

Incidence of a major insect pest of cluster bean against dates of sowing

ABSTRACT

Aims: The present study was undertaken to determine the major sucking pests viz., jassid, *Empoasca kerri* Pruthi; whitefly, *Bemisia tabaci* (Genn.) and aphid, *Aphis craccivora* Koch and Thrips *Megalurothrips distalis* attacking cluster bean crop sown at different dates to determine the optimum sowing of dates.

Place and Duration of Study: An experiment was conducted at the experimental farm, College of Agriculture, Gwalior (Madhya Pradesh) during two consecutive years of *Kharif* 2022 and 2023

Methodology: An experiment was laid out in a simple randomized block design with five different dates of sowing. The observations on the population of sucking pest were recorded on five randomly selected tagged plants at weekly intervals. The data were subjected to statistical analysis by adopting the appropriate method of analysis of variance.

Results: The five different sowing dates revealed that the early sown crop had the minimum infestation of major sucking pests and the highest seed yield was obtained as compared to the late sowing crop. It is seen that the incidence of various insect pest populations was higher reliant on the prevailing climatic circumstances of the cropping seasons.

Conclusion: The manipulation of the agro-ecosystem by altering the date of sowing is an effective tool in combating the insect population as the minor change in the microclimate adversely affects the biology and population of the pest species

Keywords: Aphid, cluster bean, jassid, sowing date, thrips whitefly

1. INTRODUCTION

The summer annual legume cluster bean, [*Cyamopsis tetragonoloba* (L.) Taub., is a deep-rooted member of the *Leguminosae* (*Fabaceae*) family that is resistant to drought and extreme heat. The word gauaahar/guar comes from the Sanskrit word, which denotes cattle or cow fodder. The cluster bean has several health advantages because it is highly nutritious and treats anemia. It strengthens bones, promotes improved blood circulation, and is good for cardiovascular health. Because it benefits the developing baby, it is advised throughout pregnancy. Researchers from several places of India have confirmed that major cluster bean insect pests have a negative impact on seed yield and quality. To address this issue, farmers dump a vast amount of chemicals in the field, posing many environmental and health risks. To address the issue of indiscriminate pesticide use, environmentally friendly measures such as agronomic practices can be used. One such strategy is to change the sowing dates in order to avoid the insect's peak activity on the crop. The date of sowing has a significant impact on pest incidence, which could be related to variations in climatic conditions [1, 2, 3]. Early-planted crops have fewer pests and a higher yield than later-planted crops [4,5,6]. As a result, it is critical to determine the optimal planting times at which

crops might avoid insect pest damage and provide an ideal opportunity for the development of pest management technologies. As a result, the current study sought to investigate the impact of planting time on the incidence of cluster bean insect pests.

Sucking pests are the most prevalent and damaging crop pests worldwide, causing significant output losses. Among all the attacking insects, cluster beans are attacked by aphids, jassids, whiteflies, and thrips, which infest the crop from seedling to maturity and reduce productivity. It produces rolling, chlorosis, yellowing, spots on young leaves, shortening of young shoot internodes, deformation, and lesions on growing plant components, resulting in the plant remaining diminutive. The damage is produced by both "nymphs and adults".

MATERIAL AND METHODS

The study of different dates of sowing on the incidence of major sucking insect pests of Cluster bean was carried out at the experimental farm, College of Agriculture, Gwalior (Madhya Pradesh) during *Kharif* 2022 and 2023. Gwalior is situated in the Northern part (Gird region) of Madhya Pradesh. The Cluster bean genotype, HG-2-20 with a spacing of 45 x 10 cm was sown on five different dates viz., 26th July, 2nd Aug, 9th Aug, 16th Aug & 23rd Aug (2022 and 2023). An experiment was laid out in the Randomized Block Design in five replications with a plot size of 2.00m x 1.8m.

The crop will be allowed to have natural insect pest infestation. Population of the sucking pests, viz., aphid, thrips, jassid and whitefly will be recorded soon after their appearance by counting the number of nymphs and adults on ten randomly selected plants, during the early morning at weekly intervals by observing three leaves (upper, middle and lower).

2.1 Statistical analysis

All the research data about the incidence of insect pests were transformed using the square root transformation as per the method described by Panse and Sukhatme [7]. The data were subjected to statistical analysis by adopting the appropriate method of analysis of variance as described by Fisher and Yates [8].

3. RESULTS AND DISCUSSION

There were five dates of sowing studied in the present investigation. The population of *A. craccivora* gradually increased, with the delay in sowing of the cluster bean crop. The lowest pest population were recorded on the 26th July sown crop during both the years (Table 1). The minimum *A. craccivora* population recorded was 2.75 and 2.88 per three leaves on the 26th July sown crop during 2022 and 2023, respectively. The significant difference in building up of *A. craccivora* population was noticed between 26th July 2nd August, 09th August, 16th August, and the 23rd August sown crop in both the years. The highest population was observed on 23rd August sown crop, viz., 5.12 and 5.16 *A. craccivora* per three leaves in 2022 and 2023, respectively (Table 1). The pooled data of two years also showed a similar trend having lowest population of *A. craccivora* on 26th July and the highest population on 23rd August, viz., 2.82 and 5.14 *A. craccivora* per three leaves, respectively (Table 1). Yadav and Singh [9] found out that the early sowing crop had the minimum infestation of *A. craccivora* in July as compared to the late sowing crop. Similarly, Mishra and Gaurav [10] found that the alteration of the sowing dates reduces *A. craccivora* population.

The population of *M. distalis* also increased with the delay in the sowing time of cluster bean (Table 1). The lowest population of *M. distalis* (3.02 in 2022 and 3.06 in 2023 per three leaves) was observed on 26th July sown crop, whereas, it was highest on the 23rd August sown crop during both

the years of study. The *M. distalis* population on 26th July 2nd August, 09th August, 16th August, and the 23rd August during both the *kharif* seasons had statistically significant differences with each other in their population. The pooled data (Table 1) also revealed that the lowest *M. distalis* population was observed on the 26th July sown crop (3.04 *M. distalis* per three leaves). The current results are completely supported by the findings of Devi and Ram [11] who investigated that the maximum population of *M. distalis* in late sown crop while population was least in early sown). Similarly, Prodhane *et al.* [12] and Bhatnagar [13] revealed a lower incidence of *M. distalis* was recorded in the early sown of different crop.

The data presented in Table 1 revealed that the maximum *E. kerri* population appeared in the last week of the August sown crop during both years of study. The population of the *E. kerri*, recorded on 26th July 2nd August, 09th August, 16th August, and the 23rd August sown crop differed significantly with each other. A similar trend was also observed in *kharif* during both the years of study. All the five dates of sowing indicated that the incidence of *E. kerri* was significant on the crops sown on different dates in 2022 and 2023. The pooled of *E. kerri* revealed that minimum infestation was on early sown crop and maximum infestation on the late sown crop with 3.09 and 6.28 *E. kerri* per three leaves, respectively (Table 1). Dobhal *et al.* [14] who has reported the maximum population of *E. kerri* on late sowing crops. similar findings are also supported by Jaba *et al.* [15].

The population of *B. tabaci* also increased with the delay in the sowing time of cluster bean (Table 1). The lowest population of *B. tabaci* (3.77 in 2022 and 3.86 in 2023 per three leaves) was observed on the 26th August sown crop, whereas, it was highest on the 23rd August sown crop during both the years of study. The *B. tabaci* population on the 26th July 2nd August, 09th August, 16th August, and the 23rd August during both the *kharif* seasons had statistically significant differences with each other in their population. The pooled data (Table 1) also revealed that the lowest *B. tabaci* population was observed on the 26th July sown crop. These results corroborate with Acharya and Singh [16] who reported that the *B. tabaci* population was lowest in July sown crop. similar findings are recorded by Yadav and Singh [9] who observed that the early sowing of the crop was found efficient in avoiding the crop from attack of *B. tabaci*.

Table 1: Effect of sowing dates on the incidence of major sucking pests and seed yield of cluster bean.

S. No.	Sowing dates	Mean population of insect pests per three leaves											
		<i>A. craccivora</i>			<i>M. distalis</i>			<i>E. kerri</i>			<i>B. tabaci</i>		
		2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2023	2023	Pooled
1	26-Jul	2.75 (1.74) *	2.88 (1.76)	2.82 (1.82)	3.02 (1.81)	3.06 (1.82)	3.04 (1.88)	3.06 (1.82)	3.12 (1.84)	3.09 (1.90)	3.77 (1.99)	3.86 (2.01)	3.82 (2.08)
2	02-Aug	4.27 (2.18)	4.44 (2.22)	4.35 (2.20)	4.22 (2.17)	4.26 (2.18)	4.24 (2.18)	5.02 (2.34)	5.08 (2.36)	5.05 (2.36)	5.34 (2.41)	5.42 (2.43)	5.38 (2.42)
3	09-Aug	4.70 (2.28)	4.80 (2.3)	4.75 (2.29)	4.62 (2.26)	4.66 (2.27)	4.64 (2.27)	5.41 (2.43)	5.46 (2.44)	5.43 (2.44)	5.73 (2.49)	5.77 (2.5)	5.75 (2.50)
4	16-Aug	4.90 (2.32)	4.94 (2.33)	4.92 (2.33)	4.80 (2.3)	4.87 (2.32)	4.84 (2.31)	5.68 (2.48)	5.86 (2.52)	5.77 (2.50)	6.06 (2.56)	6.16 (2.58)	6.11 (2.57)
5	23-Aug	5.12 (2.37)	5.16 (2.38)	5.14 (2.37)	5.08 (2.36)	5.15 (2.38)	5.11 (2.37)	6.19 (2.59)	6.37 (2.62)	6.28 (2.60)	6.66 (2.67)	6.63 (2.67)	6.64 (2.67)
SE(m)±		0.11	0.12	0.10	0.10	0.11	0.10	0.12	0.12	0.10	0.13	0.14	0.11
C.D. at 5%		0.32	0.35	0.30	0.31	0.34	0.29	0.35	0.36	0.29	0.39	0.41	0.34

*Figures in parentheses are $\sqrt{x + 0.5}$ transformed values

4. CONCLUSION

The present findings conclude that altering the date of sowing is an effective tool in combating the insect population. The incidence of sucking insect pests in cluster bean could be prevented by understanding the ecological background of pests and minor changes in the microclimate. The current research showed that the minimum infestation was on the early sowing crop compared to the late sowing crop at the end of August in the Gwalior region of Madhya Pradesh.

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