EFFECT OF SOWING ON POPULATION DYNAMICS OF APHID *MYZUS PERSICAE* (SULZER) ON CUMIN

Nisha Choudhary[1] and M M Kumawat[1]

[1]College of Agriculture, Agriculture University, Jodhpur 342304, Rajasthan, India
*Email: kumawatmm@gmail.com (corresponding author): ORCID ID 0000-0002-8378-620X

ABSTRACT

A field experiment was conducted to study the population dynamics of aphid, *Myzus persicae* (Sulz.) and to see the effect of sowing dates. Cumin variety Gujarat Cumin 4 (GC-4) was grown during rabi 2020-21. The incidence and population fluctuation was dependent on the weather parameters. The incidence initiated in third week of December (51st Standard Meteorological Week-SMW). Initially, incidence was low (6.00 aphids/ three umbels) but it gradually increased and reached the peak in last week of January i.e. 5th SMW (115.03 aphids/three umbels). The early sown crop (26th October) had the minimum infestation (68.00 aphid/3 umbels) of aphids and highest seed yield (4.90 q/ ha) was obtained as compared to the late sowing crop on 7th December (106.50 aphids/ umbels) with minimum seed yield (3.10 q/ ha).

Key words: Aphid, *Myzus persicae*, cumin, weather parameters, seasonal incidence, sowing dates, seed spices, population dynamics, climate change, ecology, populatoin is umbels

Cumin is largely cultivated in Rajasthan and Gujarat in India and both the states collectively contribute more than 90% of total country's cumin production. Among the different factors responsible for low production of cumin in India, insect pests are the limiting factors. Many insect pests have been recorded in cumin viz., aphid, *Myzus persicae* (Sulz.), *Aphis gossypii* (Glover), *Hyadaphis coriandri* (Das), mirid bug *Orthops* (=*Lygus*) *compestris*, thrips *Thrips tabaci*, *Scirtothrips dorsalis*, *Frankliniella schultzei* and jassids *Empoasca* sp. (Meena et al., 2018; Suthar et al., 2022; Kumar et al., 2023). Among these aphid, *M. persicae* is a serious pest under Rajasthan conditions. Aphids are greatly affected by weather parameters such as temperature, relative humidity, rainfall etc. and these are adapted specifically to the set of environmental and physiographic conditions. Not much work has been done on date of sowing in cumin especially in the arid-region of Rajasthan. Assessment of optimum sowing time has also been recognized as one of the main prerequisites for the establishment of effective IPM.

MATERIALS AND METHODS

Field experiment was laid out during rabi 2020-21 in a simple randomized block design (RBD) at the Instructional Farm, College of Agriculture, Agricultural University, Jodhpur (Rajasthan) with seven sowing dates viz., 26th October, 2nd November, 9th November, 16th November, 23rd November, 30th November and 7th December. Each date was replicated thrice. For observing the effect of weather parameters on seasonal incidence five plots were separately sown with variety Gujarat cumin-4 (GC-4) sown by line sowing method having plot size 3.5 x 3.0 m with 30 x 10 cm (R x P) distance. All the recommended agronomical practices were followed. The crop was allowed to have natural insect infestation and free from any insecticidal spray. The observations on aphid incidence were recorded on five randomly selected tagged plants from each experimental plot early in the morning soon after the appearance of aphid at weekly interval till harvesting. Seed yield was also recorded after harvesting. Per plot yield was converted into yield/ ha. The counts of aphid recorded on different dates of sowing was transformed into $\sqrt{x+0.5}$ values. The correlation coefficient of dates of sowing with aphid incidence and seed yield as well as with meteorological parameters was carried out.

RESULTS AND DISCUSSION

The major incidence of aphid in the field was comprised of *Myzus persicae* (Sulz.), and beside this *Aphis gossypii* (Glover) and *Hyadaphis coriandri* (Das) were also reported but their population was negligible. The aphid incidence was recorded during the 51st Standard Meterological Week (SMW) which gradually increased and reached the peak in last week of January i.e. 5th SMW (115.03 aphids/ three umbels). A gradual decline was noticed, thereafter (Fig. 1). The peak incidence occurred in last week of January to first week of February in Rajasthan (Samota et al., 2015;
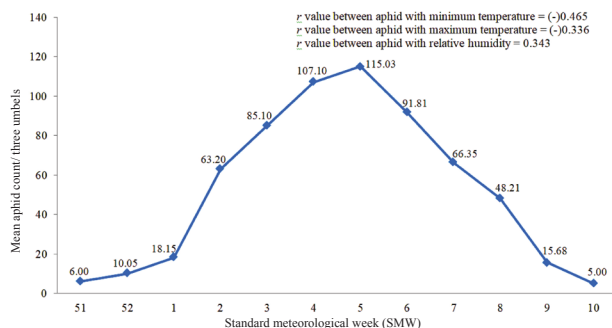
Fig. 1. Population dynamics of aphids in cumin

Yadav et al., 2018a; Regar et al. 2022). Quantitative estimation of population dynamics of *M. persicae* was carried out in relation to abiotic factors viz., minimum and maximum temperature and relative humidity. The correlation coefficient worked out revealed negative non- significant with maximum temperature (r= -0.336) and minimum temperature (r= -0.465). The correlation coefficient between relative humidity and aphid incidence was positively non- significant (r= 0.343). The present findings also get support from the results obtained by Shewale and Borad (2020) and Samota et al. (2015).

The incidence of *M. persicae* increased with the delay in sowing time; minimum peak was found on the crop sown on 26th October (68.00 aphids/ 3 umbels) followed by 2nd November (71.00 aphids/ 3 umbels) and 9th November (75.00 aphids/ 3 umbels). Maximum incidence was recorded on the crops sown on 7th December (106.50 aphids/ 3 umbels). The present findings revealed that the maximum yield (4.90 q/ ha) was observed in early sown crop, i.e. 26th October followed by 2nd November (4.70 q/ ha) and 9th November (4.55 q/ ha). However, minimum seed yield (3.10 q/ ha) followed by 3.25 q/ ha was obtained in late sown crop 7th December and 30th November, respectively, found both at par to each other (Table 1). Yadav et al. (2018b) found that the maximum incidence was recorded in late sown crop (5th December) while minimum incidence was recorded in early sown crop (25th October). The present finding also get support from the observations of Bana and Deshwal (2013), Kanani et al. (2015) and Hake et al. (2018) who reported that the early sown crop was less infested by aphid that gave higher yield. The yield of cumin had significant negative correlation with sowing dates (r= -0.980) and incidence of aphid (r= -0.988); and it exhibited significant positive correlation with sowing dates (r= 0.967). Hake et al. (2018) and Yadav et al. (2018b) also found positive correlation between sowing dates and aphid incidence. It is concluded that early

Table 1. Incidence of aphid on cumin vs. different dates of sowing (Rabi 2020-21)

Date of sowing	Counts of aphids/ 3 umbels on standard meteorological week*														Overall mean	Yield (q/ ha)
	48	49	50	51	52	1	2	3	4	5	6	7	8	9		
26th October, 2020	0.00 (0.71)	2.35 (1.69)	4.05 (2.13)	8.00 (2.92)	14.00 (3.81)	16.25 (4.09)	25.70 (5.12)	42.25 (6.54)	52.00 (7.25)	68.00 (8.28)	43.00 (6.60)	21.00 (4.64)	4.50 (2.24)	0.00 (0.71)	21.51 (4.69)	4.09
2nd November, 2020	0.00 (0.71)	0.00 (0.71)	2.00 (1.58)	6.33 (2.61)	12.50 (3.61)	18.25 (4.33)	28.68 (5.40)	49.50 (7.07)	56.00 (7.52)	71.00 (8.46)	48.00 (6.96)	24.5 (5.00)	6.75 (2.69)	1.75 (1.50)	23.23 (4.87)	4.70
9th November, 2020	0.00 (0.71)	0.00 (0.71)	1.66 (1.47)	4.00 (2.12)	10.75 (3.35)	22.00 (4.74)	30.98 (5.61)	53.00 (7.31)	58.00 (7.65)	75.00 (8.69)	50.00 (7.11)	29.75 (5.50)	9.00 (3.08)	3.75 (2.06)	24.85 (5.03)	4.55
16th November, 2020	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	2.66 (1.78)	8.50 (3.00)	25.00 (5.05)	34.78 (5.94)	56.00 (7.52)	68.25 (8.29)	83.25 (9.15)	51.75 (7.23)	33.75 (5.85)	11.50 (3.46)	8.00 (2.92)	27.39 (5.28)	3.90
23rd November, 2020	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	6.00 (2.55)	27.25 (5.27)	43.28 (6.62)	58.00 (7.65)	76.50 (8.77)	96.50 (9.85)	57.50 (7.62)	40.25 (6.38)	34.50 (5.92)	15.00 (3.94)	32.48 (5.74)	3.45
30th November, 2020	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	5.00 (2.35)	14.00 (3.81)	28.00 (5.34)	43.90 (6.66)	80.75 (9.01)	98.50 (9.95)	67.25 (8.23)	59.50 (7.75)	38.00 (6.20)	25.00 (5.05)	32.85 (5.77)	3.25
7th December, 2020	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	16.50 (4.12)	45.38 (6.77)	86.25 (9.31)	106.50 (10.34)	82.50 (9.11)	62.75 (7.95)	42.00 (6.52)	21.00 (4.64)	33.06 (5.79)	3.10
SEm±	0.01	0.01	0.03	0.05	0.03	0.06	0.07	0.09	0.11	0.13	0.11	0.09	0.07	0.05	0.07	0.12
CD at 5%	0.05	0.03	0.08	0.16	0.10	0.17	0.22	0.28	0.34	0.38	0.32	0.27	0.21	0.15	0.22	0.36

Figure in parentheses are $\sqrt{x+0.5}$ transformed values; *Mean of three replications

sowing (26th October to 2nd November) resulted in low incidence of aphids. Such low level of aphid population caused less crop injury which resulted in enhanced yield of cumin. Hence, it is suggested that early sowing is the appropriate sowing time of cumin.

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AUTHOR CONTRIBUTION STATEMENT

N Choudhary conducted experiment and wrote the manuscript. M M Kumawat conceptualized, planned and guided during the study and corrected the manuscript.

CONFLICT OF INTEREST

No conflict of interest.

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