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Seasonal Incidence of Sucking Insect Pests in Brinjal (*Solanum melongena* L.)

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ABSTRACT: The present investigation on seasonal incidence of insect pests of brinjal were carried out at entomology research field, Institute of Agriculture and Natural Science, (Diksha Bhavan) Deen Dayal Upadhyaya Gorakhpur university Gorakhpur (Uttar Pradesh) during *Rabi*-2022-23. The first appearance of aphid in 46th SMW, whitefly in 47th SMW and jassid in 48th SMW was recorded. Aphid population was recorded maximum during 7th SMW whitefly in 8th SMW and jassid in 9th SMW. Aphid population showed negatively non-significant correlation with the min. temperature, max. temperature and rainfall whereas positively non-significant correlation with the relative humidity morning and relative humidity evening. The whitefly and jassid population showed positively non-significant correlation with the min. temperature and max. temperature and non-significant correlation with morning relative humidity, evening relative humidity and rainfall. This work tackles the problem of knowing the complicated dynamics of insect infestations in eggplant agriculture. Sucking insect pests such as aphids, whiteflies, and jassids threaten crop health and productivity by sucking sap from plants. This is a difficult task since we must determine when these bugs will appear, how much damage they will inflict, and how to stop them without damaging the ecosystem.

Keywords: Aphid, whitefly, Jassid, seasonal incidence, correlation, weather.

INTRODUCTION

Brinjal (*Solanum melongena* L.) is an important vegetable crop grown worldwide. It is one of the common and popular vegetables grown throughout all over India. China ranks first in the production of brinjal (42.3% of world output). India ranks second(39.3% of world output) after China in area and production of brinjal at global level (Vanitha *et al.,* 2013). It belongs to the family Solanaceae. The fruit shape varies from oblong, ovoid, long or round cylindrical. Brinjal is an important vegetable crop due to its nutritional, medicinal as well as commercial value. It can be found everywhere at reasonable price so it is referred to as 'poor man's vegetable' (Wankhede and Kale 2010).

After China, India is the second-biggest producer of vegetables globally. In India, during 2021-22 brinjal cultivation is estimated at 774 thousand hectares with production of 12768 thousand metric tons, respectively in Uttar Pradesh brinjal cultivation is Estimated at 8.82 thousand hectares with the production of 312.98 thousand tonnes which is share 2.45% in total production of India. The average yield of brinjal in India reported in around 749 thousand hectares with production of 12874 metric tons and in Uttar Pradesh brinjal production is 303.40 thousand tons. (Anonymous, 2022).

Brinjal has variety of uses in traditional and modern countries to cure various diseases, create ornaments, as food, in rituals and even as fuel. As food it can be cooked, boiled, stewed, grilled, baked, pickled, mashed, roasted, dried, fried and even microwaved (Araujo, 2022). It is an essential source of nutrients, which are found beneficial to human health. Brinjal contain energy 25 kcal, carbohydrate 5.88 g, protein 0.98g sugars 3.53g total lipid 0.18g and fibre 3g per 100 grams (Choudhary and Gaur 2009).

Brinjal is vulnerable to many insect pests, which can cause significant yield losses, insect pest poses a significant threat to the growth and yield of brinjal plants. Some of the major insect pests of brinjal are aphids, shoot and fruit borer, stem borer, whiteflies, jassid, hadda beetle, and mites, including few of the minor pests are thrips, leafhopper, brinjal leaf Webber, brinjal lace wing bug and there incidence is found medium to high (Tupe *et al.,* 2022). Jassids and whiteflies are sucking insect pests that start causing harm to crops at the very beginning of their growth. The sucking insects' nymphs and adults collect on the underside of the leaves to collect the cell sap, which breaks down the plants' fast development. Depending on the extent of the infestation, sucking pest loss ranges from 10 to 15 percent (Chatterjee *et al.,* 2018).

MATERIAL AND METHOD

The field experiment was conducted during *Rabi* 2022-2023 for studying the seasonal incidence of sucking pests of brinjal *viz.*, aphid, jassid, whitefly. The site of the experiment was Entomology research field, IANS, Deen Dayal Upadhyaya Gorakhpur university Gorakhpur (Uttar Pradesh) (latitude 26.7479º N and longitude 83.3812º E). with an altitude of 75 meters above the mean sea level. During the study 'Pusa Purple Round' variety was grown with a spacing of 60 × 50 cm in the plot size of 3.6 × 3 m. With all the recommended horticultural practices were fulfilled as per the standard package of cultural practices. The crop under investigation kept pesticide free and no other practices were followed to reduce the pest population, the plot was exposed for natural pests infestation. Observation on the incidence of different insect pest were recorded from the first appearance of the pest and it was continued till maturity of the crop at weekly intervals. The observation of sucking insect pest of brinjal crop *viz.*, Aphid, Whitefly and Jassid (Nymph and Adult) were recorded on six leaves per plant, each two leaves from the plant's upper, middle and lower canopy. Observation was taken on 5 randomly selected plants at weekly intervals. The mean population of pests was correlated with maximum temperature, minimum temperature, relative humidity morning, relative humidity evening, rainfall.

RESULT AND DISCUSSION

The data on population fluctuations of sucking insect of brinjal in the relationship with weather parameters are presented in (Table 1). The investigation was carried out during *Rabi* 2022-23 in order to know the incidence of insect pest on brinjal. The weather factor *viz.*, maximum temperature, minimum temperature, morning humidity, evening humidity and rainfall were considered.

A. Population fluctuation of aphid (Aphis gossypii) on brinjal

The data recorded on the population fluctuation of Aphid (*Aphis gossypii*) nymphs and adults during *Rabi* season 2022 – 23 in the range of 0.07 to 34.67 aphids/ six leaves (Table 1). Weekly observations on the incidence of aphid on the brinjal crop, revealed that the first appearance during the 3rd week of November – 2022 (46th SMW) at early stage of crop. Initially the population of aphids was recorded 0.07/ six leaves. The highest population 34.67/ six leaves were noticed during 3rd week of Feb. (7th SMW), during this period, maximum temperature (26.17°C), minimum temperature (11.57°C), morning relative humidity (80.29%) and evening relative humidity (41.29%) and rainfall (0.00 mm) were recorded. Thereafter, the population gradually decreased reaching 0.67/ six leaves during first week of May (18th SMW). Bhattacharyya *et al.* (2019) recoded maximum aphids population on during the 4th week of February (8th SMW).

Correlation studies revealed the result (Table 2) that maximum and minimum temperature exhibited non-significantly negative correlation (r = -0.141, -0.177 respectively) with aphid population while morning and evening relative humidity exhibited non-significantly positive correlation (r = 0.277, 0.116 respectively). Whereas rainfall was also showed the non-significantly negative correlation (r = -0.210).

Present research work is in line with the previous workers as Bhattacharyya *et al.*, (2019) reported the first appearance of aphid in 46th SMW at every stage of the crop. Veeravel and Baskaran (1995); Bhadauria *et al*. (1999); Bharadiya and Patel (2005); Elanchezhyan *et al*. (2008); Patial and Mehta (2008); Latif *et al.* (2009); Birla (2011); Gayakwad (2012); Gangwar and Singh (2014). All of them reported they also reported aphid to be an important sucking pest of brinjal. Which was present throughout the growing period. The correlation studies are fully in line with the Srivastav (2016) reported that maximum temperature and minimum temperature were in negatively non-significant correlation with pest population however relative humidity morning, relative humidity evening and rainfall were positively non-significant. The present work is partially supported by previous workers Khilari (2020) and Bharat (2020) reported that minimum temperature and rainfall is negatively non-significant with the pest population.

B. Population fluctuation of whitefly (Bemisia tabaci) on brinjal

The data recorded on the population fluctuation of whitefly (*Bemisia tabaci*) nymphs and adults revealed the result that the whitefly population on brinjal crop ranged from 0.13 to 11.27 whitefly/ six leaves (Table1). The first appearance of whitefly was recorded at the 4th week of November 2022 (47th SMW) with a population of 0.13/ six leaves. The highest population 11.27/ six leaves were noticed during 4th week of Feb. (8th SMW), during this period, maximum temperature (29.73°C), minimum temperature (14.9°C), morning relative humidity (81.57%) and evening relative humidity (35.43%), rainfall (0.00 ml) were recorded. Thereafter, the population gradually decreased reaching 1.87/ six leaves during first week of May (18th SMW).

Correlation studies revealed the result (Table 2) that maximum and minimum temperature exhibited non-significantly positive correlation (r = 0.309, 0.276 respectively) with whitefly population while relative humidity morning, relative humidity evening and rainfall showed non-significantly negative correlation (r = -0.104, -0.319 and -0.174 respectively).

In contrary to present finding Naik *et al.* (2009) reported that the peak period for whitefly incidence was 3rd week of February. And also, the results are partial agreement with the past workers as Bhowmik *et al.* (2018) reported that the first appearance of the whitefly on brinjal crop was recorded on 21st December,2015 during the 51st SMW (*i.e.*, 17th Dec to 23rd Dec., 2015) and reached its peak during 9th SMW (*i.e.*, 26th Feb to 4th March, 2016). Bhattacharyya *et al.* (2019) reported that the whitefly attained the peak on 2nd week of March during 10th SMW. The correlation studies are fully line with the Ayyanar *et al.* (2022) reported that

maximum temperature and minimum temperature were in positively non-significant correlation with pest population however relative humidity morning, relative humidity evening and rainfall were negatively non-significant correlation. The present work is partially supported by previous workers Khilari (2020) and Bharat (2020) reported that maximum temperature is positively non-significant while rainfall is negatively non-significant. Mahore *et al.* (2022) reported that morning relative humidity and evening relative humidity is negatively non-significant and Chandan (2018) reported that evening relative humidity is negatively non-significant with the pest population.

C. Population fluctuation of jassid (Amrasca biguttula biguttula) on brinjal

The data recorded on the population fluctuation of Jassid (*Amrasca biguttula biguttula*) nymphs and adults during *Rabi* season 2022 – 23 in the range of 0.40 to 9.87 jassid/ six leaves (Table 1). The first appearance of jassid was recorded at the last week of November 2022 (48th SMW) with a population of 0.40/ six leaves. The highest population 9.87/ six leaves were noticed during last week of February to first week of March (9th SMW), during this period, maximum temperature (30.7°C), minimum temperature. (16.06°C), morning relative humidity (78.29%) and evening relative humidity (37.14%), rainfall (0.00 ml) were recorded. Thereafter, the population of jassid gradually decreased reaching 1.13/ six leaves during first week of May (18th SMW).

Correlation studies revealed the result (Table2) that maximum and minimum temperature exhibited non-significantly positive correlation (r = 0.332, 0.302 respectively) with jassid population while relative humidity evening, relative humidity morning and rainfall showed non-significantly negative correlation (r = -0.332, -0.135 and -0.188 respectively).

In contrary to present finding Raidu *et al.* (2018) reported that the peak population of jassid was observed in third week of November. Kumar *et al.* (2016) reported that high population of jassid appeared on the crop during 3rd -4th week of march. Dahatonde *et al.* (2014) reported that incidence of jassid started from November and reached to a peak level during December. The correlation studies are fully line with the Ayyanar *et al.* (2022) reported that maximum temperature and minimum temperature were in positively non-significant correlation with pest population however relative humidity morning, relative humidity evening and rainfall were negatively non-significant correlation. Chandan (2018) reported that maximum temperature, minimum temperature and rainfall are positively non-significant correlated with the jassid population while morning and evening relative humidity are negatively non-significant. The present work is partially supported by previous workers Bharat (2020) reported that morning and evening relative humidity and rainfall are negatively non-significant and maximum temperature is positively non-significant with jassid population while minimum temperature is negatively non- significant. Mahore *et al.* (2022) reported that morning relative humidity and evening relative humidity is negatively non-significant with jassid population.

Table 1: Seasonal incidence of sucking pest of brinjal and metrological data.

Sr. No.	SMW	Temperature (°C)		Relative humidity (%)		RF (mm)	Mean population (nymph+ adult) per six leaves		
		Max Temp.	Min Temp.	Morning	Evening		Aphid	Whitefly	Jassid
1.	46	27.86	13.47	84.86	35.00	0.00	0.07	0.00	0.00
2.	47	29.33	12.39	83.43	38.86	0.00	0.33	0.13	0.00
3.	48	27.39	11.91	88.14	40.00	0.00	1.33	2.53	0.40
4.	49	25.73	11.17	83.57	45.57	0.00	1.53	2.67	1.80
5.	50	24.50	10.34	83.29	52.14	0.00	2.33	2.60	2.60
6.	51	23.84	11.43	87.14	49.00	0.02	4.73	2.53	2.13
7.	52	20.11	9.04	82.43	53.00	0.00	5.07	2.47	1.93
8.	1	12.44	9.14	83.86	74.29	0.00	7.67	2.27	1.07
9.	2	15.89	7.57	85.57	67.14	0.00	12.80	2.40	0.93
10.	3	21.80	7.36	83.71	46.14	0.00	16.07	3.87	3.13
11.	4	23.96	12.70	85.14	54.86	0.00	20.53	5.13	4.53
12.	5	22.91	11.97	86.14	55.00	0.00	25.73	6.27	5.87
13.	6	26.17	12.01	83.00	41.43	0.00	30.20	8.27	6.13
14.	7	26.50	11.57	80.29	41.29	0.00	34.67	10.00	6.53
15.	8	29.73	14.90	81.57	35.43	0.00	29.47	11.27	7.47
16.	9	30.70	16.06	78.29	37.14	0.00	27.40	10.93	9.87
17.	10	31.76	17.03	73.29	30.00	0.00	25.73	10.87	8.47
18.	11	30.54	17.69	80.71	39.14	0.00	17.53	9.07	7.33
19.	12	30.94	16.86	82.57	37.43	0.29	11.93	8.07	5.60
20.	13	32.16	18.24	64.43	27.14	0.00	8.20	7.47	5.93
21.	14	35.99	19.54	56.14	14.57	0.00	5.27	6.13	5.27
22.	15	39.26	21.37	50.00	12.00	0.00	4.07	5.60	4.13
23.	16	40.40	23.67	47.14	12.14	0.00	3.93	4.60	3.80
24.	17	34.91	21.94	62.71	24.43	0.00	2.13	4.13	2.93
25.	18	33.01	22.04	58.14	48.85	1.57	0.67	1.87	1.13

Table 2: Correlation of sucking pests of brinjal with weather parameters.

Meteorological parameter	Aphid	Whitefly	Jassid
Maximum Temperature (˚C)	-0.141 ^{NS}	0.309 ^{NS}	0.332 ^{NS}
Minimum Temperature (˚C)	-0.177 ^{NS}	0.276 ^{NS}	0.302 ^{NS}
Relative humidity (Morn.)	0.277 ^{NS}	-0.104 ^{NS}	-0.135 ^{NS}
Relative humidity (Even.)	0.116 ^{NS}	-0.319 ^{NS}	-0.332 ^{NS}
Rainfall(mm)	-0.210 ^{NS}	-0.174 ^{NS}	-0.188 ^{NS}

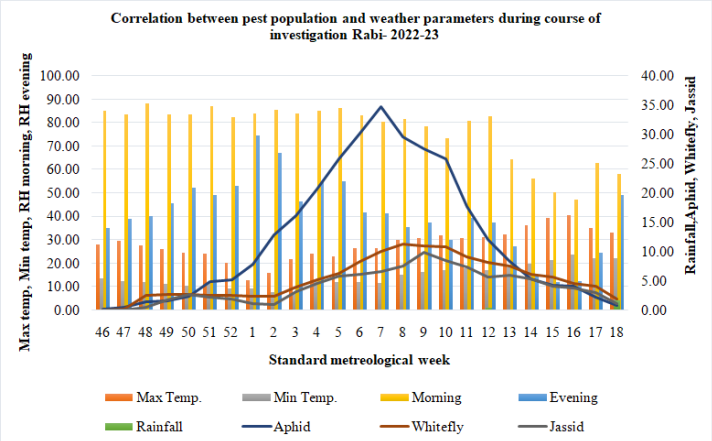

Fig. 1.

CONCLUSIONS

The present investigation has concluded that the sucking pests (aphid, jassid, whitefly). Aphid and whitefly population was recorded maximum during 7th SMW and jassid in 9th SMW. Aphid population showed negatively non-significant correlation with the minimum temperature, maximum temperature and rainfall while positively non-significant correlation with the relative humidity morning and relative humidity evening. The whitefly and jassid population showed positively non-significant correlation with the maximum and minimum temperature and non-significant correlation with morning relative humidity, evening relative humidity and rainfall.

FUTURE SCOPE

The research on the seasonal incidence of sucking insect pests in brinjal is important for the sustainable production of this crop. By understanding the factors that influence the seasonal incidence of pests, it is possible to develop effective pest management strategies that will help to protect brinjal crops.

The research on the seasonal incidence of sucking insect pests in brinjal is important for the sustainable production of this crop. By understanding the factors that influence the seasonal incidence of pests, it is possible to develop effective pest management strategies that will help to protect brinjal crops. A better understanding of the biology and ecology of sucking insect pests will help to improve pest management strategies. The includes understanding their life cycle, their feeding habits, and their interactions with other organisms.

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Conflict of interest. None.

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