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Seasonal abundance of Blister Beetle, *Mylabrispustulata* Thunberg on Pigeonpea and Mungbean

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सार – अरहर और मूंग की फसल पर फफोला भृंग (माइलाब्रिस पुस्टुलता) की ऋतु में बहुतायत और सक्रियता अवधि को दलहन के अनुसंधान फार्म, प्लांट ब्रीडिंग एंड जेनेटिक्स विभाग, पंजाब कृषि विश्वविद्यालय, लुधियाना में दर्ज किया गया।प्राप्त परिणामों से पता चला कि पंजाब की परिस्थितियों में अगस्त के अंत में अरहर और मूंग की फसल में फफोला भृंग दिखाई देने लगा। फसल मौसम के दौरान, इसकी गतिविधि बढ़ गई और सितंबर के अंत में अपने चरम पर पहुंच गई (अरहर में 13.90 भृंग / 4 मीटर पंक्ति लंबाई और मूंग में 5.48 भृंग / 1 वर्ग मीटर चतुर्थांश) जिसका अधिकतम पुष्पन के साथ मेल रहा और बाद में यह फूलों की समाप्ति के कारण घटने लगा। फफोला भृंग की गतिविधि सुबह के समय (अरहर में 20.23 भृंग / 4 मीटर पंक्ति लंबाई और मूंग में 8.04 भृंग / 1 वर्ग मीटर चतुर्थांश) और शाम के समय (अरहर में 21.04 भृंग / 4 मीटर पंक्ति लंबाई और मूंग बीन में 8.06 भृंग / 1 वर्ग मीटर चतुर्थांश) में दोपहर के घंटों की तुलना में (अरहर में 0.43 भृंग / 4 मीटर पंक्ति लंबाई और मूंग में 0.33 भृंग / 1 वर्ग मीटर चतुर्थांश) अधिक थी।

ABSTRACT. Seasonal abundance and activity period blister beetle (*Mylabrispustulata*) on pigeonpea and mungbean were recorded at Research Farms of Pulses Section, Department of Plant Breeding and Genetics, Punjab Agricultural University, Ludhiana. The results showed that the blister beetle started appearing in pigeonpea and mungbean in late August under Punjab conditions. During the crop season, its activity increased and reached at its peak in the end of September (13.90 beetles / 4 meter row length in pigeonpea and 5.48 beetles / 1 sq. meter quadrate in mungbean) coincided with the maximum flowering and afterwards it started declining due to the termination of flowers. The activity of blister beetle was more in the morning (20.23 beetles / 4 meter row length in pigeonpea and 8.04 beetles / 1 sq. meter quadrate in mungbean) and evening hours (21.04 beetles / 4 meter row length in pigeonpea and 8.06 beetles / 1 sq. meter quadrate in mungbean) as compared to the noon hours (0.43 beetles / 4 meter row length in pigeonpea and 0.33 beetles / 1 sq. meter quadrate in mungbean).

Key words – Mungbean, Mylabrispustulata, Pigeonpea, Seasonal abundance.

1. Introduction

Pigeonpea or redgram [*Cajanuscajan* (L.) Millsp.] and mungbean [*Vignaradiata* (L.) Wilczek.] are the major kharif pulse crops of India. During 2017-18, pigeonpea covered an area of 4.43 million ha with a production of 4.25 million tons while mungbean covered an area of 3.29 million ha with a production of 2.01 million tones all over India (Anonymous, 2018). These crops have the highest production after gram but still there are various factors responsible for the low potential yield levels of both these crops. Among all the factors, the damage caused by insect pests is attributed as a major constraint in their successful cultivation. More than 350 insect pests species harbor pigeonpea crop. Out of these, 65.6 per cent have been reported from India only (Chhabra, 2008). Pigeonpea is attacked by a number of insect pests from sowing to maturity out of which pod borer [*Helicoverpaarmigera* (Hübner)], tur pod fly (*Melanagromyzaobtusa* Malloch) and spotted borer [*Marucavitrata* (Geyer)] cause serious damage. Subasinghe and Fellowes (1978) reported that severe infestation by a complex of flower and pod boring insects has virtually stopped the cultivation of pigeonpea in Sri Lanka. The complex includes the legume pod borer (*M.vitrata*), lima bean pod borer (*Etiellazinckenella*), *H. armigera*, pod fly (*M. obtusa*), long-tailed blue butterfly (*Lampidesboeticus*) and the plume moth (*Sphenarchesanisodactylus* and *Exelastisatomosa*).

However, in mungbean cultivation, whitefly [*Bemisiatabaci* (Gennadius)], pod borer (*H. armigera)*and spotted borer (*M. vitrata*) are the major threats. Besides these pests, blister beetle (*Mylabrispustulata* Thunberg) has emerged as a major flower-feeding pest on pigeonpea

TABLE 1

Seasonal abundance of *M. pustulata* in pigeonpea

Month of observation	Week of observation	Mean of population of blister beetle / 4 meter row length			Mean
		Morning (6-8 AM)	Noon (12-2 PM)	Evening (4-6 PM)	
August	1st - 3rd	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)
	4th	0.59 (1.26)	0.01 (1.01)	0.88 (1.37)	0.49 (1.21)
	Mean	0.30 (1.13)	0.005 (1.003)	0.44 (1.19)	
C.D. (p = 0.05) (Week) = 0.02, C.D. (p = 0.05) (Time) = 0.02, C.D. (p = 0.05) (Interaction) = 0.04					
September	1st	2.16 (1.78)	0.20 (1.10)	4.69 (2.38)	2.35 (1.75)
	2nd	7.23 (2.87)	0.30 (1.14)	10.29 (3.36)	5.94 (2.46)
	3rd	14.37 (3.92)	0.36 (1.17)	17.18 (4.26)	10.64 (3.12)
	4th	20.23 (4.61)	0.43 (1.20)	21.04 (4.69)	13.90 (3.50)
	Mean	10.99 (3.29)	0.32 (1.15)	13.30 (3.68)	
C.D. (p = 0.05) (Week) = 0.05, C.D. (p = 0.05) (Time) = 0.04, C.D. (p = 0.05) (Interaction) = 0.08					
October	1st	16.20 (4.15)	0.37 (1.17)	13.94 (3.87)	10.17 (3.06)
	2nd	11.03 (3.47)	0.33 (1.15)	8.60 (3.10)	6.65 (2.57)
	3rd	5.03 (2.46)	0.25 (1.12)	2.89 (1.97)	2.72 (1.85)
	4th	1.41 (1.55)	0.03 (1.01)	0.46 (1.21)	0.63 (1.26)
	Mean	8.42 (2.91)	0.25 (1.11)	6.47 (2.54)	
C.D. (p = 0.05) (Week) = 0.04, C.D. (p = 0.05) (Time) = 0.03, C.D. (p = 0.05) (Interaction) = 0.06					

Figures in parentheses are $(\sqrt{n+1})$ transformations

and mungbean. Blister beetles inflict huge losses on account of their association with flowering phase (Shende*et al.*, 2013). The adult beetles severely damage buds, flowers and even tender leaves by feeding either solitarily or gregariously. The damage caused to flower is so extensive that there is no pod and seed setting resulting in drastic yield reduction (Dhingra and Sarup, 1992). Garg (1985); Dutta and Singh (1989) also reported many species of blister beetles on pulse crops causing huge damage.

Review of literature does not throw sufficient light on seasonal abundance pattern of blister beetles and variation of blister beetle population during different hours of a day. The information on these aspects is must for formulating management strategy for blister beetles. In Punjab, the population of blister beetle has increased manifold on pigeonpea and mungbean during the kharif season over the past few years. Hence, the present study was framed to study the seasonal abundance pattern and diurnal variation in blister beetle population on both the pulse crops.

2. Materials and method

A field experiment was carried out at Research farms of Pulses Section, Department of Plant Breeding and Genetics, Punjab Agricultural University, Ludhiana during kharif 2011-12. The experiment was laid out in a factorial randomized block design (RBD) with five replications. Pigeonpea variety, PAU 881 and mungbean variety, PAU 911 were sown in an area of 250 sq. m. each as per recommended agronomic practices (Anonymous, 2012). The data on seasonal abundance of blister beetle was recorded by observing the population density of beetles on pigeonpea and mungbean crop twice a week from 10 randomly selected rows each of 4 meter length in pigeonpea and 10 quadrates of 1 sq. meter area each in mungbean. Further, to observe diurnal variation in beetle population, data was recorded during morning (6 - 8 AM), noon (12 - 2 PM) and evening hours (4 - 6 PM) on both the crops.

In this experiment, the seasonal incidence and activity period of blister beetle was observed during the flowering period of pigeonpea and mungbean crop. The data was taken regularly at weekly intervals during August, September, October and November months. The experiment was conducted under field conditions during different months of the crop season and results are summarized in Table 1.

3. Results and discussion

3.1. *Seasonal abundance of blister beetle on pigeonpea*

3.1.1. *Week basis*

Data presented in Table 1 revealed that the adults of blister beetle started appearing on pigeonpea crop in the end of 3rd week of August (0.00 beetles/4 meter row length). An increasing trend in the population of blister

TABLE 2

Seasonal abundance of *M. pustulata* in mungbean

Month of observation	Week of observation	Mean of population of blister beetle / 1 sq. meter quadrate			Mean
		Morning (6-8 AM)	Noon (12-2 PM)	Evening (4-6 PM)	
August	1st -3rd	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)
	4th	0.31 (1.14)	0.03 (1.01)	0.45 (1.20)	0.26 (1.12)
	Mean	0.15 (1.07)	0.015 (1.01)	0.23 (1.10)	
C.D. (p = 0.05) (Week) = 0.02, C.D. (p = 0.05) (Time) = 0.02, C.D. (p = 0.05) (Interaction) = 0.03					
September	1st	1.44 (1.56)	0 (1.00)	1.81 (1.68)	1.08 (1.41)
	2nd	3.69 (2.17)	0.22 (1.10)	4.57 (2.36)	2.83 (1.88)
	3rd	6.60 (2.76)	0.33 (1.15)	6.92 (2.81)	4.62 (2.24)
	4th	8.04 (3.01)	0.33 (1.15)	8.06 (3.02)	5.48 (2.39)
	Mean	4.94 (2.37)	0.22 (1.10)	5.34 (2.47)	
C.D. (p = 0.05) (Week) = 0.02, C.D. (p = 0.05) (Time) = 0.02, C.D. (p = 0.05) (Interaction) = 0.03					
October	1st	7.38 (2.89)	0.38 (1.17)	5.94 (2.63)	4.57 (2.23)
	2nd	3.47 (2.11)	0.17 (1.08)	2.33 (1.82)	1.99 (1.67)
	3rd	0.12 (1.06)	0 (1.00)	0 (1.00)	0.04 (1.02)
	4th	0 (1.00)	0 (1.00)	0 (1.00)	0 (1.00)
	Mean	2.74 (1.77)	0.14 (1.06)	2.07 (1.61)	
C.D. (p = 0.05) (Week) = 0.04, C.D. (p = 0.05) (Time) = 0.04, C.D. (p = 0.05) (Interaction) = 0.07					

Figures in parentheses are ($\sqrt{n+1}$) transformations

beetle was observed with the peak period of activity registered during the 4th week of September (21.04 beetles/ 4 meter row length). The activity of *M. pustulata* lasted until 4th week of October coinciding with the maximum flowering of pigeonpea during crop season.

The data on pooled mean revealed that the highest number of beetles were observed during 4th week of September (13.90 beetles/4 meter row length) followed by 3rd week of September (10.64 beetles/4 meter row length). However, after 4th week of September, the beetle population started declining. On an average, the total number of beetles recorded per 4 meter row length was 0.12 during August, 8.21 during September and 5.04 during October on pigeonpea. The present study is in agreement with Mahal *et al*. (1989) who observed that the adults of blister beetle started appearing on pigeonpea in late August under Punjab conditions. The beetles were observed feeding on the floral parts and damage the terminal portion of the unopened flower buds and different parts of flowers, including keel of corolla and petals until the end of October and the peak activity of blister beetle was in the last week of September.

The present investigations are also in agreement with Durairaj and Ganapathy (1996) who reported that due to continuous availability of hosts, *viz.*, green gram, black gram, cowpea and pigeonpea, blister beetle occurs throughout the year with a peak incidence (12.3-19.4 beetles per plant) between August and October, which coincides with the flowering period of pigeonpea. It was also observed that pigeonpea was the most preferred host crop followed by cowpea, black gram and green gram.

3.1.2. *Time basis*

The studies carried out on studying the activity time of blister beetle on pigeonpea revealed that the beetles were more active in the morning and evening hours (Table 1) and the average population of blister beetle was 6.57 and 6.74 beetles/4 meter row length, respectively. The population at noon hours was relatively low (0.19 beetles/4 meter row length) and the beetles preferred to feed on the lower branches, preferably opposite the direction of the sun. The beetle population during morning, noon and evening times differed statistically from each other.

Pooled data of entire crop season of pigeonpea revealed that maximum blister beetle population in the morning was 20.23 beetles/4 meter row length during the 4th week of September while in case of evening hours, the maximum blister beetle population was 21.04 beetles/4 meter row length during the 4th week of September. Results showed that the activity of blister beetle was low during noon hours, reaching maximum upto 0.43 beetles/4 meter row length. Our study is in agreement with Mahal *et al*. (1989) who reported that the activity of blister beetlewas more in the morning and evening hours on pigeonpea. Similarly, Mann and Dhooria (1993) also reported that the feeding activity of blister beetle was highest between 9 AM and 10 PM and again between

4 PM and 5 PM. Between these two periods of the day, feeding activity was comparatively lower.

3.2. *Seasonal abundance of blister beetle on mungbean*

3.2.1. *Week basis*

The data presented in Table 2 revealed that the adults of blister beetle started appearing on mungbean crop from the end of 4th week of August (0.31 beetles/1 sq. meter quadrate) during kharif 2011-12. An increasing trend in the population of blister beetle was observed with the peak activity period registered during the 4th week of September (8.06 beetles/1 sq. meter quadrate). The activity of *M. pustulata* lasted until 3rd week of October (0.04 beetles/1 sq. meter quadrate) with the peak coinciding with the maximum flowering of mungbean during crop season.

The pooled mean of the data revealed that the highest number of beetles were recorded on 4th week of September (5.48 beetles/1 sq. meter quadrate) followed by 3rd week of September (4.62 beetles/1 sq. meter quadrate). However, after 4th week of September, the beetle population started declining. On an average, the total number of beetles recorded per 1 sq. meter quadrate was 0.13 during August, 3.50 during September and 1.65 during October on mungbean.

3.2.2. *Time basis*

The studies made on activity time of blister beetle on mungbean revealed that the blister beetles were more active in the morning and evening hours (Table 2) with the average population of blister beetle being 2.61 and 2.54 beetles/1 sq. meter quadrate, respectively. The population at noon hours was relatively low at 0.12 beetles/1 sq. meter quadrate and the beetles preferred to feed on the lower branches, preferably opposite the direction of the sun. The beetle population during morning, noon and evening times differed statistically from each other.

Pooled data of entire crop season of mungbean revealed that maximum blister beetle population in the morning was 8.04 beetles/1 sq. meter quadrate during the 4th week of September while in case of evening hours, the maximum blister beetle population was 8.06 beetles/1 sq. meter quadrate during the 4th week of September. Results showed that the activity of blister beetle was low at noon hours reaching maximum up to 0.33 beetles/1 sq. meter quadrate. Our results are in agreement with Pawar *et al*. (2014) who also concluded that highest feeding activity of adult blister beetles was more during pre noon period whereas, most of the adult blister beetles preferred idleness (avoiding sunlight) post noon period.

Disclaimer

The contents and views expressed in this research paper/article are the views of the authors and do not necessarily reflect the views of the organizations we belong to.

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