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Impact of Date of Sowing and Weather Parameters on Insect Pests Infesting Summer Mungbean

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ABSTRACT

An experiment was conducted at Pulses Research Station, SDAU, Sardarkrushinagar during summer 2021 and 2022 to find out the insect pests attacking mungbean crop sowing at different dates to determine the optimum date(s) of sowing. It is seen that the incidence and population fluctuation of various insect pests was very much dependent on the prevailed climatic conditions of the cropping season. Study on the impact of date of sowing on sucking pests revealed that the sucking pest populations of whitefly, leafhopper and thrips were significantly high during the crop sown on February 15 and March 8 during both years, and high pod borer damage and low yield were also recorded on this date of sowing. Sucking pest population and percent pod borer damage were comparatively low on the date of sowing on February 26th, and the highest yield was also recorded on this date of sowing. The last week of February is advisable for sowing summer mungbean to get a higher yield and the lowest sucking pest and pod borer populations

Key words Date of sowing, Mungbean, Leafhopper, Thrips, Whitefly, Podborer.

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INTRODUCTION

Pulses are an important food crop worldwide, especially in India, where they are the major source of vegetable proteins and micronutrients including iron for poorer sections of the population (Nair *et al.* 2013). The mungbean (*Vigna radiata* L.) is an important crop of India. Mungbean has many common names, viz., mung, moong, golden gram, mungo and green gram belongs to the family Fabaceae. It is well adapted to large number of cropping systems and creates an important source of cereal based diet worldwide. The biological value of wheat or rice improves greatly when it is combined with mungbean because of the complementary relationship of the essential amino acids (Suradkar *et al.* 2015). In India, during 2019-20, mungbean occupied an area of 45.81 lakh hectares with a total production of 25.09 lakh tonnes and productivity of 548 kg/ha (Anonymous 2020). The major mungbean producing states

in India are Rajasthan, Madhya Pradesh, Maharashtra, Karnataka and Bihar (Anonymous 2020). The major reason for lower yield is the sensitivity of the crop to insects, weeds and diseases caused by fungi, virus and bacteria (Anonymous 2012). A total of 64 species of insects have been reported to be attacking mungbean in the field condition (Anonymous 2014). It has also been estimated that 30% of pod damage is caused by spotted pod borer in greengram (Umbarkar and Parsana 2014). Yield loss due to whitefly was 30-70%, due to *Helicoverpa armigera* was 60%, in green gram. Weather conditions have an impact on the population of numerous insect pests, including the spotted pod borer. Date of sowing had direct impact on incidence of insect pests of mungbean. Keeping in view also the climate change issue, the present investigation on impact of date of sowing and weather parameters on insect pests infesting summer mungbean was carried out.

MATERIALS AND METHODS

The experiment was carried out at Pulses Research Station, Sardarkrushinagar Dantiwada Agricultural University, SDAU during summer 2021 and 2022. The experiment on mungbean crop variety GM 4 (Gujarat Mungbean 4) was conducted with three date of sowing (15th February, 26th February and 8th March during 2021, 2022) replicated seventh times under randomized block design. Mungbean was grown in plot size 10 ×10 m at a spacing of 30 × 10 cm between row to row and plant to plant by adopting all recommended agronomical practices except plant protection measures.

RESULTS AND DISCUSSION

First year (2021)

Amongst the sucking pests (Table 1 and Fig. 1), whitefly appeared from second week of March and remained till third week of April with a peak (0.60/ trifoliate) in fourth week of March in the first date of sowing. Whereas in the second date of sowing the incidence was noticed from third week of march and continued till first week of May with a peak (0.80/ trifoliate) in third week of March. In the third date

Table 1. Population of insect pests in different date of sowing at Sardarkrushinagar during summer 2021.

SMW	Whitefly/trifoliate			Leafhopper/trifoliate			Thrips/flower			*Helicoverpa armigera* larvae/plant		
	15/02	26/2	08/03	15/02	26/2	08/03	15/02	26/2	08/03	15/02	26/2	08/03
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.23	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	0.33	0.40	0.23	0.43	0.60	0.33	0.67	0.00	0.00	0.00	0.00	0.00
12	0.33	0.60	0.33	0.53	0.50	0.33	2.75	0.00	0.00	0.00	0.40	0.00
13	0.60	0.80	0.40	0.58	0.40	0.40	3.12	1.33	1.00	0.33	0.60	0.33
14	0.40	0.40	0.58	0.60	0.50	0.40	1.33	2.67	3.67	1.00	0.60	0.40
15	0.50	0.50	0.58	0.70	0.70	0.55	0.66	2.94	2.33	0.98	0.80	0.98
16	0.60	0.60	0.60	0.50	0.60	0.60	0.33	7.33	1.95	0.60	0.60	0.58
17	0.00	0.40	0.50	0.44	1.20	0.44	0.00	3.67	1.67	0.55	0.44	0.37
18	0.00	0.22	0.40	0.00	0.43	0.43	0.00	2.00	0.33	0.33	0.24	0.40
19	0.00	0.00	0.33	0.00	0.13	0.33	0.00	0.00	0.00	0.00	0.00	0.33
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
Mean	**0.27**	**0.36**	**0.36**	**0.37**	**0.46**	**0.35**	**0.81**	**1.81**	**1.00**	**0.34**	**0.33**	**0.31**
	Correlation coefficient											
BSS	-0.071	0.052	0.389	0.160	0.235	0.235	0.449	0.252	0.252	-0.273	0.294	0.226
Max T	-0.015	0.253	0.731**	0.214	0.375	0.375	0.698**	0.517	0.517	-0.042	0.440	0.360
Min T	0.109	0.291	0.673**	0.281	0.406	0.406	0.617*	0.520	0.520	0.015	0.444	0.389
MaxRH	0.028	0.088	0.349	0.072	0.164	0.164	0.302	0.255	0.255	-0.050	0.243	0.208
Min RH	-0.330	-0.148	0.051	-0.292	-0.076	-0.076	0.188	-0.051	-0.051	-0.324	0.157	0.003

Date of sowing	Pod borer damage at harvest (%)	Yield (kg/ha)
15 Feb	11.20	750
26 Feb	8.20	800
08 March	13.60	510

Note: *Significant at 5%, **Significant at 1%

SMW= Standard meteorological week, BSS= Bright sunshine hours, T= Temperature.

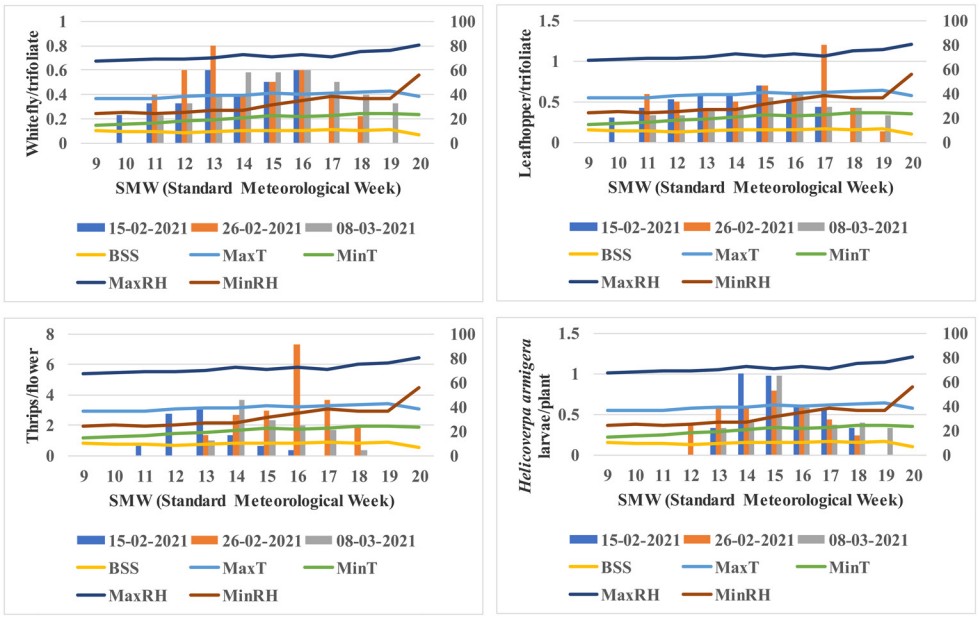

Fig. 1. Population of insect pests in different date of sowing at Sardarkrushinagar during summer 2021.

of sowing, it started from third week of march and continued till first week of May with a peak (0.60/ trifoliate) in third week of April.

Tamang *et al.* (2017) was noted that whitefly was found most abundant up to first two week of February. The present finding was nearly about same with earlier research.

Leafhopper commenced from second week of March and remained till last week of April with a peak (0.70/ trifoliate) in second week of April in the first date of sowing. Whereas, in the second date of sowing the incidence was noticed from third week of March and continued till second week of May with a peak (1.20/ trifoliate) in fourth week of April. In the third date of sowing, it started from third week of march and continued till second week of May with a peak (0.60/ trifoliate) in third week of April.

Earlier Nitharwal (2009) reported that minimum jassids incidence observed in early sown crop of mungbean. The present finding may vary with earlier finding variation might be due to difference on climatic condition in different location.

Thrips were seen in the flowers from third week of March and remained till third week of April with a peak (3.12/ flower) in last week of March in the first date of sowing. Whereas, in the second date of sowing the incidence was noticed from last week of March and continued till first week of May with a peak (7.33/flower) in third week of April. In the third date of sowing, it started from last week of March and continued till first week of May with a peak (3.67/ flower) in first week of April.

The present studies were in conformity with Sreekanth *et al.* (2002) and Prodhan *et al.* (2008) they found that the early and late sowing of mungbean crop contain more incidence of thrips.

Pod borer, Helicoverpa armigera was observed from fourth week of March and remained till first week of May with a peak (1.0/plant) in first week of April in the first date of sowing. Whereas, in the second date of sowing the incidence was noticed from third week of March and continued till first week of May with a peak (0.80/plant) in second week of April. Whereas, in third date of sowing, it started from fourth week of March and continued till second week of May

Table 2. Population of insect pests in different date of sowing at Sardarkrushinagar during summer 2022.

SMW	Whitefly/trifoliate			Leafhopper/trifoliate			Thrips/flowers			*Helicoverpa armigera* larvae/plant		
	15/02	26/02	08/03	15/02	26/2	08/03	15/02	26/2	08/03	15/02	26/2	08/03
11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	2.4	3.0	0.0	4.6	3.8	3.0	0.0	0.0	0.0	0.0	0.0	0.0
13	4.2	4.6	1.6	5.0	4.8	4.0	1.8	0.0	0.0	0.0	0.0	0.0
14	5.4	5.6	2.2	6.8	6.2	5.4	4.0	3.6	1.6	0.3	0.0	0.0
15	5.0	5.8	3.0	5.8	5.6	4.6	5.8	4.0	4.0	0.4	0.3	0.6
16	4.0	4.2	2.6	4.0	4.6	4.0	6.0	5.8	5.2	0.6	0.5	0.8
17	2.0	3.3	2.0	3.8	3.4	3.2	3.6	4.0	4.8	1.3	1.0	1.5
18	0.9	2.6	1.0	2.0	2.3	1.9	2.0	3.6	3.0	0.8	0.9	0.8
19	0.0	0.0	0.3	0.9	1.0	1.0	0.0	1.0	1.0	0.3	0.5	0.5
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean	**2.17**	**2.65**	**1.18**	**2.99**	**2.89**	**2.49**	**2.11**	**2.00**	**1.78**	**0.34**	**0.29**	**0.41**
						Correlation coefficient						
BSS	0.397	0.478	0.614	0.472	0.495	0.531	0.549	0.569	0.615	0.546	0.526	0.387
Max T	-0.052	-0.026	0.219	-0.057	-0.010	0.035	0.165	0.340	0.262	0.612	0.511	0.474
Min T	-0.136	-0.089	0.178	-0.169	-0.115	-0.082	0.192	0.371	0.339	0.542	0.508	0.445
Max RH	0.896**	0.830**	0.696*	0.808**	0.838**	0.840**	0.634*	0.384	0.213	-0.213	-0.287	-0.329
Min RH	-0.423	-0.316	-0.027	-0.418	-0.352	-0.326	0.056	0.337	0.432	0.620	0.691*	0.683*

Date of sowing	Pod borer damage at harvest (%)	Yield (kg/ha)
15 Feb	8.13	613
26 Feb	7.5	725
8 March	9.0	520

Note: *significant at 5%, **significant at 1%
SMW= Standard Meteorological Week, BSS= Bright Sunshine Hours, T= Temperature

with a peak (0.98/ trifolialte) in second week of April.

The present studies were in close conformity with Tamang *et al*. (2017) they found that the same pod borer population with current findings.

All the weather parameters, had a non-significant effect on insects except maximum and minimum temperatures which showed a highly significant positive effect on whitefly population on third date of sowing (8/3/2021). Also, the maximum temperature showed highly significant positive and minimum temperature had significant positive impact on thrips population.

Current finding was nearly about same with Kumar *et al*. (2016) and they found that the significant correlation of jassid population with max temp. The variation in present findings might be due to variation in climatic factors during growing season. Sujatha and Bharpoda (2017) was noted significant correlation of thrips population with BSS which are differing from current investigation, it might be due to different location, environmental fluctuation.

Percent pod borer damage at harvest (Table 1) was numerically lower (8.20%) in the mungbean crop sown on 26/02/2021 with highest yield (800kg/ ha) followed by first date of sowing (15/2/2021) with numerically 11.20 % and 750 kg/ha yield. Whereas, numerically highest (13.6 %) damage was obtained in the crop sown on 8/3/2021 with the yield of 510 kg/ha.

Makone *et al.* (2015) was noted lowest per cent pod damage and highest yield was recorded in last week of February. The present finding was same with earlier research.

Second year (2022)

Amongst the sucking pests Table 2 and Fig. 2, whitefly appeared from fourth week of March and remained till first week of May in the first and second dates

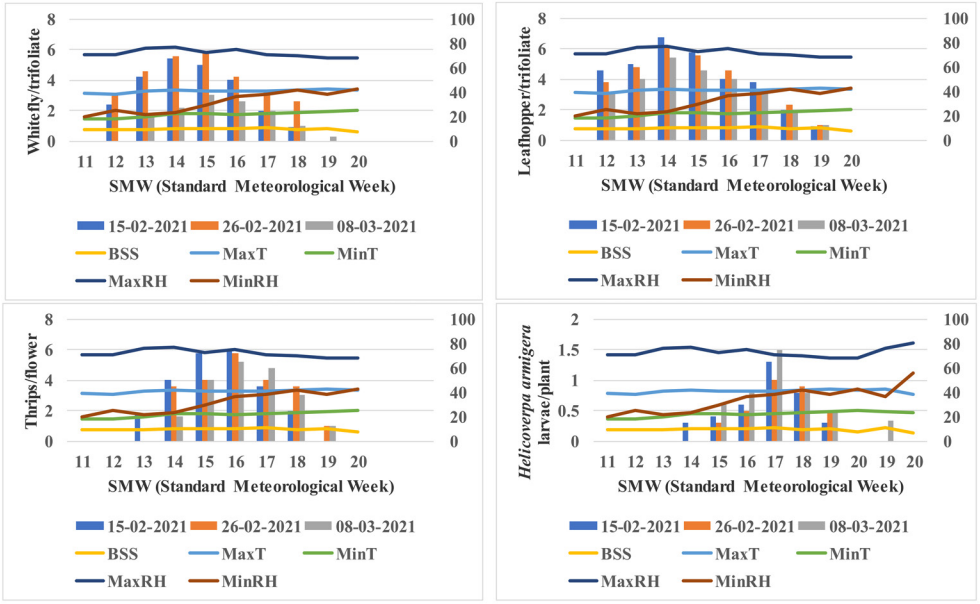

Fig. 2. Population of insect pests in different date of sowing at Sardarkrushinagar during summer 2022

of sowing with a peak in first week of April (5.4 / trifoliate) and second week of April (5.8 /trifoliate), respectively. Whereas in the third date of sowing the incidence also it was noticed from fourth week of March and continued till second week of May with a peak (3.0 /trifoliate) second week of April.

Our findings accordance to Meena *et al*.,(2013), Chandra and Rajak (2004) and Vikrant and Bajpai (2013). Current findings are similar to past research.

Leafhopper commenced from fourth week of March and remained till second week of May in all the three dates of sowing with a peak in first week of April (6.8 /trifoliate, 5.8 /trifoliate and 5.4 /trifoliate), respectively. Thrips were observed from fourth week of March and remained till first week of May in the first date of sowing with a peak in first week of April (5.4/ trifoliate) and second week of April (5.8 / trifoliate), respectively. Whereas, in the third and last date of sowing, the incidence was noticed from fourth week of March and continued till second week of May with a peak (3.0 /trifoliate) second week of April.

The present studies were in conformity with Sreekanth *et al*. (2002) and Prodhan *et al*. (2008) they found that the early and late sowing of mung-bean crop contain more incidence of leafhopper and thrips populations.

The larval population of podborer, Helicoverpa armigera was seen from fourth week of March and remained till second week of May with a peak (1.3 / plant) in fourth week of April in the first date of sowing. Whereas, in the second and third date of sowing, the incidence was noticed from second week of April and continued till second week of May in 2nd and 3rd date of sowing, with a peak (1.0 /plant) and (1.5 / plant) in fourth week of April, respectively. Percent pod borer damage at harvest was lower (7.50%) in the mungbean crop sown on 27/02/2022 with significantly highest yield (725 kg/ha) Whereas, highest (9.00 %) damage was obtained in the crop sown on 9th March with the yield of 520 kg/ha.

Makone *et al*. (2015) discovered the lowest percent pod damage and highest yield in the last week of February. The current finding was consistent with previous research.

All the weather parameters, had a non-significant effect on insects except maximum relative humidity

which showed a highly significant positive effect on whitefly and leafhopper for two date of sowing except 9th March in case of whitefly where in only significant impact was seen. Also, the maximum relative humidity showed significant positive impact on thrips population only on the first date of sowing (15/2/2022), whereas non-significant impact was observed on other dates of sowing. The Helicoverpa larval population showed a non-significant impact for all weather parameters studied except positive significant minimum relative humidity for last two date of sowing.

Kumar *et al.* (2016) noted that significant positive correlation was observed with maximum temperature with jassid population and negative correlation between morning relative humidity with jassid and whitefly population and morning vapour pressure with whitefly population. But current findings are somewhat differing from past research, this fluctuation it may be due to different location and environment.

Finally it can concluded that as far sucking pests was concerned lowest population is visible in second week of February (15 February) but as far as podborer was concerned lower population of *H. armigera* was observed during last week of February(26 February) along with highest yield.

REFERENCES

Anonymous (2012). Selected state wise Area, Production and Productivity of Moong (*kharif* and *rabi*) in India, Ministry of Agriculture and Farmers Welfare. Govt. of India.

Anonymous (2014) AESA based IPM package for blackgram and greengram. National Institute of Plant Health Management, Rajendranagar, Hyderabad, pp 2.

Anonymous (2020) All India estimates of area, production and yield of foodgrains. Retrieved from https://eands.dacnet.nic.in/APY_96_To_06.htm.

Chandra U, Rajak DC (2004) Studies on insect-pests on urdbean (Vigna mungo). Annals of *Pl Protection Sci* 12(1): 213-214.

Kumar Dipesh, Shukla Abhishek, Bondre CM (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.

Makone P, Patel JG, Desai CK, Das S, Pal V, Paramar JK (2015) Influence of weather parameters on summer greengram (*Vigna radiata* (L.) Wilczek) at Sardarkrushinagar. *J Agrometeorology* 17(1): 142-144.

Meena RS, Ameta OP, Meena BL (2013). Population dynamics of sucking pests and their correlation with weather parameters in chilli, *Capsicum annum L.* crop. The Bioscan 8(1): 177-180.

Nair RM, Yang RY, Easdown WJ, Thavarajah D, Thavarajah P, Hughes J, Keatinge JD (2013) Biofortification of Mungbean (*Vigna radiata*) as a whole Food to Enhance Human Health. *J Sci Food Agric* 93(8): 1805-1813.

Nitharwal M (2009) Management of key insect pests of green gram, *Vigna radiata* (Linn.) Wilckzek with special reference to Biorational practices. PhD (Agril.) Thesis submitted to the Rajasthan Agricultural University, Bikaner.

Prodhan MZH, Hossain MA, Rahman MT, Afroze F, Sarker MA (2008) Incidence of major insect pests of blackgram at different dates of sowing. *Int J Sustain Crop Prod* 3(3) : 6-9.

Sreekanth M, Sreeramulu M, Rao RD, Prasada VJ, Babu B, Sarath B (2002) Effect of sowing date on Thrips palmi Karny population and peanut bud necrosis virus incidence in greengram (*Vigna radiata* L. Wilczek). I*nd J Pl Protect* 30(1): 16-21.

Sujatha B, Bharpoda TM (2017) Succession of major insect pests and impact of abiotic factors in green gram. Agriculture Update 12(10): 2788-2794.

Suradkar DD, Mane SS, Deshmukh JM (2015) Adoption of Recommended Production Technology on Greengram, Ann. plant soil res 17: 514-516.

Tamang S, Rao PV, Chaterjee M, Chakraborty G (2017) Population dynamics of major insect pests of mungbean (*Vigna-radiata* (L.) Wilczek) and correlation with abiotic factors under terai agro climatic zone of west Bengal. The Biosscan 2(2): 893-897.

Umbarkar PS, Parsana GJ (2014) Field Efficacy of Different Insecticides against Spotted pod borer, Maruca Vitrata (Geyer) Infesting Greengram. *J Ind Pollut Control* 30(2): 217-219.

Vikrant Swaminathan R, Bajpai NK (2013) Population dynamics of major insect pests of Blackgram. *Ind J Appl Entomol* 27(1): 16-20.