Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 11, Issue 1, January 2020: 348-350

Studies on Pulse Beetle Activity in Association with Weather Parameters on Arhar at Annamalainagar, Cuddalore District, South India

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Abstract

The most serious and devastating insect pest the pulse beetle, *Callosobruchus maculatus,* causes huge damage to stored legume grains both in field and storage. Weekly samples of pigeon pea pods during December 2017 to March 2018 at Annamalainagar, Cuddalore, showed the emergence of pulse beetle (*Callosobruchus maculatus*) during eight weeks from mid January to mid March. This incidence period coincided with maximum and minimum temperature ranges of 30.1^0C - 35.6^0C and 18.5^0C -23.0^0C respectively, besides forenoon relative humidity range of 79-88%. More extensive sampling studies to establish a weather-linked prediction model are suggested.

Keywords : Pigeon pea , Pulse beetle, Seasonal Incidence.

Introduction

Pulses constitute an integral part of Indian agriculture because of their vital role in enriching the human diet as well as soil fertility. The commonly grown pulses in India are chickpea, pigeon pea, field pea, green gram, black gram, lentil, moth bean and French bean. Pulses occupy an area of about 75.98 million hectare contributing 67.65 metric tons of production to the world food basket (Anonymous, 2011). India is the largest producer of pulses in the world occupying an area of about 26.16 million hectares, with annual production of 17.11 million tonnes with a productivity of 654 kg/ha (ESI, 2015). Pigeon pea (*Cajanus cajan*) is an important grain legume and occupies the second largest area among the pulse crops grown in India (Gundannavar *et al.*, 2014). It is a staple diet in most part of India as it is rich in protein. In India, the major pigeon pea growing states are Uttar Pradesh, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu. TN stands tenth in India in area (AICRP, 2014).

The pulse beetle, C*allosobruchus maculatus* (Fabricius) (Bruchidae : Coleoptera) is a very destructive pest of stored pulses and is wide spread in many countries. Infestation by pulse beetle originally starts from the field and is carried over to storage (Singhal and Kalra,1991; Silim Nahdy *et al.*, 1999). Adult beetles lays eggs on the pods in the field and the larvae develop within the pod, thereby the population build up takes place. Field infestation by pulse beetle tends to lead to greater loss in storage (Khanvilkar and Dalvi, 1984). In order to understand the impact of weather parameters on the incidence of pulse beetle in pigeon-pea, a field study was taken up during 2017 to 2018 to correlate maximum temperature, minimum temperature and relative humidity with the pulse beetle adult field activity.

Materials and Methods

The field study was conducted at the Experimental Farm, Faculty of Agriculture, Annamalai nagar , Cuddalore , Tamil Nadu during 2017-2018. Sowing of pigeon-pea (CO 6 variety) was done in July, 2017. An area of 100 m^2 with three replications at the recommended spacing, fertilizer and irrigated as recommended. The adult pulse beetle activity was recorded between 7 am and 8 am throughout the crop period. The numbers of adult pulse beetles caught with net sweeping at weekly intervals from 50% of flowering till harvest was accounted. Observations on weather parameters were also recorded and the population of pulse beetles were correlated with weather parameters.

Results and Discussion

The observations were started when the crop neared 50% flowering (December 2017) and continued till harvest (March 2018). Five net sweepings were carried out per day in the 100 m^2 area. The result was calculated for average number of adult pulse beetles caught per week. The weather parameters prevailing during the period was recorded and correlated with the adult pulse beetle field activity. The maximum temperature ranged from 28.3 to 36.2^{0}C during the crop period and attained maximum (36.2^{0}C) during March. Minimum temperature ranged from 18.5 to 24.1^0 C and no rainfall was received during the third week of January to March.

The activity of the pulse beetle was noticed from the third week of January with 10.0 No's./week and peak incidence was recorded during last week of February (46 No's./week) (Table 1). The lowest number of adults were caught during second week of March (6.0 No's./week). Incidence started vanishing from third week of March 2018.

The present findings agree with the results of Singhal and Kalra (1991) who found that adults of *Bruchus lentis* were caught by sweeps during the peak season, besides reports on carry-over of pulse beetle from pulse crop field to storage by Khanvilkar and Dalvi (1984) and Silim Nahdy *et al*., (1999). Correlation between number of pulse beetle adults caught and the weather factors was non-significant with each other, the maximum and minimum temperature prevailing during adult activity ranged from 30.1^0 C - 35.6^{0}C and 18.5^{0}C - 23.0^{0}C respectively and the relative humidity ranged from 79-88% which apparently favoured the adult activity and this finding is in agreement with those of Khanvilkar and Dalvi (1984). Comparative studies with weekly trap catches of the rice weevil, *Sitophilus* Spp. showed no significant correlation with weekly precipitation (James and Daniel, 1989), whereas a threshold temperature is probably required before flight occurs in *Sitophilus* which appears to be between 20.0 and 23.3^0 C (Taylor, 1971).

It is thus concluded that the limited information recorded on pigeon pea in the present study should be followed up with more extensive assessments so as to lead to short term prediction of the pulse beetle activity based on crop phenology and associated weather factors.

Table 1: Pulse Beetle activity in association with Weather Parameters in Pigeon pea.

Month	Std. Week	Beetle catch/week (No.)	Temp. (^{0} C)		RH (%)	Rainfall (mm)
			Max.	Min.		
December,	48 week	0.0	29.5	21.2	90	0.5

2017	49 week	0.0	29.3	20.9	91	1.2
	50 week	0.0	29.7	20.3	88	0.2
	51 week	0.0	29.0	22.5	86	0.9
	52 week	0.0	28.3	20.9	87	0.0
January, 2018	01 week	0.0	30.6	18.8	90	0.0
	02 week	0.0	30.8	22.6	87	0.2
	03 week	10.0	30.4	22.8	88	0.0
	04 week	22.0	30.1	18.7	85	0.0
February, 2018	05 week	24.0	30.9	19.2	87	0.0
	06 week	43.0	30.9	18.5	83	0.0
	07 week	40.0	33.4	21.5	87	0.0
	08 week	46.0	34.5	21.4	86	0.0
March, 2018	09 week	15.0	35.0	20.9	79	0.0
	10 week	6.0	35.6	23.0	84	0.0
	11 week	0.0	35.3	23.3	75	0.0
	12 week	0.0	36.2	20.3	81	0.0
	13 week	0.0	35.7	24.1	82	0.0

References:

1. AICRP - All India Coordinated Research Project. Annual Report. 2014.
2. Anonymous. 2011. Directorate of Economics and Statistics, Ministry of Agriculture, Govt. Of India, New Delhi.
3. ESI, 2015 The Economic Survey of India, New Delhi.
4. Gundannavar, K. P. S. Lingappa and R. S. Giraddi. 2014. Bio-rational approaches for the management of pod borer in pigeon pea ecosystem. *Karnataka Journal of Agricultural Sciences*, 17(3): 597-599.
5. James E. and Daniel, C. 1989. Seasonal flight activity of the maize weevil, *Sitophilus zeamays* and the rice weevil, *Sitophilus oryzae* in south Carolina. *Journal of Agricultural Entomology*. 6(3): 183-192.
6. Khanvilkar, S.V. and C.S. Dalvi. 1984. Carryover of pulse beetle infestation from the field to its control. *Bulletin of Grain Technology*, 22(1): 54-61.
7. Silim Nahdy, M., S.N. Silim and R.H. Ellis. 1999. Effect of field infestations of immature pigeon pea (*Cajanus cajan*) pods on production of active(flight) and sedentary (flightless) morphs of C*allosobruchus chinensis* (L.). *Journal of Stored Product Research. 35(1): 47-55.*
8. Singhal, K. and V. K. Kalra. 1991. First record of C*allosobruchus maculatus* infesting black gram, *Vigna mungo* under field conditions in Haryana. *Bulletin of Grain Technology*, 29(2): 121-122.
9. Taylor, T.A.1971. On the flight activity of *Sitophilus zeamays* and some other grain- infesting beetles in the field and stores. *Journal of Stored Product Research.* 6: 295-306.