Research Paper :

Population dynamics of gram pod borer, *Helicoverpa armigera* (Hubner)

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SUMMARY

The experiment was conducted for monitoring the population dynamics of gram pod borer, *Helicoverpa armigera* (Hubner) by the use of sex pheromone (Helilure) at Karmveer Kakasaheb Wagh College of Agriculture, Nashik (M.S.) during *Rabi* season 2007-08. Total five pheromone traps were installed in the gram field comprising the varieties *viz.,* Vishal, Virat and Vihar. Observations were recorded daily in morning regarding the number of moths of *H. armigera* attracted in each of the traps from December 2007 to March 2008. The data were compiled on weekly basis. The data indicated that, the catches of moths were increasing irrespective of varieties from 4th week of December, 2007 (9 moths) when maximum and minimum temperatures were 29.0^{0}C and 13.9^{0}C with morning and evening relative humidity 75.1 per cent and 60.6 per cent, respectively and observed peak at 1st week of February (151 moths) when the maximum and minimum temperatures were 23.9^{0}C and 6.5^{0}C with morning and evening relative humidity of 62.6 per cent and 30.1 per cent, respectively. The pest gradually decreased and reached at rock bottom level of 2 moths during 3rd week of March, 2008, when maximum and minimum temperatures were of 36.3^{0}C and 20.8^{0}C with morning and evening relative humidity of 57.8 per cent and 24.4 per cent respectively. The moth emergence was found to be negatively and significantly correlated with the maximum temperature (r =-0.62) and minimum temperature (r =-0.75) while there was significant relationship between relative humidity and pest incidence.

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India is the largest producer of chickpea (*Cicer arietinum* L.) with 67 per cent of the global production and occupying nearly 31 per cent of pulse area in the country contributing over 37 per cent to the national pulse production (Ali and Kumar, 2003). *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae), is well known as cotton bollworm, gram caterpillar, pod borer or American bollworm. It is highly polyphagous pest with broad spectrum of host families including important agricultural crops such as cotton, maize, chickpea, pigeonpea, sorghum, sunflower, soybean, groundnut etc. (Fitt, 1989). In chickpea, *Helicoverpa armigera* caused losses ranging from 10 to 80 per cent in terms of pod damage (Yelshetty and Sidde Gowda, 1998). The study of population dynamics of the pest is important for the effective management of the pest population. The present studies were therefore undertaken to know the seasonal occurrence of *Helicoverpa armigera* in gram by the use of sex pheromone traps.

Minimum temperature influenced on the trap catches positively during winter. Relative humidity influenced negatively during winter season but positively influenced during rainy season in *S. litura* (Mahalingam *et al.*, 2003). Influence of weather parameters on *Spodoptera liturai* catches in pheromone trap was studied by Gedia *et al.* (2007). Monitoring of cotton bollworm through pheromone traps and impact of abiotic factors on trap catches were reported by Prasad *et al.* (2008). They found that minimum temperature and rainfall were found to exert highly significant negative influence on pheromone trap for catches of *H .armigera.*

So, the present study was undertaken to

find out seasonal dynamics of *Helicoverpa armigera* for adoption of effective pest management strategy.

MATERIALS AND METHODS

The experiment was conducted at Instructional farm of Karmveer Kakasaheb Wagh College of Agriculture, Nashik (M.S.) during *Rabi*, 2007-08.

Three cultivars of chickpea *viz*., Vishal, Virat and Vihar were sown in field in December, 2007. Pheromone traps were used for monitoring the adults of *H. armigera* with use of Helilures. Five pheromone traps per hectare were established in gram field, 15 days after germination. Synthetic pheromone Helilures was changed at 21 days interval regularly. Observations were recorded daily in the morning for the adult male trapping in each pheromone traps, by counting the number of moths in each of trap. Average number of moths collected in each trap was worked out. Simultaneously meteorological observations were also recorded for the temperature, humidity during the period of experiment. The data are presented in tabular and graphical forms.

RESULTS AND DISCUSSION

The data presented in Table 1 and Fig.1 reveal that the initiation of moth emergence was from 3rd week of December, 2007 (9 moths), when the maximum and minimum temperatures were 29.0^{0}C and 13.9^{0}C with morning and evening relative humidity of 75.1 per cent and 60.6 per cent, respectively. The population was found to gradually increase up to 151 moths, during 1st week of February when the maximum and minimum temperatures were 23.9^{0}C and 6.5^{0}C with morning and evening relative humidity of 62.6 per cent and 30.1 per cent, respectively. The population of moth decreased steadily and reached rock bottom level (2 moths) during 3rd week of March, 2008, when maximum and minimum temperatures were of 36.3^{0}C and 20.8^{0}C with morning and evening relative humidity of 57.8 per cent and 24.4 per cent respectively. Hossain (2008) reported that emergence of chickpea pod borer moth was increased from the 3rd week of January to 2nd week of February, and then its population increased gradually up to April and declined gradually.

The moth emergence was found to be negatively

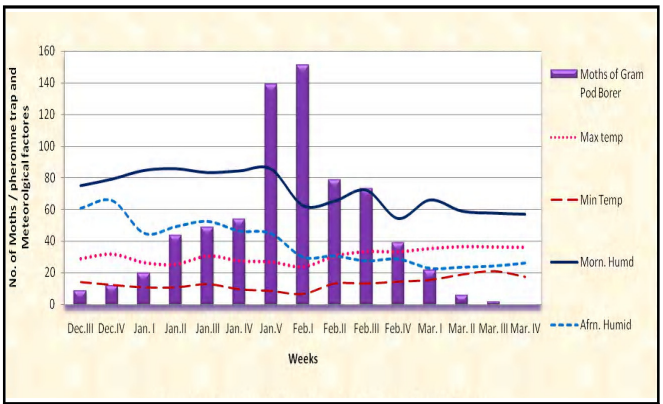

Fig. 1 : Population dynamics of *H .armigera* in relation to climatic factores

Table 1: Seasonal incidence of *H. armigera* in gram field, monitored by pheromone trap

Sr. No.	Month and week	Meteorological week	Avg. number of moths collected per trap				Temp. (^{0}C)		Relative humidity (%)	
			Virat	Vihar	Vishal	Total	Max.	Min.	Morn.	Aftn.
1.	Dec. III	51st	8	1	0	9	29.0	13.9	75.1	60.6
2.	Dec. IV	52nd	5	3	4	12	31.8	12.1	79.3	65.4
3.	Jan. I	1st	6	6	8	20	26.5	10.6	84.7	45.0
4.	Jan. II	2nd	15	19	10	44	25.5	10.6	85.8	49.1
5.	Jan. III	3rd	11	22	16	49	30.7	12.6	83.4	52.4
6.	Jan. IV	4th	13	26	15	54	27.6	9.4	84.4	46.4
7.	Jan. V	5th	29	71	39	139	27.0	8.3	85.6	44.8
8.	Feb. I	6th	37	86	28	151	23.9	6.5	62.6	30.1
9.	Feb. II	7th	25	46	8	79	30.6	13.0	65.4	30.7
10.	Feb. III	8th	12	39	22	73	33.41	13.0	72.3	27.6
11.	Feb. IV	9th	5	24	10	39	33.3	14.2	54.4	28.8
12.	Mar. I	10th	2	13	7	22	35.3	15.3	66.1	23.0
13.	Mar. II	11th	0	2	4	6	36.5	18.6	59.1	23.7
14.	Mar. III	12th	0	0	2	2	36.3	20.8	57.8	24.4
15.	Mar. IV	13th	0	0	0	0	36.1	17.2	57.1	26.3

and significantly correlated with the maximum temperature (r =-0.62) and minimum temperature (r =-0.75) which indicated that the population of *Helicoverpa* moths was more when there was decrease in temperature and the moth population decreased when there was increase in temperature. Same results were reported by Gedia *et al,*. (2007) in *Spodoptera litura*.As regards the effect of relative humidity, it was noticed that there was not significant effect of relative humidity (both morning and afternoon humidity) on the catches of *Helicoverpa* moths which indicated that the intensity of humidity did not influence significantly on pest population. These fluctuations in catches of *Helicoverpa* moths in pheromone trap were found irrespective to varieties during the period of experiment.

Therefore, it is apparent that emergence of *H. armigera* was increased from 4th week of January and peak at 1st week of February. Its population declined gradually up to 3rd week of March. Prasad and Newpane (1992) reported that the maximum catches of *Helicoverpa* moth was observed during last week of February, 1987-99.

These types of observations will be helpful to undertake timely plant protection measures for the management of *H. armigera* in chickpea. The present findings are in conformity with those results reported by earlier research workers.

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REFERENCES

Ali, M. and Kumar, Shiv (2003). Chickpea Research in India-An overview. In: *Chickpea Research in India.* Eds. Masood, Ali, Shiv Kumar and Singh, N.B., Indian Institute of Pulses Research, Kanpur,India

Fitt, G.P. (1989). The ecology of Heliothis in relation to agroecosystem. *Ann. Rev. Ent.,* **34** : 17-52.

Gedia, M.V., Vyas, H.J. and Acharya, M.F. (2007). Influence of weather parameters on *Spodoptera litura* in pheromone trap and oviposition on groundnut. *Ann. Plant Protec. Sci.,* **15** (2) : 117-120.

Hossain, M. Altab. (2008). Monitoring and evaluation of chickpea pod borer *Helicoverpa armigera* (Hubner) (Lepidoptera:Noctuidae) by using pheromone traps. *Bangladesh J. Sci. Ind. Res.,* **43**(3) : 419-426.

Mahalingam, C.A., Saminathan, V.R. and Venkatesan, S. (2003). Impact of weather factors on pheromone trap catches of tobacco caterpillar (*Spodoptera litura*). *Indian J. Agric. Sci.*, **73** (8) : 438-440.

Prasad, N.V.V.S.D., MahaLakshmi, M.S. and Rao, N.H.P. (2008). Monitoring of cotton bollworms through pheromone traps and impact of abiotic factors on trap catch. *J. Entomol. Res.*, **32** (3).

Prasad, L.N., and Newpane, F.P. (1992). Monitoring the chickpea borer, *Helicoverpa armigera* (Hubner) over period 1987 to 1990 by pheromone trap at Rampur, Chitwan, Nepal. *Food Legu. Newsl.,* **17** : 9.

Yelshetty, S.and Sidde Gowda, D.K. (1998). Progress in pulse entomological research of Gulbarga, Paper presented at the Seminar on progress and perspectives for sustainable agriculture in North Karnataka, Dharwad, 20th March 1998.

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