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Screening of Cowpea Varieties for Relative Preference against Major Sucking Insect Pests

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ABSTRACT

The experiment was conducted during *kharif* (July-October) 2022 at the Agronomy Farm, Sri Karan Narendra College of Agriculture, Jobner to assess varietal resistance of some varieties of cowpea against major sucking insect pests. The aphid (*Aphis craccivora* Koch), leafhopper (*Empoasca fabae* (Harris)) and whitefly (*Bemisia tabaci* (Genn.)) were major sucking insect pests of cowpea and occuring in various parts of India and causing 20–40 % yield losses. Growing varieties resistant to insect pest is an ideal component of integrated pest management. The screening of available crop varieties helps to know the level of resistance in a particular variety so that farmers can cultivate it to attain higher yield even after pest infestation. In this study ten cowpea varieties (RC-19, GC-9040, KBC-9, Pant lobia-3, CPD-119, RC-101, Ajmer selection, KM-5, GC-3, CPD-3) were screened for their preference and susceptibility against the major sucking insect pests viz., aphid (*Aphis craccivora* Koch), leafhopper (*Empoasca fabae* (Harris)) and whitefly (*Bemisia tabaci* (Genn.)). None of the tested cowpea varieties were found completely free from insect pests infestation. However based on the level of insect pest incidence the varieties RC-101 and GC-3 were categorized as least susceptible to all three insect pests viz., aphid, leafhopper and whitefly. The varieties KBC-9, CPD-3, CPD-119, Pant Lobia-3 and GC-9040 were classified as moderately susceptible. While, the varieties RC-19, KM-5 and Ajmer Selection were identified as highly susceptible to aphid, leafhopper and whitefly.

KEYWORDS: Varietal preference, aphid, leafhopper, whitefly, susceptible, RC-101, cowpea and resistant

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1. INTRODUCTION

Cowpea (*Vigna anguiculata* (Linn.) Walp.) is an important leguminous crop in tropical and subtropical regions, serving as a source of food, forage, and soil fertility through nitrogen fixation (Singh and Jackai, 1985). The crop belongs to the family Fabaceae and well suited for cultivation across diverse Agro-ecological zones. Cowpea often referred as vegetable meat due to high amount of protein with excellent biological value on dry weight basis. The grain contains approximately 23.4% protein, 1.8% fat and 60.3 % carbohydrates and it is rich source of essential amino acids such as lysine and tryptophane (Singh, 1983). In Indian context, it is a minor pulse cultivated mainly in arid and semi-arid tracts, grown in pockets of Punjab, Haryana, Delhi, and West UP along with considerable area in Rajasthan, Karnataka, Kerala, Tamilnadu, Maharashtra and Gujarat. In India, cowpea occupies 654 lakh ha area and production of 599 lakh t along with productivity of 916 kg ha^{-1} (Anonymous, 2021). In Rajasthan, the area under cowpea was 48522 ha with the annual production of 26998 mt and productivity of 556 kg ha^{-1} (Anonymous, 2023). Sardhana and Verma (1986) reported that at least 21 insect pests attack the cowpea crop from germination to maturity. Among the most economically damaging insect pests are aphid (*Aphis craccivora* Koch); jassid (*Empoasca fabae* (Harris)); thrips (*Megaleurothrips distalis* Karny); army worm (*Mythimna separata* (Walker)); semilooper (*Thysanoplusia orichalcea* (Fab.)); leafminer (*Phytomyza horticola* Meigen) and pod borer (*Helicoverpa armigera* (Hubner)). These pests can lead to significant yield reductions (Prasad et al., 1983 and Satpathy et al., 2009). However, its production is severely constrained by a complex of insect pests, among which sucking pests-notably aphids, leafhoppers, whiteflies, and thrips-play a dominant role (Adipala et al., 2000; Yadav et al., 2015; Singh and Allen, 1980). These pests not only cause direct damage by sap-feeding but also act as vectors of viruses, compounding yield losses (Maradi et al., 2024). Indeed, early germplasm surveys identified cowpea cultivars globally that show varying degrees of resistance to these insects (Singh, 1987). In cowpea extensive efforts have been made to improve productivity by developing insect-resistant lines and applying modern quantitative genetics and genomic tools (Boukar et al., 2016, 2019; Ongom et al., 2022). These advances are expected to accelerate genetic gains and enable farmers to fully benefit from the crop's genetic potential (Ongom et al., 2021). Despite the recognized importance of resistance, the relative preference or differential feeding by sucking pests on different cowpea genotypes remains under-explored. Understanding which varieties are more or less preferred by pests under comparable conditions can inform breeding selection, integrated pest management (IPM), and deployment strategies. Screening cowpea genotypes against key insect pests is crucial for identifying reliable sources of resistance. Because insect pressure is one of the major causes of yield loss in cowpea, systematic evaluation of diverse germplasm under field and controlled conditions helps researchers pinpoint genotypes with inherent tolerance or resistance mechanisms. These resistant sources serve as valuable inputs for breeding programs, enabling the development of improved varieties that can withstand pest attacks, reduce reliance on chemical pesticides (Ranawat et al., 2020), and enhance yield stability for farmers. While some studies have reported on population dynamics of these pests in the field (e.g., seasonal incidence linked to meteorological parameters) (Yadav et al., 2025), screening of cowpea genotypes against aphid, *Aphis craccivora* koch (Choudhary et al., 2022) or their susceptibility to insecticides (Meena et al., 2020). Knowledge on specific factors that contribute to insect resistance can be extremely useful to entomologists and plant breeders. Hence, some varieties of cowpea were screened for resistance against major sucking insect pests.

2. MATERIALS AND METHODS

2.1. Study site

The investigations were conducted during *kharif* (July–October) 2022 at the Agronomy farm of S.K.N. College of Agriculture, Jobner (S.K.N. Agriculture University, Jobner). Geographically, Jobner was located at longitude of 75° 28' East, latitude of 26° 06' North and at the altitude of 427 m from the mean sea level (MSL). It falled under agro-climatic zone III A, the Semi-arid Eastern Plain region of Rajasthan, where sandy loam soils were prevalent.

The experiment was conducted using a simple Randomized Block Design (RBD) with ten cowpea varieties as treatments, each replicated thrice. Each variety was sown in individual plot of size 3.0×2.5 m^2. The spacing between row to row and plant to plant were kept 30 cm and 10 cm, respectively. There were 10 rows of each variety $plot^{-1}$. The crop was sown on 14th July, 2022.

Ten cowpea varieties were screened to assess the varietal preference against major sucking insect pests viz., aphid, leafhopper and whitefly were considered as treatments. The varieties screened and their sources of supply were given in Table 1.

2.2. Methods of data collection

Observation on the major insect pests viz., aphid, leafhopper and whitefly population were recorded at weekly interval from their appearance until harvesting of the crop. Data were collected from five randomly selected and tagged plants in each plot. The aphid population including nymphs and adults was recorded on 10 cm terminal shoot by visual counting method without disturbing the plant. The

Table 1: Varieties of cowpea and their sources of supply

Sl. No.	Name of variety	Source of supply
1.	RC-19	Rajasthan Agricultural Research Institute, Durgapura, Jaipur
2.	RC-101	-do-
3.	CPD-119	-do-
4.	GC-9040	-do-
5.	KBC-9	-do-
6.	Pant Lobia-3	-do-
7.	Ajmer selection	-do-
8.	KM-5	-do-
9.	GC-3	-do-
10.	CPD-3	-do-

population of leafhopper (nymphs and adults) was recorded on three leaves, viz., one each from top, middle and lower canopy of the plant (Rawat and Sahu, 1973). The population of whitefly was recorded by counting the nymphs and adults on three leaves, viz., one each from top, middle and lower canopy of plant. For counting the whitefly population, the leaf was held at the petiole by thumb and fore finger and twisted until the entire underside of leaf became clearly visible (Butter and Vir, 1990).

The data obtained on the populations of major sucking insect pests of cowpea from experimental field were transformed using the √X+0.5 transformation method (Gomez and Gomez, 1976) and subjected to analysis of variance (ANOVA). The peak population of aphid, leafhopper and whitefly on cowpea were categorized based on the following formula:

$\bar{x}\pm\sigma$

Where,

$\bar{x}$=Mean of peak insect population

σ=Standard deviation of peak insect population

The categories were made as under:

Mean insect population	Category
$<\bar{x}-\sigma$	Highly resistant
$\bar{x}-\sigma$ to $\bar{x}+\sigma$	Moderately resistant
$>\bar{x}+\sigma$	Least resistant

3. RESULTS AND DISCUSSION

Ten varieties of cowpea (*Vigna anguiculata)* namely, RC-19, GC-9040, KBC-9, Pant lobia-3, CPD-119, RC-101, Ajmer selection, KM-5, GC-3, CPD-3 were screened for their relative susceptibility to major insect pests of cowpea viz., aphid (*Aphis craccivora* Koch), leafhopper (*Empoasca fabae* (Harris)) and whitefly (*Bemisia tabaci* (Genn.)) during *kharif,* 2022. Among them, none of the varieties were found to be completely free from infestation by these pests.

3.1. Aphid, Aphis craccivora koch

The aphid population started to build up from 1st week of August (5th August, 2022) as evident in table. All the varieties were found infested with aphid, which ranged from 6.53 to 21.66 (10 cm)$^{-1}$ terminal shoot. The peak population of aphid was observed in all the varieties on 2nd September (35th SMW). The aphid incidence increased gradually on all the varieties, which was found to be in the range of 62.4 to 123.46 aphids (10 cm)$^{-1}$ terminal shoot, the minimum being on variety RC-101 and maximum on variety RC-19 (Table 2).

Based on the statistical categorization ($\bar{x}+\sigma$) (Table 3), the mean aphid population was found to be below 30.36 (10 cm)$^{-1}$ terminal shoot on varieties RC-101 and GC-3 and categorized as least susceptible to *A. craccivora*. The aphid population was in the range of 30.36–58.53 (10 cm)$^{-1}$ terminal shoot on varieties KBC-9, CPD-3, CPD-119, Pant Lobia-3 and GC-9040, which were categorized as moderately susceptible. The population of aphid was above 58.53 (10 cm)$^{-1}$ terminal shoot on varieties Ajmer Selection, KM-5 and RC-19, were categorized as highly susceptible. The ascending order of aphid infestation in different varieties of cowpea was: RC-101<GC-3<KBC-9<CPD-3<CPD-119<Pant Lobia-3<GC-9040<Ajmer Selection<KM-5<RC-19. The results were in agreement with the results obtained by Choudhary (2002), Anusha et al. (2013), Ranawat et al. (2020) and Choudhary et al. (2022) who reported that the variety RC-19 was more preferred by aphid on cowpea crop. Whereas, variety RC-101 categorized as moderately susceptible. The results were also supported from the findings of Jangu (2005) who reported that the variety GC-3 was least susceptible and variety RC-101 categorized as moderately susceptible.

3.2. Leafhopper, Empoasca fabae (harris)

The leafhopper population started to build up from 30th SMW (29th July, 2022) as evident in table 4. All the varieties were found infested with leafhopper, which ranged from 0.93 to 2.93 (3 leaves)$^{-1}$. The peak population of leafhopper was observed in all the varieties on 2nd September (35th SMW). The leafhopper incidence increased gradually on all the varieties, which were found to be in the range of 7.06 to 16.20 leafhopper (3 leaves)$^{-1}$, the minimum being on variety RC-101 and maximum on variety RC-19.

Based on the statistical categorization ($\bar{x}\pm\sigma$) (Table 5), the mean leafhopper population was found to be below 4.23 (3 leaves)$^{-1}$ on varieties RC-101 and GC-3, these varieties were

Table 2: Mean population of aphid, *Aphis craccivora* on different varieties of cowpea, *Vigna anguiculata* (L.) Walp. at weekly interval

Sl. No.	Varieties	Aphid population (10 cm)$^{-1}$ terminal shoot									
		05.08.22	12.08.22	19.08.22	26.08.22	02.09.22*	09.09.22	16.09.22	23.09.22	30.09.22	Mean
1.	CPD-3	10.80	39.93	68.13	65.73	87.86	38.06	21.13	12.40	9.26	39.26
		(3.36)	(6.36)	(8.28)	(8.14)	(9.40)	(6.21)	(4.65)	(3.59)	(3.12)	(6.31)
2.	GC-3	7.13	26.86	47.66	45.60	63.33	24.86	13.46	7.06	5.33	26.81
		(2.76)	(5.23)	(6.94)	(6.79)	(7.99)	(5.04)	(3.74)	(2.75)	(2.41)	(5.23)
3.	KM-5	19.26	59.73	98.06	94.06	118.26	61.53	62.06	33.60	16.66	62.58
		(4.45)	(7.76)	(9.93)	(9.72)	(10.90)	(7.88)	(7.91)	(5.84)	(4.14)	(7.94)
4.	Ajmer selection	18.06	57.13	97.93	91.40	116.46	58.46	58.80	30.53	15.86	60.51
		(4.31)	(7.59)	(9.92)	(9.59)	(10.81)	(7.68)	(7.70)	(5.57)	(4.04)	(7.81)
5.	RC-101	6.53	24.73	45.53	43.06	62.40	23.46	12.26	6.93	4.26	25.46
		(2.65)	(5.02)	(6.78)	(6.60)	(7.93)	(4.89)	(3.57)	(2.73)	(2.18)	(5.10)
6.	CPD-119	11.33	40.26	72.46	68.93	88.13	41.06	23.13	13.33	10.26	40.99
		(3.44)	(6.38)	(8.54)	(8.33)	(9.41)	(6.45)	(4.86)	(3.72)	(3.28)	(6.44)
7.	Pant Lobia-3	13.06	42.86	74.80	69.20	90.20	43.53	25.66	15.33	11.46	42.90
		(3.68)	(6.58)	(8.68)	(8.35)	(9.52)	(6.64)	(5.11)	(3.98)	(3.46)	(6.59)
8.	KBC-9	10.26	38.06	65.66	63.06	86.33	25.13	20.93	12.13	8.60	36.68
		(3.28)	(6.21)	(8.13)	(7.97)	(9.32)	(5.06)	(4.63)	(3.55)	(3.02)	(6.10)
9.	GC-9040	13.33	43.46	77.57	70.46	91.33	45.06	26.86	17.86	11.73	44.18
		(3.72)	(6.63)	(8.84)	(8.42)	(9.58)	(6.75)	(5.23)	(4.28)	(3.50)	(6.68)
10.	RC-19	21.66	65.33	101.26	96.06	123.46	62.76	63.40	34.93	16.80	65.07
		(4.71)	(8.11)	(10.09)	(9.83)	(11.13)	(7.95)	(7.99)	(5.95)	(4.16)	(8.10)
SEm±		0.15	0.31	0.36	0.35	0.39	0.31	0.24	0.22	0.17	0.34
CD (p=0.05)		0.45	0.91	1.06	1.04	1.15	0.91	0.69	0.66	0.49	1.00

Figures in the parentheses were √X+0.5 values, *: Peak population of aphid during the crop season

Table 3: Categorization of cowpea varieties into degree of susceptibility against aphid, *Aphis craccivora* Koch

S l . No.	Mean aphid population (10 cm)$^{-1}$ terminal shoot	Name of varieties	Category
1.	Below 30.36 ($\bar{x}$-σ)	RC-101 and GC-3	Least susceptible
2.	30.36 to 58.53 ($\bar{x}$-σ to $\bar{x}$+σ)	KBC-9, CPD-3, CPD-119, Pant Lobia-3, GC-9040	Moderately susceptible
3.	Above 58.53 (>$\bar{x}$+σ)	Ajmer Selection, KM-5 and RC-19	Highly susceptible

categorized least susceptible to *E. fabae*. The population of leafhopper was in the range of 4.23–8.94 (3 leaves)$^{-1}$ on varieties KBC-9, GC-9040, CPD-119, CPD-3 and Pant Lobia-3, therefore, categorized as moderately susceptible. The population of leafhopper was above 8.94 (3 leaves)$^{-1}$ on varieties KM-5, Ajmer Selection and RC-19, these were categorized as highly susceptible. The ascending order of leafhopper infestation on different varieties of cowpea was found in order: RC-101<GC-3<KBC-9<GC-9040<CPD-119<CPD-3<Pant Lobia-3<KM-5< Ajmer Selection<RC-19. The present results were in conformity with results obtained by Ranawat et al. (2020) who reported that the variety RC-19 as highly susceptible and variety RC-101 as moderately susceptible for leafhopper on cowpea crop. Different workers have worked on different varieties, therefore the findings related to preference of other varieties could not be discussed.

Table 4: Mean population of leafhopper, *Empoasca fabae* (Harris) on different varieties of cowpea, *Vigna anguiculata* (L.) Walp at weekly interval

Sl. No.	Varieties	Mean leafhopper population (3 leaves)$^{-1}$									
		29.07.22	05.08.22	12.08.22	19.08.22	26.08.22	02.09.22*	09.09.22	16.09.22	23.09.22	Mean
1.	CPD-3	1.93	4.20	6.20	8.26	9.33	11.46	8.73	5.06	3.46	6.51
		(1.56)	(2.17)	(2.59)	(2.96)	(3.14)	(3.46)	(3.04)	(2.36)	(1.99)	(2.65)
2.	GC-3	1.06	2.46	3.26	4.73	5.26	7.20	5.06	2.86	1.13	3.67
		(1.25)	(1.72)	(1.94)	(2.29)	(2.40)	(2.77)	(2.36)	(1.83)	(1.28)	(2.04)
3.	KM-5	2.80	5.73	9.53	11.73	12.93	15.80	12.66	7.66	5.33	9.35
		(1.82)	(2.50)	(3.17)	(3.50)	(3.66)	(4.04)	(3.63)	(2.86)	(2.41)	(3.14)
4.	Ajmer selection	2.86	5.86	9.80	12.06	13.06	15.86	12.86	7.93	5.46	9.53
		(1.83)	(2.52)	(3.21)	(3.54)	(3.68)	(4.04)	(3.66)	(2.90)	(2.44)	(3.17)
5.	RC-101	0.93	2.33	3.12	4.46	5.13	7.06	4.86	2.80	1.06	3.53
		(1.20)	(1.68)	(1.90)	(2.23)	(2.37)	(2.75)	(2.32)	(1.82)	(1.25)	(2.01)
6.	CPD-119	1.86	4.13	5.20	8.06	8.73	11.06	8.33	4.86	3.06	6.14
		(1.54)	(2.15)	(2.39)	(2.93)	(3.04)	(3.40)	(2.97)	(2.32)	(1.89)	(2.58)
7.	Pant Lobia-3	2.00	4.26	7.06	8.53	9.46	11.73	9.46	5.66	3.66	6.87
		(1.58)	(2.18)	(2.75)	(3.00)	(3.16)	(3.50)	(3.16)	(2.48)	(2.04)	(2.71)
8.	KBC-9	1.73	2.93	3.73	5.46	6.46	7.93	6.13	3.46	2.20	4.45
		(1.49)	(1.85)	(2.06)	(2.44)	(2.64)	(2.90)	(2.57)	(1.99)	(1.64)	(2.22)
9.	GC-9040	1.80	4.06	5.06	7.93	8.53	10.80	7.93	4.66	2.80	5.95
		(1.52)	(2.14)	(2.36)	(2.90)	(3.00)	(3.36)	(2.90)	(2.27)	(1.82)	(2.54)
10.	RC-19	2.93	5.93	10.33	12.40	13.66	16.20	13.20	8.13	5.60	9.82
		(1.85)	(2.54)	(3.29)	(3.59)	(3.76)	(4.09)	(3.70)	(2.94)	(2.47)	(3.21)
SEm±		0.08	0.10	0.13	0.17	0.16	0.18	0.15	0.12	0.11	0.14
CD (p=0.05)		0.23	0.31	0.39	0.49	0.49	0.53	0.45	0.35	0.32	0.42

Figures in the parentheses are √X+0.5 values; *: Peak population of leafhopper during the crop season

Table 5: Categorization of cowpea varieties into degree of susceptibility against leafhopper, *Empoasca fabae* (Harris)

Sl. No.	Mean leaf hopper population (3 leaves)$^{-1}$	Name of varieties	Category
1.	Below 4.23 ($\bar{x}$-σ)	RC-101 and GC-3	Least susceptible
2.	4.23 to 8.94 ($\bar{x}$-σ to $\bar{x}$-σ)	KBC-9, GC-9040, CPD-119, CPD-3, and Pant Lobia-3	Moderately susceptible
3.	Above 8.94 (>$\bar{x}$+σ)	KM-5, Ajmer Selection and RC-19	Highly susceptible

3.3. Whitefly, Bemisia tabaci (Genn.)

The whitefly population started to build up from last week of July (29th July, 2022) as evident in table 6. All the varieties were found infested with whitefly population. The mean whitefly population ranged from 0.66 to 2.73 (3 leaves)$^{-1}$. The peak population of whitefly in all the varieties on 2nd September in which the population of whitefly ranged from 5.93 to 12.6 (3 leaves)$^{-1}$.

Based on the statistical categorization ($\bar{x}$-σ) (Table 7), the mean whitefly population was found to be below 3.41 (3 leaves)$^{-1}$ on varieties RC-101 and GC-3, these varieties were categorized least susceptible to *B. tabaci*. The population of whitefly was in the range of 3.41–6.47 (3 leaves)$^{-1}$ on varieties KBC-9, GC-9040, CPD-119, CPD-3 and Pant Lobia-3, therefore, categorized as moderately susceptible. The population of whitefly was above 6.47 (3 leaves)$^{-1}$ on varieties KM-5, Ajmer Selection and RC-19, these were categorized as highly susceptible. The descending order of whitefly infestation in different varieties of cowpea was: RC-

Table 6: Mean population of whitefly, *Bemisia tabaci* (Genn.) on different varieties of cowpea, *Vigna anguiculata* (L.) Walp at weekly interval

Sl. No.	Varieties	Mean whitefly population (3 leaves)$^{-1}$									
		29.07.22	05.08.22	12.08.22	19.08.22	26.08.22	02.09.22*	09.09.22	16.09.22	23.09.22	Mean
1.	CPD-3	1.73	3.06	5.80	6.06	6.26	9.06	5.73	4.26	1.93	4.88
		(1.49)	(1.89)	(2.51)	(2.56)	(2.60)	(3.09)	(2.50)	(2.18)	(1.56)	(2.32)
2.	GC-3	0.80	1.67	3.80	3.93	4.13	6.06	3.60	2.13	1.00	3.01
		(1.14)	(1.47)	(2.07)	(2.10)	(2.15)	(2.56)	(2.02)	(1.62)	(1.22)	(1.87)
3.	KM-5	2.26	4.46	7.86	8.20	8.13	12.26	8.06	5.93	3.06	6.69
		(1.66)	(2.23)	(2.89)	(2.95)	(2.94)	(3.57)	(2.93)	(2.54)	(1.89)	(2.68)
4.	Ajmer Selection	2.60	4.60	7.93	8.40	8.60	12.40	8.20	6.06	3.26	6.89
		(1.76)	(2.26)	(2.90)	(2.98)	(3.02)	(3.59)	(2.95)	(2.56)	(1.94)	(2.72)
5.	RC-101	0.66	1.53	3.73	3.80	4.06	5.93	3.53	2.06	0.93	2.91
		(1.08)	(1.42)	(2.06)	(2.07)	(2.14)	(2.54)	(2.01)	(1.60)	(1.20)	(1.85)
6.	CPD-119	1.60	2.93	5.53	5.93	6.13	8.93	5.60	3.93	1.86	4.72
		(1.45)	(1.85)	(2.46)	(2.54)	(2.57)	(3.07)	(2.47)	(2.10)	(1.54)	(2.28)
7.	Pant Lobia-3	1.80	3.26	5.93	6.13	6.33	9.13	5.93	4.33	2.13	5.00
		(1.52)	(1.94)	(2.54)	(2.57)	(2.61)	(3.10)	(2.54)	(2.20)	(1.62)	(2.34)
8	KBC-9	1.40	2.20	4.26	4.30	5.93	6.40	4.06	2.93	1.46	3.66
		(1.38)	(1.64)	(2.18)	(2.19)	(2.54)	(2.63)	(2.14)	(1.85)	(1.40)	(2.04)
9.	GC-9040	1.53	2.80	5.46	5.80	6.00	8.80	5.46	3.66	1.73	4.58
		(1.42)	(1.82)	(2.44)	(2.51)	(2.55)	(3.05)	(2.44)	(2.04)	(1.49)	(2.25)
10.	RC-19	2.73	4.86	8.06	8.46	8.66	12.60	8.46	6.33	3.40	7.06
		(1.80)	(2.32)	(2.93)	(2.99)	(3.03)	(3.62)	(2.99)	(2.61)	(1.97)	(2.75)
SEm±		0.08	0.09	0.12	0.13	0.13	0.16	0.12	0.11	0.08	0.12
CD (p=0.05)		0.23	0.28	0.36	0.37	0.38	0.46	0.36	0.33	0.24	0.36

Figures in the parentheses are √X+0.5 values; *: Peak population of whitefly during the crop season

Table 7: Categorization of cowpea varieties into degree of susceptibility against whitefly, *Bemisia tabaci* (Genn.)

Sl. No.	Mean whitefly population (3 leaves)$^{-1}$	Name of varieties	Category
1.	Below 3.41 ($\bar{x}$-σ)	RC-101 and GC-3	Least susceptible
2.	3.41 to 6.47 ($\bar{x}$-σ to $\bar{x}$-σ)	KBC-9, GC-9040, CPD-119, CPD-3, and Pant Lobia-3	Moderately susceptible
3.	Above 6.47 (>$\bar{x}$+σ)	KM-5, Ajmer Selection and RC-19	Highly susceptible

19>Ajmer Selection>KM-5>Pant Lobia-3>CPD-3>CPD-119>GC-9040>KBC-9>GC-3> RC-101. Ranawat et al. (2020) reported that the cowpea variety RC-19 ranked highly susceptible and variety RC-101 as moderately susceptible to the whitefly infestation corroborated the investigation.

4. CONCLUSION

The varieties RC-101 and GC-3 were found to be least susceptible while, the varieties KM-5, Ajmer Selection and RC-19 were found to be highly susceptible. The moderately susceptible varieties were KBC-9, CPD-3, CPD-119, Pant Lobia-3 and GC-9040 against aphid, leafhopper and whitefly.

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