

SEASONAL INCIDENCE OF MAJOR INSECT PESTS OF MUNGBEAN

Comment [DM1]: Add study area name in the title

ABSTRACT

The experiment was carried out at RVSKVV, College of Agriculture Gwalior, Madhya Pradesh, India during *kharif* 2022, to study the seasonal incidence of major insect pests of mung bean. The findings showed the presence of three sucking insect pests viz., whitefly *Bemisia tabaci*, leafhopper *Empoasca kerri* and aphid *Aphis craccivora* from vegetative stage to maturity stage. Two lepidopterans, *Spodoptera litura* and *Lampides boeticus* were observed from reproductive to maturity stage. The peak incidence of the *A. craccivora* and *B. tabaci* occurred during 39th SMW with the population 1.45 aphids/ plant and 7.55 whiteflies/ plant respectively. *E. kerri* reached its peak population of 4.95 adults/ plant on 40th SMW. *S. litura* peaked at 0.52 larve/ plant on the 38th SMW, while *L. boeticus* peaked at 0.21 larve/ plant on the 39th SMW. Correlation studies revealed that *A. craccivora*, *B. tabaci*, and *L. boeticus* showed a significant negative correlation ($r = -0.667$, -0.679 , and -0.680) with maximum temperature. Although *S. litura* had a significant positive ($r = 0.704$) correlation with evening RH and a significant negative one (-0.697) with maximum temperature.

INTRODUCTION

Mung bean (*Vigna radiata* L. Wilczek) is an important pulse crop in India after chickpea and pigeon pea (Ved *et al.*, 2008). Hussain *et al.*, (2011) its productivity in India is 570 kg/ ha. It is also consumed as fresh sprouts, seeds used for making soups, bread and biscuits (Sehrawat *et al.*, 2013). The low productivity of mung bean in Madhya Pradesh may be attributed to a wide variety of factors, among which insects is of paramount importance. A number of insects have been recorded on mung bean, and in India, 64 species of insect pests reported (Lal, 2008). As a result, the current study was conducted to investigate the insect pests of mung beans and their seasonal occurrence in order to develop effective, efficient, and environmentally responsible pest management strategies.

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MATERIALS AND METHODS

The experiment was carried out on “Sikha” variety sown at College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalyaya, Gwalior, Madhya Pradesh, India during

kharif 2022. Plot size of $20 \times 10 \text{ m}^2$ was followed with a row to row and plant to plant spacing of $30 \times 10 \text{ cm}$, and all agronomic practices were adopted except the pest control measures. Observations on insect pests were recorded from randomly selected 10 plants at weekly interval, starting from 15 DAS (days after sowing) and continued till the crop maturity. Sucking insect pests *Aphis craccivora* (Koch.) and *Empoasca kerri* Pruthi were observed on 3 compound leaves viz., top, middle and bottom; *Bemisia tabaci* (Genn.) population was recorded by using cage method. The lepidopterans *Spodoptera litura* (F.) and *Lampides boeticus* L., were recorded on 10 randomly selected plants by counting the number of larvae/ plants. Incidence of these pests was correlated with weather parameters; maximum and minimum temperature ($^{\circ}\text{C}$), rainfall (mm), maximum and minimum RH (%). Regression equations were developed for the ones with significant impact (Snedecor and Cochran, 1967).

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RESULTS AND DISCUSSION

The major insects that attack during the vegetative stage (15 DAS i.e. 35 SMW) were *A. craccivora*, *B. tabaci*, and *E. kerri*, and these infestations persisted up to maturity 41st SMW which are in accordance with the findings of Sahoo and Patnaik, 1994; Nath, 1994; Singh and Kalra, 1995; and Dar *et al.*, 2002. *S. litura* and *L. boeticus* were observed at reproductive, which were active till maturity; the former was observed from 36 DAS (38- 41 SMW) agreeing with earlier reports of Sujayanand *et al.* (2021); and the latter from 29 DAS (37 to 41 SMW). Irulandi and Balasubramanian (1999), Ebadah (2002) and Sarkar *et al.* (2008) also studied seasonal incidence of insect pests of Mung bean.

During *kharif 2022*, the population dynamics of these pests were recorded and correlated with weather factors. *Aphis craccivora* appeared during 34th SMW (0.11 aphids/ plant) and remained active till maturity of the crop (0.98 aphid/ plant), with peak population of 1.45 aphids/ plant being in 39th SMW; correlations revealed a significant negative correlation ($r = -0.667$) with maximum temperature, agreeing with the finding of Bairwa and Singh (2017). *Bemisia tabaci* appeared during 34th SMW (1.42 whiteflies/ plant) and remained active till maturity of the crop (5.30 whiteflies/ plant), with peak of 7.55 whiteflies/ plant being in 39th SMW. Chandra *et al.* (2021) The observation is in correlation with that of *B. tabaci*; a significant negative correlation ($r = -0.679$) was observed with the maximum temperature which agrees with those of Tamang *et al.* (2017). *E. kerri* appeared on 34th SMW (0.61 adult/ plant), continued till 42th SMW with peak (4.95 adult/ plant) attained on 40th SMW. *A. craccivora* and *Bemisia tabaci* appeared on the 34th

SMW, continued till 42th SMW, with a peak (7.55 whiteflies/ plant) on the 39th SMW; correlation revealed a significant negative correlation ($r = -0.679$) with maximum temperature. *S. litura* appeared on the 34th SMW (0.09 larvae/ plant), continued till 42th SMW, with peak (0.52 larvae/ plant) on the 38th SMW, its incidence showed a significant negative correlation ($r = -0.697$) with maximum temperature, and a significant positive one ($r = 0.704$) was with evening RH. *Lampides boeticus* appeared on the 37th SMW, continued till 42th SMW with peak (0.34 larvae/ plant) on the 39th SMW and had a significant negative correlation ($r = -0.680$) was observed with maximum temperature. (Table 1,2).

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Table 1. Seasonal activity of insect pests of mung bean- Gwalior (kharif, 2022).

Date	SMW	Sucking Insect (Nymph & Adult /plant)			Lepidopteran insect pest (larvae/plant)	
		<i>Aphis craccivora</i>	<i>Bemisia tabaci</i>	<i>Empoasca kerri</i>	<i>Spodoptera lithura</i>	<i>Lampides boeticus</i>
20-26 August	34	0.11	1.42	0.61	0.09	0.00
27-2 September	35	0.25	1.01	0.71	0.00	0.00
3-9 September	36	0.40	1.85	1.64	0.00	0.00
10-16 September	37	1.25	5.80	2.34	0.39	0.16
17-23 September	38	1.39	6.98	3.60	0.52	0.21
24- 30 September	39	1.45	7.55	3.84	0.27	0.34
1-7 October	40	0.50	4.10	4.95	0.11	0.10
8-14 October	41	1.40	6.80	2.30	0.30	0.29
15-21 October	42	0.98	5.30	1.38	0.02	0.14

SMW= Standard Metrological Week

Table 2. Correlation coefficients- incidence of insect pest vs. weather factors

Weather Factors	<i>Aphis craccivora</i> r	<i>Bemisia tabaci</i> r	<i>Empoasca kerri</i> r	<i>Spodoptera lithura</i> r	<i>Lampides boeticus</i> r
Temp. Max. (°C)	-0.667*	-0.679*	-0.147NS	-0.697*	-0.680*
Temp. Min. (°C)	-0.340NS	-0.423NS	-0.024NS	0.077NS	-0.360NS
Rainfall (mm)	0.043NS	0.039NS	-0.253NS	0.387NS	0.075NS
RH Morning. (%)	0.290NS	0.276NS	0.073NS	0.602NS	0.164NS
RH Evening (%)	0.229NS	0.213NS	0.013NS	0.704*	0.146NS

r = Correlation, NS-Non significant

REFERENCES

- Bairwa B, Singh P S. 2017. Population dynamics of major insect pests of mungbean (*Vigna radiata* (L.) Wilczek) in relation to abiotic factors in Gangetic plains. *The Bioscan* **12**(3): 1371-1373.
- Dar M H, Rizvi P Q, Naqvi N A. 2002. Insect pest complex and its succession on mung bean and urd bean. *Indian Journal of Pulses Research* **15**(2): 204.
- Ebadah I M A. 2002. Population fluctuations and diurnal activity of the leafhopper, *Empoasca decipiens* on some summer crops in Kalubia Governorate, Egypt. *Bulletin of Faculty of Agriculture, Cairo University* **53**(4): 653-670.
- Hussain F, Malik, A U, Haji M A, Malghani A L. 2011. Growth and yield response of two cultivars of mungbean (*Vigna radiata* L.) to different potassium levels. *Journal of Animal and Plant Sciences* **21**(3): 622-625.
- Irulandi S, Balasubramanian G. 1999. Effect of weather parameters on galerucid beetle, *Madurasia obscurella* (Jacoby) (Galerucidae: Coleoptera) and stemfly, *Ophiomyia phaseoli* (Tryon) (Agromyzidae: Diptera) on green gram. *Insect Environment* **5**(1): 8-9.
- Lal S S. 2008. A review of insect pests of mungbean and their control in India. *Tropical Pest Management* **31**(2): 105-114.
- Nath P D. 1994. Effect of sowing time on the incidence of yellow mosaic virus disease and whitefly population on green gram. *Annals of Agricultural Research* **15**(2): 174-177.
- Sahoo B K, Patnaik N C. 1994. Insect pests in green gram and black gram in the south coastal region of Orissa with notes on their seasonal activity. *Orissa Journal of Agricultural Research* **7**: 74-76.
- Sarkar M A, Mannan M A, Dutta N K, Mahmudunnabi M, Salim M R. 2008. Incidence of major insect pests attacking mungbean in relation to seasonal variation. *Bangladesh Journal of Entomology* **18**(1): 101-106.
- Sehrawat N, Bhat K V, Sairam R K, Pawan K J. 2013. Identification of salt resistant wild relatives of mungbean [*Vigna radiata* L. Wilczek]. *Asian Journal of Plant Sciences and Research* **3**(5): 41-49.
- Singh Raj, Kalra V K. 1995. Studies on the insect-pest complex associated with summer mungbean, *Vigna radiata* (L.) Wilczek and urdbean, *Vigna mungo* (L.) Hepper in Haryana. *Journal of Insect Science* **8**(2): 181-184.

Comment [DM7]: Mention Conclusion before References

- Snedecor G W, Cochran W G. 1967. Statistical methods, 6th ed. Ames, Iowa: Iowa State University Press.
- Sujayanand G K, Chandra A, Pandey S, Bhatt S. 2021. Seasonal abundance of spotted pod borer, *Maruca vitrata* Fabricius in early pigeonpea [*Cajanus cajan* (L.) Millsp.] and its Management through Farmscaping in Uttar Pradesh. *Legume Research* **44**(2): 233-239.
- Tamang S, Venkatarao P, Chaterjee M, Chakraborty G. 2017. Population dynamics of major insect pests of mung bean (*Vigna radiata* (L.) wilczek) and correlation with abiotic factors under terai agroclimatic zone of West Bengal; *The Bioscan* **12**(2): 893-897.
- Yadav D K, Singh S K. 2006. Forecast model of major insect pests of mungbean. *Annals Plant Protection Sciences* **14**(2): 323-328.

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