The Pharma Innovation Journal 2023; SP-12(12): 1061-1064

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(12): 1061-1064

www.thepharmajournal.com
Received: 07-09-2023
Accepted: 11-10-2023

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Seasonal incidence of sucking insect pests on Chrysanthemum under plain zone of Chhattisgarh at Pendri, Rajnandgaon

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Abstract
The field experiment was carried out at Research Instructional Farm, Rajnandgaon, Under College of Pt. Kishori Lal Shukla College of Horticulture and Research Station, Instructional Research farm, Pendri, Rajnandgaon (Chhattisgarh) during *Rabi* 2022-23. The studies revealed that the population of aphid noticed from last week of October (44th SMW) to last week of January (05th SMW). In comparison to all the month so crop period the highest activity of aphid was observed in 3rd week of December (51 SMW) with aphid population 76.32/three leaf. The results indicated that aphid population had significantly negative correlation with, maximum temperature (r = -0.667**). Thrips population was first appeared first week of November (45th SMW) at flowering stage to last week of January (05th SMW) and maximum peak population was (7.30/flower) observed in second week of December (50th SMW). The results indicated that thrips population had significantly negative correlation with, maximum temperature (r = -0.614*), while remaining weather parameters like minimum temperature, sunshine, average temperature, relative humidity, and rainfall were negatively non-significant correlated with both the insect.

Keywords: Aphid, thrips, seasonal incidence, correlation, abiotic factors

Introduction
The words "Chrysanthemum" and "anthemon" are Greek words that signify "flower" and "gold," respectively. It belongs to the asteraceae family and is commonly produced in open fields and esteemed as a powerful flower crop in many nations. Chrysanthemums were among the top ten cut flowers in the world market for flower crops, coming in second to Rose in terms of popularity, owing to their variety of flower shapes and sizes, beautiful color tones, and long blossom life (Brahma, 2002) [2]. Chrysanthemums are primarily used to make garlands, veni, weaths, bracelets, hair ornaments, garden decorations for exhibitions, and religious offerings (Bohra and Kumar 2014) [1].

Light and temperature are the two vital components that affect chrysanthemum growth and flowering. The peak season for chrysanthemum flowering is typically from August through December. However, the quality of these flowers is deteriorated due to many insect pests. Insect pests cause high economic loss to the growers. Insect pest complex studies on chrysanthemum revealed that a total of 11 insect species associated with the crop at different stages of the crop (Sreedhar *et al*., 2020) [9].

Chrysanthemum is infected by different pests such as aphids, caterpillars, mites, whiteflies, thrips and leaf miners. Among these insect pests, Chrysanthemum aphid [*Macrosiphoniella sanborni* (Gillette)], was of the key pest of the crop and is wide spread on cultivated Chrysanthemum throughout the world (Sewak and Sharma 2021) [8]. It is possible to lessen the negative effects of traditional insecticides by combining new generation pesticides (spinetoram, fipronil, and imidacloprid) with natural substances (NSKE, cow urine), because they are selectively toxic to insects while being safe for natural enemies, the new class of insecticides is more environmentally friendly.

Materials and Methods
Weekly observations of different insect pests and natural enemies was recorded from ten randomly selected plants of untreated plot of chrysanthemum crop from 1st Nov.2022 at

Research Farm, Pendri, Pt. Kishori Lal Shukla College of Horticulture and Research Station, Rajnandgaon during *rabi* 2022-23. Weekly aphid population was counted from top, middle and lower leaves of a plant (Saicharan *et al*., 2017) [7]. The populations of thrips was recorded by placing a hard paper sheet of white color A4 size (21 cm×30 cm) under the tropical portion of the plant and gently shaken on white card sheet. The thrips population on paper was counted with the help of l0x magnification power. The larval population was recorded on each plant by visual search method. Natural enemies population was recorded at the time of observation of insect pests.

Table 1: Seasonal incidence of sucking insect pests infesting chrysanthemum at Pendri, Rajnandgaon during *Rabi* 2022 -2023

S.N.	SMW	Date	Temperature (°C)			Relative Humidity (%)			Rainfall (mm)	Sunshine (Hours)	Insect pest population* (No.)	
			Max.	Min.	Average	Morning	Evening	Average			Aphid	Thrips
1	44	29/10/2022	31.94	24.41	28.18	89.14	44.86	67.00	1.00	7.66	8.00	0.00
2	45	05/11/2022	32.56	20.11	26.34	86.43	60.86	73.64	0.00	7.93	20.11	2.22
3	46	12/11/2022	31.80	17.43	24.61	86.86	39.00	62.93	0.00	7.80	33.50	3.60
4	47	19/11/2022	30.31	12.53	21.42	89.71	34.00	61.86	0.00	9.03	47.50	4.00
5	48	26/11/2022	32.67	18.93	25.80	88.43	55.43	71.93	0.00	5.17	58.12	3.80
6	49	03/12/2022	30.97	15.90	23.44	82.14	38.29	60.21	0.06	6.93	63.51	6.00
7	50	10/12/2022	28.60	14.66	21.63	84.43	25.57	55.00	0.00	8.79	67.10	7.30
8	51	17/12/2022	30.67	11.89	21.28	85.29	29.71	57.50	0.00	8.44	76.32	7.00
9	52	24/12/2022	30.16	15.80	22.98	84.71	28.29	56.50	0.00	8.49	71.60	6.80
10	01	01/01/2023	27.66	10.27	18.96	84.71	29.14	57.43	0.00	7.83	64.49	6.10
11	02	08/01/2023	28.41	8.65	18.53	85.13	25.50	55.31	0.00	8.69	61.30	5.55
12	03	15/01/2023	30.49	25.46	27.97	89.00	72.29	80.64	11.69	1.84	49.38	4.30
13	04	22/01/2023	28.44	25.13	26.79	91.86	69.43	80.64	10.69	2.41	44.65	2.90
14	05	29/01/2023	31.00	25.46	28.23	91.43	69.14	80.29	4.26	5.46	37.10	1.10
Seasonal mean											46.83	4.04

SMW = Standard Meteorological week, Average number of insect pests/plants

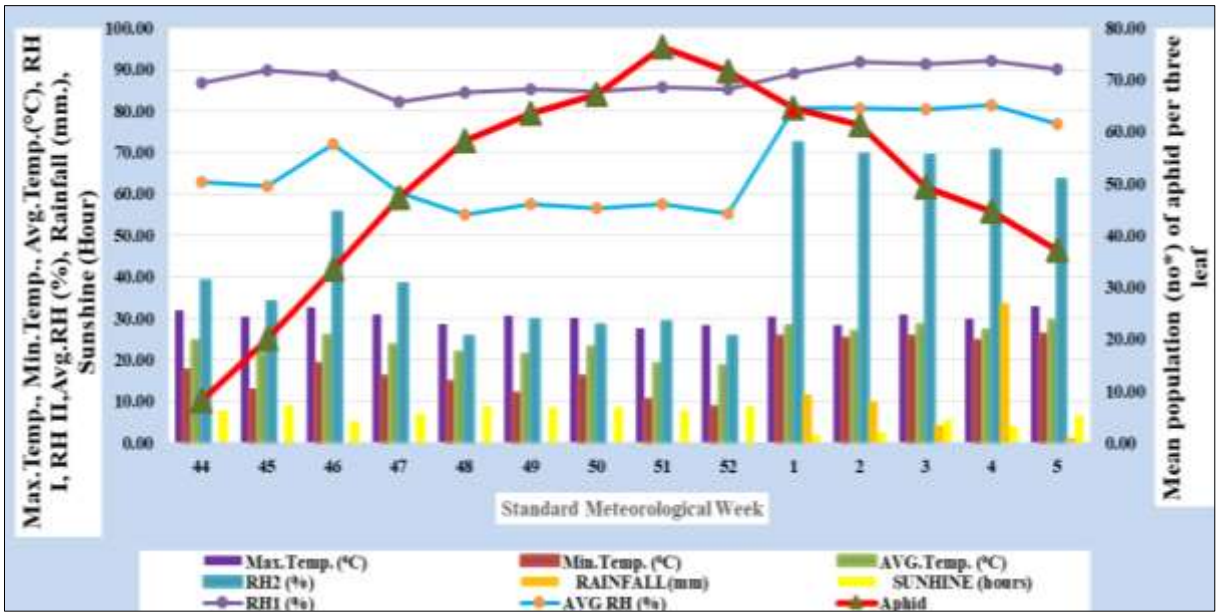

Fig 1: Seasonal incidence of aphid *Macrosiphoniella sanborni* (Hemipter: Aphididae) on chrysanthemum

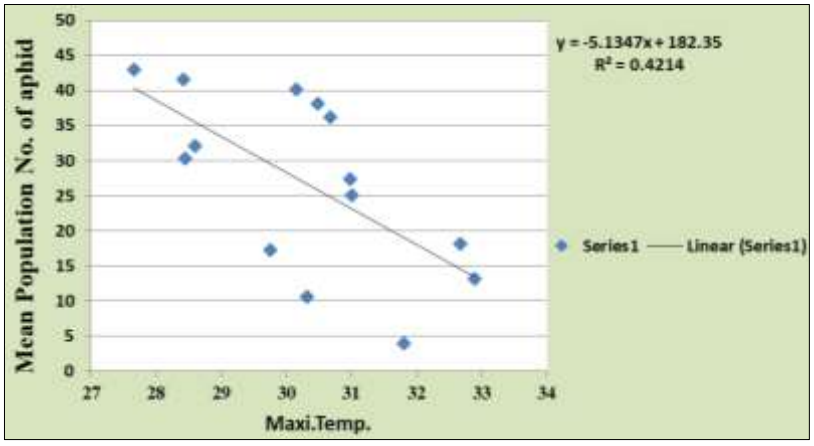

Fig 2: Regression of aphid infestation on maximum temperature (°C)

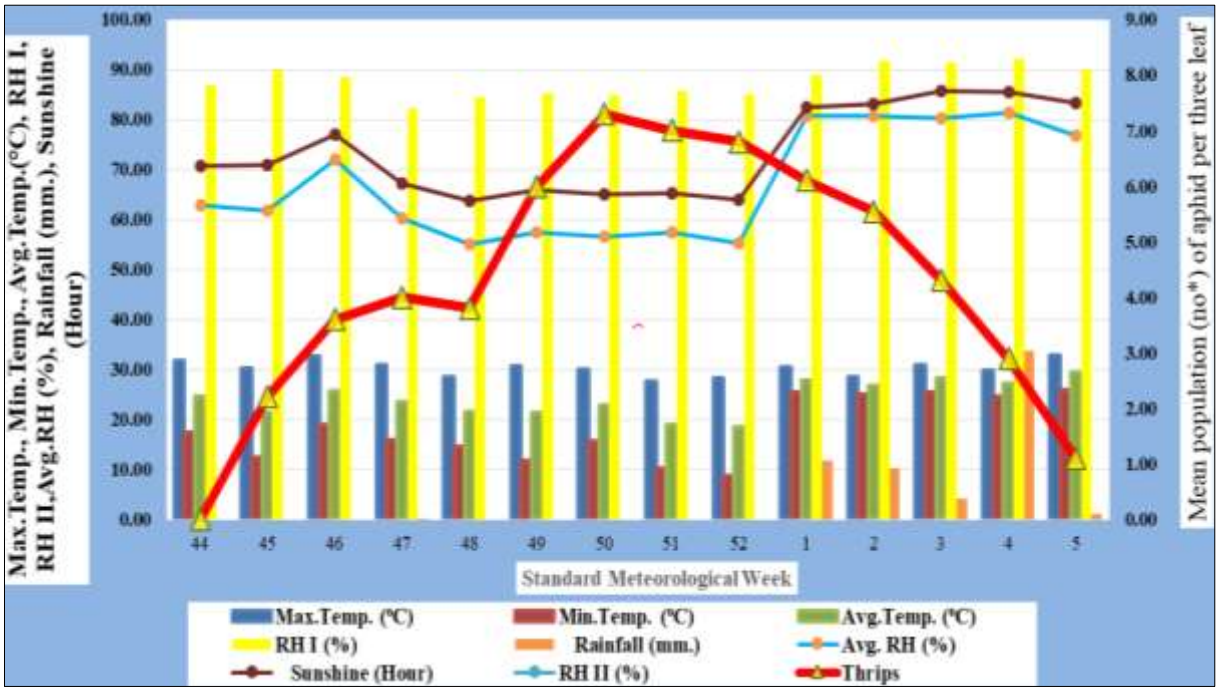

Fig 3: Seasonal incidence of thrips, *Thrips palmi* Karny, *Scirtothrips dorsalis* Hood (Thysanoptera: Thripidae) on chrysanthemum

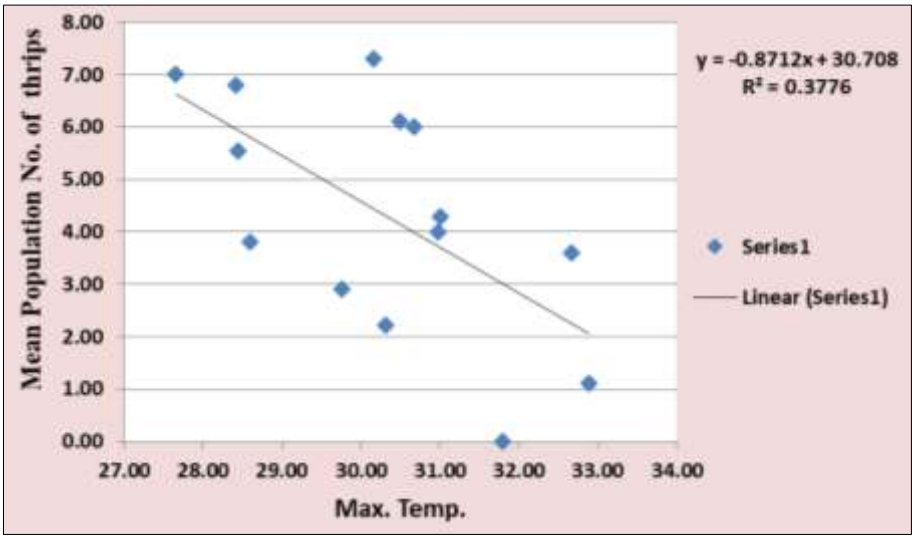

Fig 4: Regression of thrips infestation on maximum temperature (°c)

Table 2: Correlation (r) and regression (b_{yx}) coefficient between meteorological parameters and population of sucking pests

Meteorological parameters	Aphid		Thrips	
	r	b_{yx}	r	b_{yx}
Maximum Temperature (°C)	-0.667**	-5.134	-0.614*	-0.871
Minimum Temperature (°C)	-0.204	_	-0.318	_
Average Temperature (°C)	-0.331	_	-0.421	_
Morning RH (%)	-0.082	_	-0.313	_
Evening RH (%)	-0.158	_	-0.232	_
Average RH (%)	-0.18	_	-0.25	_
Sunshine (Hrs.)	0.025	_	-0.043	_
Rainfall (mm)	-0.031	_	-0.070	_

*Significant at 5%; **significant at 1%

Results and Discussions

The seasonal incidence of aphid was observed on chrysanthemum starting from last week of October 2022 to last week of January 2023 at weekly interval (Fig. 1). The first incidence of aphid was recorded on chrysanthemum crop in the last week of October (44th SMW) with an overall population ranged from 8.00 to 76.32 aphid/three leaf. The aphid population (76.32 aphid/three leaf) attained peak during the third week of December (51th SMW). The Weather condition prevailed during this period were maximum (30.67 °C), minimum (11.89 °C) and average (21.28 °C) temperatures, morning (85.29), evening (29.71) and average (57.50) relative humidity, Rainfall (0.00 mm) and sunshine hours (8.44 hrs.). From the third week of December (51th SMW), the Aphid population started declining and reached to lowest (37.10aphid/three leaf) during the last week of January (05th SMW).

Correlation co-efficient was worked out between the number of aphid and the weather factors *viz*., temperature (maximum and minimum), relative humidity (morning and evening), rainfall and sunshine hours (Table 1). The correlation studies of aphid, showed a significant negative correlation with maximum temperature (r = -0.667) and all other weather parameters were non-significantly correlated with population of aphid. The regression equation between aphid and maximum temperature (y = -5.134x + 182.3, R^2 = 0.421)

depicts that every unit increase in maximum temperature, the infestation level decreases by – 5.134 units. The correlation studies showed that the incidence of aphid was affected only by temperature, which indicated that the increase in temperature decreasing the population of aphid. The current findings are in consistent with pervious findings. In the safflower crop, Kamath and Hugar (2001) [3] observed the mean maximum temperature 28-30 °C significant negative correlation (r = -0.63) on aphid population. Painkra *et al*., (2003) [5] also studied on safflower crop and discovered significant negative relationship between the aphid and maximum and minimum temperature. Patil *et al.,* (2008) [6] discovered a significant negative correlation (r = - 0.63) between maximum temperature with relative humidity on aphid population.

The first activity of thrips (2.22/flower) on chrysanthemum was seen in the first week of November (45th SMW), with a population was (2.22 to 7.30) ranging from (Table 4.4). The thrips population was (7.30/flower) peaked during the second week of December (50th SMW). The weather conditions prevailed during this period were maximum (30.16 °C), minimum (15.80 °C) and average (22.94 °C) temperatures, morning (84.71%), evening (28.29%) and average (56.50%) relative humidity, sunshine hours (8.49 hrs.) and rainfall (0.00 mm). The thrips population was started declined during third week of December (51th SMW) and reached lowest population during last week of January (1.20/flower) (05th SMW). The correlation of thrips with weather parameters showed a significant negative correlation with maximum temperature (r = -0.614), while remaining weather parameters like minimum temperature, sunshine, average temperature, relative humidity, and rainfall were negatively non-significant correlated with thrips. The current findings are in consistent with pervious findings. In the rose crop, Norboo *et al.,* (2017) [4] observed the mean maximum temperature significant negative correlation on thrips population.

Conclusion

During the course of study, Aphid made its initial appearance on chrysanthemum crop in the last week of October in vegetative stage and maximum population (76.30 aphid/three leaf) during flowering stage in third week of December. The pest activity was observed on the crop up to maturity stage. The first appearance of Thrips was recorded in chrysanthemum crop during first week of November in vegetative stage. The peak activity (7.30/flower) of the pest was recorded during second week of December in flowering stage. The activity of thrips was observed up maturity stage of crop. We can conclude the all the weather factor showed negatively effect on pests population however maximum temperature show significantly negative effect on aphid with r value (-0.667), and thrips (-0.871), while remaining weather parameters like minimum temperature, sunshine, average temperature, relative humidity, and rainfall were negatively non-significant correlated with the both insect.

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