RESEARCH ARTICLE Agricultural Science Digest, Volume 41 Special Issue: 199-202 (April 2021)

Seasonal Incidence of Insect Pests on Mungbean (*Vigna radiata*) in Correlation with Meteorological data

L. Gehlot, A.K. Prajapat

10.18805/ag.D-5222

ABSTRACT

Background: Mung bean is important pulse crop in India due to its nutritional value. Its grain contains protein, fat, carbohydrate, vitamin and minerals therefore human uses it in various ways in food. Mung bean crop cultivated in kharif, rabi and summer season in India. Various species of insect pests are infested to mung bean crop and cause very harmful effect to crop and farmer. These pests decrease productivity and quality of mung bean.

Methods: Field experiment was carried out for the study of seasonal incidence of insect pests on RMG-62 variety of green gram during kharif season 2019. Mung bean was grown on a plot size of 25 m × 25m with 50 cm row to row and 20 cm plant to plant spacing. Randomly selected 20 plants from weekly interval to record population of insect pests. The population of jassid and whitefly was recorded by counting number of pests on 2 upper, 2 middle and 2 lower leaves of a plant whereas population of aphid was recorded by counting number of aphid on 10 cm twig/plant.

Result: The mean population of aphid, jassid and whitefly were recorded. Incidence of aphid started during 33th standard week with 0.9 aphid/10cm twig/plant, jassid and whitefly started during 32th standard week with 0.3 jassid/6 leaves/plant and 2.1 whitefly/6 leaves/plant, respectively. Peak mean population of aphid, jassid and whitefly reached during 36th standard week with 10.2 aphid/ 10cm twig/plant, 10.1 jassid/6 leaves/plant and 14.1 whitefly/6 leaves/plant, respectively. Simultaneously six species of insect pests also infested green gram, these were *Mylabris pustulata, Helicoverpa armigera, Trichoplusia ni., Lampides boeticus, Spoladea recurvalis* and *Diaphania indica.* The population of aphid, jassid and whitefly positively correlated with temperature. Population of aphid and whitefly had positive correlation with humidity, whereas jassid population had positive correlation with minimum humidity and negative correlation with maximum and average humidity. All three pests expressed negative correlation with rainfall.

Key words: Aphid, Insect pests, Jassid, Mungbean, Seasonal incidence, Whitefly.

INTRODUCTION

Mungbean or green gram, *Vigna radiata* is important pulse crop in India after chickpea and pigeon pea (Ved *et al.* 2008). It is used as fresh green pods, dry seeds as vegetables due to presence of protein, vitamin and mineral (Das *et al*. 2014). Mungbean grains contain 24.2% protein, 1.3% fat and 60.4% carbohydrate (Hussain *et al*. 2011). It is also consumed as fresh sprout, seeds used for making soups, bread and biscuits (Sehrawat *et al.* 2013).

Mungbean is an important *kharif* pulse crop grown in the arid and semi-arid regions of India. India is the largest producer and consumer of mungbean, which is grown in 4.26 million hectare with an annual production of 2.01 million tones and yield 472 kg/hectare. More than 80 per cent of mungbean production comes from 10 states of India. These are Rajasthan, Madhya Pradesh, Maharashtra, Bihar, Karnataka, Tamil Nadu, Gujarat, Andhra Pradesh, Odisha and Telangana. Rajasthan with 42.23 per cent area and 39 per cent of production is largest mungbean producing state in India during 2017-18. In Rajasthan, mungbean grown in 17.19 lakh hectare area and production is 7.42 lakh tones (Anonymous, 2018).

Mungbean grow easily in Rajasthan because it has ability to drought tolerance, grow in harsh climate and minimum rainfall, rapid growth, early maturation, restore soil fertility by nitrogen fixation and increase soil fertility (Sharar *et al*. 2001).

Department of Zoology, Jai Narain Vyas University, Jodhpur-342 001, Rajasthan, India.

Corresponding Author: L. Gehlot, Department of Zoology, Jai Narain Vyas University, Jodhpur-342 001, Rajasthan, India. Email: drlekhu@rediffmail.com

How to cite this article: Gehlot, L. and Prajapat, A.K. (2021). Seasonal Incidence of Insect Pests on Mungbean (*Vigna radiata*) in Correlation with Meteorological data. Agricultural Science Digest. 41 (Special Issue): 199-202. DOI: 10.18805/ag.D-5222.

Submitted: 23-05-2020 **Accepted:** 02-09-2020 **Online:** 10-11-2020

Many insect pests attack mungbean crop causing extremely elevated losses to the crop and its production. Hence insect pests act as a limiting factor in production of mungbean (Panchabhavi and kadam, 1990). Dar *et al*. (2002) reported *Bemisia tabaci, Empoasca kerri, Aphis craccivora and Ophiomyia phaseoli* on mungbean and urdbean of which *Bemisia tabaci* was major pest during summer season. The insect pests noted on mungbean involve jassid (*Empoasca motti,* Pruthi), thrips (*Caliothrips indicus,* Bagnall), whitefly *(Bemisia tabaci,* Genn.), semilooper (*Plusia orichalcea,* Fab.), green bug (*Nezara viridula*, Linn.), stemfly (*Ophiomyia phaseoli,* Tryon.), pod borers (*Helicoverpa armigera*, Hubner and *Maruca testulalis*, Geyer), tortricid moth (*Cydia ptychora*, Meyr), galerucid beetle (*Madurasia obscurella*, Jacoby) and

cutworm (*Agrotis ipsilon,* Hufn) (Kumar *et al*. 2004, Nitharwal and Kumawat, 2013).

MATERIALS AND METHODS

The field experiment was conducted during kharif season of 2019 for studying of seasonal incidence of insect pests of mungbean. The site of experiment was a local farm in Taranagar (longitude of 75.03° east, latitude of 28.68° north and at the elevation of 232 meters from sea level) of Churu district in Rajasthan. It is fall under IC-Hyper Arid partial Irrigated agro-climatic zone of Rajasthan (Hussain, 2015). During this study mungbean variety RMG-62 was grown on a plot size of 25 m × 25m with 50 cm row to row and 20 cm plant to plant spacing. All agronomical procedures were fulfilled as per the scientific suggestions. The crop under investigations was uncovered to natural infestation and retained free from the insecticides throughout the experiment. Observations were commenced from visibility of insect pests to crop harvest. The population of pests was recorded from the tagged twenty plants at weekly interval. Observation of the population of jassid (*Empoasca motti* Pruthi) and whitefly (*Bemisia tabaci* Genn.) was recorded by counting number of pests on 2 upper, 2 middle and 2 lower leaves of a plant. The population of aphid was recorded by counting number of aphid on 10 cm twig/plant. The counted pests population was recorded in glass frame box. The data of mean population of pests was correlated with temperature, humidity and rainfall.

RESULTS AND DISCUSSION

The incidence of insect pests of green gram were studied during kharif season 2019. The study revealed that nine insect species infesting the crop such as *Aphis craccivora, Ampoasca motti, Bemisia tabaci, Mylabris pustulata, Helicoverpa armigera, Trichoplusia ni., Lampides boeticus, Spoladea recurvalis* and *Diaphania indica.* Incidence of these pests started from seedling stage and continued till the harvesting, However the observation on the population of three major insect pests *viz*. aphid (*Aphis craccivora*), jassid (*Ampoasca motti*) and whitefly (*Bemisia tabaci*) were recorded as mean population and represented in (Table 1). Meteorological data are represented in (Table 2) and correlation coefficient of pests population with abiotic factors are represented in (Table 3).

Aphid (*Aphis craccivora*)

The population of aphid was noted during 33th standard week from 0.9 aphids/ 10cm twig/plant. The peak population was recorded in 36th standard week with 10.2 aphids/10cm twig/ plant. The correlation of aphid population with minimum and maximum temperature, minimum, maximum and average humidity and rainfall were 0.309, 0.373, 0.084, 0.100, 0.088 and -0.349, respectively.

Jassid (*Empoasca motti* Pruthi)

Jassid population was noted during 32th standard week with 0.3 jassid/6 leaves/plant. The peak population of jassid was observed during 36th standard week with 10.1 jassid/6 leaves/plant. The correlation of jassid population with minimum and maximum temperature, minimum, maximum and average humidity and rainfall were 0.277, 0.300, 0.048, 0.051, 0.005 and -0.305, respectively.

Whitefly (*Bemisia tabaci* Genn.)

Whitefly incidence on mungbean crop was noted during 32th standard week with 2.1 whitefly/6 leaves/plant. The peak population of whitefly was recorded during 36th standard week with 14.1 whitefly/6 leaves/plant. The correlation of whitefly population with minimum and maximum temperature, minimum, maximum and average humidity and rainfall were 0.492, 0.488, 0.141, 0.171, 0.163 and -0.099, respectively.

The population of aphid, jassid and whitefly increased gradually with the increase in temperature and reached at peak level during 36th standard week. Thereafter declination in the population of these insect pests was observed with the decrease in both temperatures. Therefore the population was positively correlated with the maximum temperature. Similar results were found in the case of population of aphid and whitefly with humidity, whereas the population of jassid was negatively co-related with minimum and average humidity. The aphid, jassid and whitefly population showed negative co-relation with rainfall.

Similar results were observed by other authors; Kumar *et al*. (2004) reported the peak population of whitefly in first two week of May on mungbean and second two week of September on urdbean with a positive correlation with temperature and sunshine hours.

Umbarkar *et al*. (2010) reported that green gram crop infested by gram pod borer [*Helicoverpa armigera* (Hubner)], incidence of pest started from 31th standard week and reached at peak in 37th standard week. Pest population had positive correlation with maximum temperature and negative with minimum temperature, humidity and rainfall.

The major insect pests of mungbean recorded in the semi-arid region of Rajasthan were jassid (*Empoasca motti),* whitefly (*Bemisia tabaci*) and thrips (*Caliothrips indicus).* The incidence of insect pests started from first week of august and remained active throughout the crop season. The peak population of these pests was observed in the first week of September (Nitharwal and Kumawat, 2013).

The seasonal incidence of insect pests of mungbean during *kharif* season indicated that the population of jassid and whitefly started from 31th standard week with 0.4/cage jassid and 0.2/cage whitefly. The peak population of jassid and whitefly ranged from 0.4-5.8/cage and 0.2-7.4/cage respectively. The incidence of thrips, blister beetle, tobacco caterpillar, epilachna beetle were also reported (Singh and Yadav, 2013).

Yadav *et al*. (2015) reported incidence of whitefly on green gram started from 36th standard week and attained peak population in 39th standard week. Whitefly population showed positive correlation with temperature, humidity and rainfall.

Table 1: Seasonal incidence of insect pests on mungbean during *kharif* season-2019.

Standard observation	Date of week	Mean population of insect pests		
		Aphid/10cm twig/plant	Jassid/6 leaves /plant	Whitefly/6 leaves /plant
32	09/08/2019	00	0.3	2.1
33	16/08/2019	0.9	2.4	6.4
34	23/08/2019	3.2	6.2	9.7
35	30/08/2019	6.8	8.9	10.1
36	06/09/2019	10.2	10.1	14.1
37	13/09/2019	9.1	7.4	10.3
38	20/09/2019	8.3	6.3	8.4
39	27/09/2019	2.3	4.3	5.5
40	04/10/2019	2.1	3.2	3.2
41	11/10/2019	1.9	2.6	2.3

Table 2: Weekly recorded meteorological data during the *kharif* season-2019.

Date of observation	Temperature (°C)		Relative humidity (%)			Rainfall (mm)
	Min.	Max.	Min.	Max.	Avg.	
09/08/2019	30	38	41	57	49.5	0.0
16/08/2019	26	36	50	71	62.1	78.0
23/08/2019	28	39	22	46	33.8	0.0
30/08/2019	26	34	35	59	46.8	7.9
06/09/2019	29	40	37	60	49.1	0.0
13/09/2019	28	40	35	54	45.6	0.0
20/09/2019	27	37	43	68	55.2	0.90
27/09/2019	27	38	39	71	55.5	0.0
04/10/2019	20	31	29	53	40.8	11.9
11/10/2019	22	36	18	41	29.3	0.0

Table 3: Correlation coefficient (r) of insect pests with abiotic factors.

Abiotic factors	Correlation coefficient		
	Aphid	Jassid	Whitefly
Minimum Temperature (ºc)	0.309	0.277	0.492
Maximum Temperature (ºc)	0.373	0.300	0.488
Minimum Humidity %	0.084	-0.048	0.141
Maximum Humidity %	0.100	0.051	0.171
Average Humidity %	0.088	-0.005	0.163
Rainfall (mm)	- 0.349	-0.305	-0.099

*Correlation is significant at 0.05 level.

Kumar *et al*. (2016) reported that mungbean crop is infested by jassid (*Empoasca kerri),* whitefly (*Bemisia tabaci*) and thrips (*Taeniothrips sp.*) and incidence of these insect pests started from 15th standard week and remained up to 22th standard week. Peak population of insect pests were recorded in 20th standard week. Jassid population had positive correlation with temperature and negative correlation with humidity.

Bairwa and Singh (2017) investigated that the population dynamics of major insect pests of mungbean in relation to abiotic factors during kharif season 2014-2015 revealing the peak population of *Bemisia tabaci, Caliothrips indicus, Maruca vitrata, Aphis* cracivora and *Empoasca kerri* in 35thstandard week. The maximum temperature had positive correlation with population dynamics of *E. kerri, A. craccivora, C. indicusand M. vitrata. E. kerri* had positive correlation with rainfall while all other insect had negative correlation with rainfall. *E. kerri* and all other insect showed negative correlation with sunshine.

Mohapatra *et al.* (2018) observed that black gram, (*Vigna mungo* (Linn.)) crop was mainly infested by whitefly (*Bemisia tabaci*), jassid (*Empoasca kerri*), bihar hairy caterpillar *(Spilosoma oblique* Walker) and tobacco caterpillar (*Spodoptera litura* F.). The maximum population

of pests was observed during 39th standard week. All insect pests under study had positive correlation with temperature and rainfall and negative correlation with relative humidity.

Singh *et al*. (2019) investigated seasonal incidence of sucking insect pests of green gram during *kharif* 2015, the peak population of jassid and whitefly during first week of September. Jassid and whitefly population showed negative correlation with minimum temperature, relative humidity and rainfall but with maximum temperature jassid had negative correlation and whitefly had positive correlation.

Rajawat *et al*. (2020) reported that black gram crop was infested by whitefly and aphid. The incidence of whitefly started from 5th week of July and reached at peak in 4th week of August and aphid started from 2nd week of August and reached at peak in 2nd week of September. Both pests had positive correlation with temperature and negative with humidity and rainfall.

ACKNOWLEDGEMENT

The author is thankful to Professor Lal Singh Rajpurohit former Head, Department of Zoology, Jai Narain Vyas University, Jodhpur for making facilities available during research work.

REFERENCES

Anonymous (2018). Pulses revolution from food to nutritional security. Crop Division, Government of India, Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation and Farmers Welfare Krishi Bhawan, New Delhi, 4-18.

Bairwa, B. and 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. and Naqvi, N.A. (2002). Efficacy of neem and synthetic insecticides for the management of insect-pests of green gram [*Vigna radiata* (L.) Wilczek]. Pest Management and Economic Zoology. 10(1): 57-60.

Das, S., Shekhar, U.D and Ghosh, P. (2014). Assessment of molecular genetics diversity in some green gram cultivars as revealed by ISSR analysis. Advances in Applied Science Research. 5(2): 93-97.

Hussain, F., Malik, A.U., Haji, M.A. and 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 Science. 21(3): 622-625.

Hussain, M. (2015). Agro-climatic Zones and Economic Development of Rajasthan. International Journal of Humanities and Social Science Invention. 4(2): 50-57.

Kumar, D., Shukla, A. and Bondre, C.M. (2016). Succession and incidence of insect pest on green gram (*Vigna radiata* L. Wilzek) during summer season. Advances in Life Sciences. 5(5): 1782-1784.

Kumar, R., Ravikant and Ojha, C.B. (2004). Character association and cause effect analysis for spring season genotype of mung (Vigna radiata L.). Legume Research. 27(1): 32-36.

Kumar, R., Razvi, S.M.S. and Ali, S. (2004). Seasonal and varietal variation in the population of whitefly (*Bemisia tabaci* Genn.) and incidence of yellow mosaic virus in urd and mungbean. Indian Journal of Entomology. 66(2): 155-158.

Mohapatra, M.M., Singh, D.C., Gupta, P.K., Chandra, U., Patro, B. and Mohapatra, S.D. (2018). Seasonal incidence of major insect pests on blackgram, *Vigna mungo* (Linn.) and its correlation with weather parameters. International Journal of Current Microbiology and Applied Science. 7(6): 3886-3890.

Nitharwal, M., Kumawat, K.C. and Choudhary, M. (2013). Population dynamics of insect pests of green gram, *Vigna radiata* in semi-arid region of Rajasthan. Journal of Insect Science (India). 26(1): 90-92.

Panchabhavi, K.S. and Kadam, M.L. (1990). Avoidable loss in yield due to insect pests at different stages of growth in pigeon pea. Indian J. Agricultural Science. 60: 742-743.

Rajawat, I.S., Kumar, A., Alam, M.A., Tiwari, R.K. and Pandey, A.K. (2020). Insect Pest of Black Gram (*Vigna mungo* L.) and Their Management in Vindhya Region. Legume research. Online First Articles, 1-8. DOI: 10.18805/LR-4171

Sehrawat, N., Bhat, K.V., Sairam, R.K. and Pawan, K.J. (2013). Identification of salt resistant wild relatives of mungbean [*Vigna radiata* L. Wilczek]. Asian Journal of Plant Science and Research. 3(5): 41-49.

Sharar, M.S., Ayub, M., Nadeem, M.A. and Noori, S.A. (2001). Effect of different row spacing and seeding densities on the growth and yield of gram. Pakistan Journal of Agricultural Science. 38: 95-99.

Singh, M., Bairwa, D.K. and Jat, B.L. (2019). Seasonal incidence of sucking insect pests of green gram. Journal of Entomology and Zoology Studies. 7(2): 654-658.

Umbarkar, P.S., Parsana, G.J. and Jethva, D.M. (2010). Seasonal Incidence of Gram Pod Borer, *Helicoverpa armigera (Hubner)* on Green gram. Legume Research. 33(2): 148-149.

Ved, R., Massod, A., Misra, S.K. and Upadhyay, R.M. (2008). Studies on sulphur, zinc and bio fertilizers on yield and yield attributes and nutrient content at different growth stages of mungbean. J. Food Legumes. 21(4): 240-242.

Yadav, N.K. and Singh, P.S. (2013). Seasonal abundance of insect pests on mungbean and its correlation with abiotic factors. Journal of Entomological Research. 37(4): 297-299.

Yadav, P.C., Sharma, U.S., Ameta, O.P. and Padiwal, N.K. (2012). Seasonal incidence of major sucking pests of Groundnut (*Arachis hypogaea* L.). Indian J. Applied Entomology. 26(1): 57-59.

Yadav, S.K., Agnihotri, M. and Bisht, R.S. (2015). Seasonal incidence of insect-pests of blackgram, *Vigna mungo* (Linn.) and its correlation with abiotic factors. Agricultural Science Digest. 35(2): 146-148.