of plants	Number of aphids per plant	Number of shoot fly eggs per plant	Number of dead hearts per plant	Number of stem borer pinholes per plant	Number of natural enemies per plant	Number of aphids per sq. cm leaf area	Number of shoot fly eggs per sq. cm leaf area	Number of dead hearts per sq. cm leaf area	Number of stem borer pinholes per sq. cm leaf area	Number of natural enemies per sq. cm leaf area
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
24/06/08 Kharif	15	0	0	0	0	0	0	0	0	0	0	0
24/07/08 Kharif	15	1.2	1.2	0	0	0	0	0	0	0	0	0
23/08/08 Kharif	15	2.1	2.1	0	0	0	0	0	0	0	0	0
21/09/08 Kharif	15	3.0	3.0	0	0	0	0	0	0	0	0	0
16/10/08 Rabi	15	2.6	2.6	0	0	0	0	0	0	0	0	0
11/11/08 Rabi	15	2.2	2.2	0	0	0	0	0	0	0	0	0
07/12/08 Rabi	15	2.5	2.5	0	0	0	0	0	0	0	0	0
04/01/09 Rabi	15	2.8	2.8	0	0	0	0	0	0	0	0	0
01/02/09 S...	15	2.5	2.5	0	0	0	0	0	0	0	0	0
27/03/09 S...	15	3.0	3.0	0	0	0	0	0	0	0	0	0
25/04/09 S...	15	3.0	3.0	0	0	0	0	0	0	0	0	0
Average		2.3	2.3	0	0	0	0	0	0	0	0	0
SD		0.39	0.39	0	0	0	0	0	0	0	0	0

**Table 2 : Seasonal fluctuation of natural enemies of insect pests in maize ecosystem**

Sr. No.	Date of sowing	Mean no. of <i>Menochilus sexmaculatus</i> beetles/plant	Mean no. of <i>Coccinella septempunctata</i> beetles/plant	Mean no. of <i>Chrysoperla carnea</i> adults/plant
1.	24-06-2008	1.24	1.32	0.84
2.	20-07-2008	1.34	1.36	0.72
3.	18-08-2008	1.25	1.24	0.56
4.	21-09-2008	1.32	1.26	0.58
5.	16-10-2008	1.24	1.26	0.64
6.	15-11-2008	1.36	1.26	0.58
7.	17-12-2008	1.2	1.32	0.52
8.	19-01-2009	0.84	1.2	0.48
9.	16-02-2009	1.24	1.28	0.52
10.	14-03-2009	1.34	1.32	0.58
11.	15-04-2009	1.36	1.42	0.6
	Average	1.25	1.29	0.60
	S.D.±	0.012	0.012	0.075

Mean values for 25 plants

in the month of August (32 pinholes/plant) and lower number in the month of December (21) and June (21). These observations were based on the leaf injury rating on scale 7-9. The maximum dead hearts by stem borer were observed in the month of July (62%), and the minimum damage was noticed in the month of June (32%), December (32%) and January (32%). Present are findings broadly corroborated with the studies of Trehan and Butani (1949), who reported that the infestation by *C. partellus* was higher in *Kharif* (July-August planted crop). Similar results were reported by Jalali and Singh (2001) who found high infestation but in late summer season on maize. This variation may due to different climatic conditions.

#### **Hairy caterpillar (*Euproctis fraternal* Moore):**

The peak activity of hairy caterpillar was observed only in the month of August (1.6 larvae per plant) and was not noticed in other months irrespective of different dates of sowing. On an average 0.15 larvae/plant was recorded.

#### **Armyworm (*Mythimna separata* Walker):**

The maximum per cent damage by armyworm was observed when the crop was during the month of October, and however minimum damage was in the month of June and January. On an average 23.27 per cent of armyworm damage was noticed in all the dates of sowing based on the extent of defoliation. Patel *et al.* (1981) also reported higher incidence of armyworm in the last week of September to second week of October in rice crop. Similar results were also reported by Kulkarni *et al.* (1974) on maize.

#### **Cobworm (*Helicoverpa armigera* Hubner):**

Higher population of cobworm was noticed in the month of February, but lower larval population was in June. An average of 0.74 larvae per cob was recorded irrespective of dates of sowing, and its activity was seen throughout the year. The maximum per cent damage by cobworm was in the crop sown during the month of March, minimum damage was in the crop sown during the month of June, with an average 23.91 per cent noticed at all the dates of sowing. The continuous and regular incidence of cob worm may be due to the practice of farmers sowing the maize in all the seasons thus making the food availability to the pest. Panwar *et al.* (1989) reported higher infestation by this pest in *Kharif* and *Rabi* sorghum crop, but not on maize.

#### **Predators:**

The seasonal fluctuation of natural enemies of insect pests in maize ecosystem is presented in Table 2.

#### **Coccinellids:**

Higher number of *Menochilus sexmaculatus* (Fabricius) beetles was recorded in the month of April sown crop, but lower number was in the crop sown in the month of January, and an average of 1.25 beetles/plant were recorded. Similarly, higher number of *Coccinella septempunctata* L. beetles was recorded in the month of April sown crop (1.42 beetles/plant), but lower number was in the month of January (1.20), and an average of 1.29 was recorded. Harish (2008) reported higher incidence of Coccinellids in late sown soybean crop and observed the population fluctuation in relation to prey population. Increase in the natural enemy population was

correlated with the host density.

### ***Chrysoperla carnea* stephens:**

Higher number of *C. carnea* adults was observed in the crop sown in the month of June (0.84 adults/plant), but lower number was in the month of January (0.48 adults/plant), with an average of 0.60 adults/plant. It is because of different dates sowing, unusual weather conditions and increase in the natural enemies, positively correlated with the aphid population. Present findings are in line with the studies of Harish (2008) who reported that the incidence of *C. carnea* in all dates of sowing of soybean crop.

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