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Correlation studies between abiotic factors and infestation of aphid on safflower

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Abstract
During the years 2008 and 2009, a correlation study between abiotic variables and aphid infestation of the Bhima variety of safflower, Carthamus tinctorius L., was conducted. The crops sown during the first, third, second, and third weeks of October, November, and December, respectively, showed peaks of 140.35 and 139.80 aphids/ 10 cm twig during the fifth week after sowing. The crops sown during the first and third weeks of December showed peaks of 140.35 and 139.80 aphids/ 10 cm twig during the fifth week after sowing. The crop planted in the first and third weeks of October was less affected by this bug. Aside from the crop sowed during the first week of December, when the pest was strongly and adversely connected with maximum temperature (r = 0.9974), there was no significant influence of climatic conditions on the incidence of aphid.
Safflower, *Carthamus tinctorius*, *Uroleucon compositae*, and sowing are some of the related terms.

Keywords: Abiotic factors, aphid, safflower

Introduction
One of the crucial rabi oilseed crops is safflower, *Carthamus tinctorius* L. (Compositae), which is most likely an Arabian native. The most devastating insect pest that affects this crop is the aphid, *Uroleucon compositae* Theobald. The nymphs and adults negatively impacted the health of the crop and seed production by sucking the cell sap from the inflorescence, shoots, capitula, and underside of leaves. According to Basavangoud (1979) [3] and Painkra *et al*. (2003) [5], *U. compositae* caused yield losses in the safflower crop of 68% and 50%, respectively, in Karnataka and Chattisgarh. Research was conducted at College Agronomy Farm, Bansilal Amritlal College of Agriculture, Anand Agricultural University (AAA), Anand, to determine the impact of meteorological parameter on the presence and abundance of *U. compositae* in connection to different sowing seasons in Middle Gujarat conditions.

Materials and Methods
Chrysanthemums of the Bhima variety were sowed in the first and third weeks of October, November, and December, respectively. On the predetermined planting date, the crop was grown using conventional agronomic techniques. Throughout the crop season, no insecticidal sprays were applied to the plots. At weekly intervals, the number of aphids on a randomly chosen 10 plants in each sector was counted on a 10 cm terminal twig. Bright sunshine (BSS), wind speed (WS), rainfall (RF), maximum (MaxT), minimum (MinT), and mean (MT) temperatures; morning (RH1), evening (RH2), and mean (MH) relative humidity; morning (VP1), evening (VP2), and mean (MVP) vapour pressure; and morning (VPD1), evening (VPD2), and mean (MVPD) vapour pressure deficit recorded by department of meteorology were used to study the effect of weather parameters on population fluctu

Results and Discussion
The crop seeded during the first and third weeks of October revealed aphid incidence after 9 and 7 weeks after sowing, respectively, and reported considerably lower mean aphid populations (24.68 and 28.91/ 10 cm terminal twig, respectively). As a result, the crop was spared from aphid infestation. In the crop seeded during the first week of October, the aphid population peaked during the 12th week after sowing (45.83 aphids/ 10 cm terminal twig), whereas it peaked during the 11th week (52.95) in the crop cultivated during the third week of October. After 5 weeks following seeding, the first and third weeks of November's crop suffered from the bug. As in the case of a crop seeded during the first week of November, the population began to rise quickly after the eighth week and peaked (166.15) during the 13th week following sowing.

The crop sowed in the third week of November had the greatest mean aphid population (87.60), followed by the first week of November (82.42). The crop that was sown in the first and third weeks of December was significantly impacted in its early stages (4 weeks after planting). During these sowing seasons, pest activity persisted for a very little time at a high intensity. When it was grown in the third week of November, as well as the first and third weeks of December, the crop perished from a severe aphid infestation. Safflower crops often fared better when they were grown in the first or third week of October. According to Bade and Kadam (2001) [2], the crop seeded on 15th September had the lowest aphid population (10.30 aphids/three leaves/plant) and the crop sown on 15th November had the greatest aphid population (78.04); the crop sown on 30th November, 15th December, and 1st January perished as a result of a severe aphid infestation. In the current study, the crop grown during the third week of November as well as the first and third weeks of December exhibited comparable benefits, correlating with Bade and Kadam's findings. With the exception of the fifth sowing period, or the first week of December, when the maximum temperature (-0.9974*) was significantly and negatively correlated with the incidence of aphid, the data presented in Table 2 clearly show that there was no significant correlation between the incidence of aphid and weather parameters. The non-significant relationships between aphid populations and several climatic characteristics were also found by Neharkar (1999) [4] from Parbhani, Maharashtra, and Sahu (2008) [6] from Jabalpur, Madhya Pradesh, India. Similar to the findings of Akashe *et al.* (1995) [1], MaxT was shown to be significantly adversely linked with aphid only in cases of crops seeded during the first week of December.

Table 1: Incidence of aphid, *Uroleucon compositae* on safflower, *Carthamus tinctorius* in different sowing periods

No. of aphids/ 10 cm terminal twig at indicated week and sowing period																		
Sr. No.	SMW	WAT	1st Week Oct	SMW	WAT	3rd Week Oct	SMW	WAT	1st Week Nov	SMW	WAT	3rd Week Nov	SMW	WAT	1st Week Dec	SMW	WAT	3rd Week Dec
1	40	1	-	42	1	-	44	1	-	46	1	-	48	1	-	50	1	-
2	41	2	-	43	2	-	45	2	-	47	2	-	49	2	-	51	2	-
3	42	3	-	44	3	-	46	3	-	48	3	-	50	3	-	52	3	-
4	43	4	-	45	4	-	47	4	-	49	4	-	51	4	22.53	1	4	10.83
5	44	5	-	46	5	-	48	5	6.90	50	5	7.85	52	5	69.28	2	5	49.50
6	45	6	-	47	6	-	49	6	24.05	51	6	38.85	1	6	140.35	3	6	139.80
7	46	7	-	48	7	11.23	50	7	41.18	52	7	68.68	2	7	-	4	7	-
8	47	8	-	49	8	25.38	51	8	65.28	1	8	99.90	3	8	-	5	8	-
9	48	9	4.90	50	9	34.03	52	9	85.63	2	9	142.83	4	9	-	6	9	-
10	49	10	14.05	51	10	49.88	1	10	97.83	3	10	167.48	5	10	-	7	10	-
11	50	11	28.18	52	11	52.95	2	11	127.98	4	11	-	6	11	-	8	11	-
12	51	12	45.83	1	12	42.58	3	12	149.23	5	12	-	7	12	-	9	12	-
13	52	13	43.28	2	13	23.78	4	13	166.15	6	13	-	8	13	-	10	13	-
14	1	14	33.10	3	14	12.33	5	14	59.98	7	14	-	9	14	-	11	14	-
15	2	15	22.08	4	15	8.03	6	15	-	8	15	-	10	15	-	12	15	-
16	3	16	6.05	5	16	-	7	16	-	9	16	-	11	16	-	13	16	-
Mean			24.68			28.91			82.42			87.60			77.38			66.71

SMW – Standard meteorological Week WAS – Week after sowing

Table 2: Correlation between aphid, *Uroleucon compositae* population and weather parameters

Meteorological parameters	Correlation Coefficient					
	1st week of Oct.	3rd week of Oct.	1st week of Nov.	3rd week of Nov.	1st week of Dec.	3rd week of Dec.
Bright Sunshine Hours (BSS)	0.1817	0.3092	-0.1684	-0.0715	0.6660	0.5813
Wind Speed (WS)	-0.3930	-0.3966	-0.1178	0.2706	-0.1034	0.0049
Maximum Temperature (MaxT)	-0.2221	0.0209	-0.5422	-0.4071	-0.9974*	-0.9993
Minimum Temperature (MinT)	-0.5360	-0.3730	-0.2742	-0.0416	-0.7086	-0.6281
Relative Humidity Morning (RH1)	0.3976	0.3239	0.5236	0.0973	-0.0915	-0.1987
Relative Humidity Evening (RH2)	-0.0072	-0.0838	0.5260	0.5564	0.1996	0.3045
Vapour Pressure Morning (VP1)	-0.1806	-0.0416	-0.0142	-0.0454	-0.8902	-0.8356
Vapour Pressure Evening (VP2)	-0.1247	-0.1545	0.3553	0.2316	-0.3583	-0.2552
Vapour Pressure Deficit Morning (VPD1)	-0.4550	-0.3222	-0.5888	-0.1701	-0.3284	-0.2242
Vapour Pressure Deficit Evening (VPD2)	-0.1158	-0.0006	-0.5535	-0.7051	-0.6291	-0.7095

* Correlation is significant at the 5% level.

Summary and Conclusion

According to the results of the experiment, safflower planted in the first or third week of October had reduced aphid infestation. Aphid infection in the crop sowed during the first week of December was not influenced by abiotic conditions, with the exception of the highest temperature.

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