Seasonal Incidence and Effect of Abiotic Factors on Mango LeafHopper(*Amritodusatkinsoni* L.) Population on Different Cultivars of Mango in EasternUttar Pradesh

ABSTRACT

The mango hopper (*Amritodusatkinsoni*L.) is a very serious pest of mango in Eastren Uttar Pradesh. A series of experiments wereconducted on seasonal abundance and the influence of abiotic factors on the incidence of *A. atkinsoni*on different cultivars of mango *viz*. Dasheri, Sindhu, Amarpali and Langra atVindhyavasini Park (Mango orchard) in DDU~~,~~ Gorakhpur University. Gorakhpur.The mango hoppers (adults) started appearing with the panicle emergence during the 40thMSW and continued up to 20thMSW ~~(~~in the year 2022-~~20~~23~~)~~. The peak population of mango hopper was seen onDasheri varietyin14thMSW and minimum in 42$^{nd~~th~~}$MSW followed byAmrapalivariety, maximum incidence of mango hopper was seen on 4th, 7th, 8thMSW and minimum in 40thMSW. Abiotic factors such as maximum temperature(X_1), minimum temperature(X_2), morning relative humidity(X_3), evening relative humidity(X_4), and rainfall (X_5) had a much impact on the ~~impact of~~ hopper population.The hopper population negatively ~~correlated~~ andsignificantly correlated with morning relative humidity (r = -0.65** to 0.34*) and evening relative humidity (r = -0.40* to -0.21)and showed a non-significant ~~negatively~~correlation with mean maximum temperature (r = 0.28 to 0.09) and minimum temperature (r = 0.17 to –0.02), whereas rainfall remained fluctuating throughout the study period thus didn't show any significant impact.

Keywords: Mango hopper, seasonal incidence, abiotic factor, multiple correlation coefficients.

INTRODUCTION

Mango (*Mangiferaindica*Linn., family~~.~~, Anacardiacae) is the most important commercially popular fruit and is also the national fruit of India. It is referred to as the "king of fruits" due to its wide adaptability, sweetness, excellent flavour, and delicious taste, as well as its rich source of nutrition, mineral fiber, vitamin A, C, and pro-vitamins [10]. India is one of the world's main mango producers in the world. In India, it is cultivated in accounting for ~~fifty~~ 50 percent of the

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global total, and ranks third in mango exports. India has the greatest land area among these nations [5]. With a land area of 2,339 million hectares and a crop yield of 2,036,600 metric tons, India is the world's foremost agricultural producer. In India, it is cultivated in Uttar Pradesh, Karnataka, Bihar, Gujarat, Tamil Nadu, and Maharashtra. Uttar Pradesh is the leading producer state, with a total output of 4,807,83 MT [2].On a global scale, 26 species of nematodes and 462 species of insects that assault mango have been identified. Kannan and Rao [9] ~~have~~ reported ~~a~~ number of insect~~predators~~ pests, including hoppers, *viz*., *Idioscopusclypealis* (Lethierry), *Amritodusatkinsoni* (Lethierry); mealybugs, *Drosichamangiferae* (Green); fruit flies, *Bactrocera dorsalis* (Hendel); fruit sucking moth, *Eudocimaaurantia* (Moore); thrips, *Aeolothripsitermedius*Bagnall; ants, *Oecophyllasmaragdina* (Fabricius); termites, *Odontotermes*spp. and grey weevil, *Myllocerusdiscolour* (Boheman) which affect mango tree. Due to climate change and better conditions, mango hoppers like *A. atkinsoni*.,*I. clypealis* and *Idioscopusnitidulus* (Walker) are becoming more dangerous during the mango~~'s~~ blooming season.Kumar *et al*[12] observed that the mango hopper,*Idioscopus* spp. was most common during the 49thmeteorological standard week~~s~~(MSW)and went away on the 13thMSW. Sarode and Mohite[21] noticed that adult mango hoppers start~~ed~~ to show up when the panicles start to grow in between February and March. The number of adult mango hoppers range~~d~~~~s~~ from 9.6 to 14.2 in the wild and in all cultivars during May and June. The number of hoppers started to go down over time, but there was another peak (6.6 to 9.8) in August and September. Rathod[20] ~~R~~reported that the number of mango hoppers started to rise gradually from the second week of September to the fourth week of September (18.22 hoppers per 5 panicles), which was between 37 and 39 metrological standard weeks. The most mango hoppers were found in the 44th metrological week, when there were 45.76 hoppers per 5 panicles.Namni*et al*[14]revealed that the highest temperature (r = 0.093) had a positive correlation with the number of hoppers, while the minimum temperature (r = -0.217) had a negative correlation. Rathod[20] found that the temperature (r = 0.302) had a positive relationship with the number of mango hoppers, while rain (r = -0.062) and relative humidity (r = -0.383) had a negative relationship. Anithakumari*et al*[1] observed that relative humidity hurts hopper populations.Debnath*et al* [4] did an experiment to see how the population of the mango hopper, *A. atkinsoni*, changed over time based on yearly abundance and where people gathered on the mango cultivar Langra during the *Rabi* season. The most common mango hoppers are found on the main branch in May, followed by leaves

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andflowers. The mango hoppers has a strong and positive relationship with the temperature and a strong and negative relationship with the relative humidity in the morning (r = -0.445) and the relative humidity in the evening (r = -0.118). Rainy days and rain don't have much of an effect on the number of mango hoppers [6].

MATERIALS AND METHODS

The present experiment on Seasonal incidence and effect of abiotic factors on mango hopper (*Amritodusatkinsoni* L.) population on different cultivars of mango in Eastern Uttar Pradesh was carried out during 2022-2023 at Vindhyavasini Park (Mango Orchard) in DDU Gorakhpur University, Gorakhpur on 20-25 years old mango tress. The geographical coordinates of Gorakhpur are 26.766^{o} latitude, 83.369^{o} longitude, and 272 Ft. elevation.The seasonal incidence of *A. atkinsoni* population in relation to abiotic factors *viz.*, maximum temperature (X_1), minimum temperature (X_2), morning relative humidity(X_3), evening relative humidity(X_4) and rainfall (X_5) were conducted on four cultivars of mango *viz.*, Dasheri, Amarpali, Sindhu and Langra. For the seasonal incidence of mango hopper, *A. atkinsoni* (adults), the observations were made at weekly interval from three randomly selected trees, *i.e.*, one tree per replication. During this investigation, all agronomic practices was followed from time to time, excluding plant protection measures. The observations on hopper population was recorded throughout the year at bloom and vegetative phases *viz.*, at panicle emergence stage or pre-bloom, at the bloom period, at the fruit stage, and non-flowering seasons from July to December. Hopper population was collected from panicles, leaves, stem and trunk through bagging traps method as suggested by Tandon[23]. In this method, the terminal part of inflorescence was covered with a polythene bag (60 ×30 cm^2), provided with cotton swabbed soaked in ethyl acetate. After the trapping the mango hoppers, bags were brought to laboratory and both nymphs and adults were separated and counted. Same method was used for the collection of hopper, from new flush, branches and stems of mango trees. Data on mango hopper was recorded from trunk per 10 cm^2 area of the tree in four (North, South, East and West) directions.Simultaneously, observations on meteorological factors, *i.e.*, maximum and minimum temperature, relative humidity (both morning and evening) and rainfall were recorded daily.

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Fortnightly, average was calculated for all these factors before calculating Pearson's correlation coefficient and multiple correlation coefficients.

RESULTS AND DISCUSSION

The periodical data on seasonal incidence of mango hoppers recorded from mango panicles/inflorescences were ~~also~~ correlated with various abiotic factors to determine the relationship with the pest.The incidence of mango hoppers was recorded on mango crop starting from 40th to 20thMSW~~periodically~~ at weekly interval.

Seasonal incidence of mango hopper *A. atkinsoni* in variety Dashehri (mango)

It ~~was~~ isobserved (Table 1) that in the 40thMSW a population of 10.33 hoppers/panicle ~~population~~ were seen on the mango tree (Dasheri variety) during ~~the~~ which period respectively, the mean maximum temperature ~~(31.20°C)~~ and minimum temperature were 31.2 and 20.1°C~~(20.10°C)~~, while the relative humidity was recorded at morning 88.25 and evening 46.52 %. During the season, hopper population was observed ~~in~~ fromthe 40th ~~to~~ 20thMSW in the year of 2022-~~20~~23. The maximum population of mango hopper was observed in 14thMSW (27.00 hopper/panicle) when maximum temperature was 33.12°C and minimum temperature was 17.23°C and relative humidity morning (72%) and evening (28%), followed by 16thMSW (25.67 hopper/panicle) and 12thMSW(25.00hopper/panicle). However, the minimum population of mango hopper was observed in 42th MSW(7.00 hopper/panicle), followed by in 49thMSW (9.00hopper/panicle) and 44thMSW (9.67hopper/panicle) on the mango tree.

The data on correlation coefficient between weather parameters and hopper population revealed that the hopper population was positively correlated~~ioncoefficient~~ (r = 0.28 and r = 0.17) ~~between~~ with the maximum and minimum temperatures and ~~also~~non-significant. ~~in the year.~~ The hopper population showed a negative correlation ~~coefficient with highly~~ and significant with relative humidity morning (r = -0.65**) and relative humidity evening ~~was negative correlation coefficient with significant~~ (r = -0.40*), while rainfall showed a positive correlation ~~coefficient with~~ which wasnon-significant (r = 0.147*) (Table 2).

Following regression equation was developed to predict the incidence of hopper

Y= 101.39 - 0.367X1+0.074X2-0.875X3-0.066X4-2.824X5

The regression equation revealed that the various abiotic factors were to be most influencing factors, which contributed (R^2= 0.549) 54 per cent variation in hopper population with abiotic factors [11], who ~~saw~~ reportedan enormous decrease in the number of hoppers from April to

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May at Jhansi (U.P.), which also agreed with the results of this study. Sharma and Tara [22], and Paul and Lalnunsangi[17], noticed that *A. atkinsoni* adults started showing up in February and March,which shows that the correlation values between abiotic factors and mango hopper were not significant. They found a positive correlation with the highest temperature (r = 0.3406) and a negative correlation with the lowest temperature (r = -0.2038). Also, found a weak positive correlation between the number of hoppers and the RH in the morning and a strong negative correlation between the RH in the evening at Tirupati. Verghese and Rao ~~Both~~[24] found that the number of hoppers went down when relative humidity and minimum temperature went up. This is because hoppers mostly show up when flowers bloom and new shoots start to grow, which is when the crop's phenology and abiotic factors come together. Abiotic factors may not have had much of a relationship because there were no hoppers ~~around~~ during the other months of the static crop time. In general, the number of hoppers changes with the growth of crops in different areas, and the weather isn't the same every year, which can change how important they are. So, the most important data of weather conditions and hopper populations over a number of years in a controlled canopy is going to result in predictions that are more precise and reliable.

Seasonal incidence of mango hopper *A. atkinsoni* in variety ofAmrapali (mango)

It ~~wa~~ is observed (Table 1) that in the 7th,4th and 8thMSW amaximum population of 31.33hopper/panicle ~~population~~ were seen ~~maximum population of mango hopper~~ on mango tree (Amrapali), followed by 20th and 11th MSW (30.67 hopper/panicle). ~~Respectively, t~~The minimum population of mango hopper was observed in 40th,42th~~nd~~ and 41th~~st~~ MSW (13.33 ~~hooper/panicle~~, 14.67 ~~hopper/panicle~~ and 16.33hoppers/panicle, respectively). The ~~mean were~~ 7th and 8thMSW recorded a maximum temperature of ~~(~~25.77^{o}C and 27.47^{o}C~~)~~, respectively and minimum temperature of ~~(~~12.00^{o}C and 12.08^{o}C~~)~~, respectively, while the morning relative humidity in 7th and 8thMSW was ~~recorded at morning~~ 77.42 and 86.00~~i;e~~whereas evening RH ~~at recorded~~ 39.14 and 42.42 %, respectively. In ~~SW~~ 1st, 2nd and 3rdMSWhoppers were observed ~~that~~ as20.33~~hopper/panicle~~, 23.33 ~~hopper/panicle~~ and 26.33hoppers/panicle, respectively~~and 1st, 2nd and 3rd SW~~ when maximum temperature was 18.57~~^{0}~~C~~, 12.27~~^{0}~~C~~ and 16.8^{o0}C, respectively

The data on correlation coefficient between weather parameters and hopper population ~~was~~ revealed that the correlation ~~between~~ withmaximum temperature was positive and minimum temperature was negative ~~hopper population~~ (r = 0.10 and r = -0.11) and non-significant in the year. The correlation between morning and evening relative humidity was negative (r = -0.50**

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and r = -0.34*) significant in the year.The correlation between ~~rain fall~~rainfall and hopper population was positive (r = 0.30*) and significant in the year(Table 2).

Following regression equation was developed to predict the incidence of hopper

Y=82.32-0.354X1-0.558X2-0.332X3-0.279X4+0.839X5

The regression equation revealed that the various abiotic factors were to be the most influencing factors, which contributed (R^2= 0.529) 52 per cent variation in hopper population.

According to Lakshmi *et al*[13], the population of mango hoppers began to increase in January and reached its peak in May. Due to the formation of inflorescence and fruiting stages, Bana *et al*[3] identified two peak occurrences of mango hoppers in South Gujarat, with the highest activity between the last week of March and the last week of May. From the second week of September to the fourth week of September, mango hoppers progressively increased, corresponding to the 37th and 39thMSW. In addition, Zagade and Chaudhari[25] reported that hopper activity decreased from April onwards, reached its lowest point (0.20 and 0.33 hopper/panicle) during the 34thMSW of 2016-17 and 2017-18, and then increased. Zagade and Chaudhari[25] reported that from September 2013 to August 2014 and September 2014 to August 2015 evapotranspiration (r=0.443** and 0.368**), bright sunshine hours/day (r=0.398** and 0.325*) and maximum temperature (r=0.467** and 0.316*)showed positive correlation whereas, morning (r=-0.469** and -0.275*) and evening (r=-0.430** and -0.289*) relative humidity showed negative correlation with population of hoppers. According to Bana *et al*[3], the population of mango hoppers had a significant positive correlation with maximum temperature (r=0.323*) and a significant negative correlation with morning (r=-0.496**) and evening (r=-0.824**) relative humidity (RH) and precipitation (r=-0.566**). Rathod[20] found that temperature (r=0.302), rainfall (r=-0.062), and relative humidity (r=-0.383) were positively correlated with the incidence of mango hoppers. According to Debnath*et al*[4], evaporation (r=0.890**), bright sunshine hours/day (r=0.370*), and maximum temperature (r=0.880**) demonstrated a significant positive correlation, whereas morning (r=-0.880**) and evening (r=-0.720**) RH demonstrated a significant negative association with the hopper population. Population of mango hoppers had a positive correlation with maximum temperature (r=0.532** and 0.426**), sunshine hours/day (r=0.521** and 0.371**), and evaporation (r=0.379** and 0.375) from 2009-2010 to 2010-2011, while evening relative humidity (r=-0.304*) and precipitation (r=-0.281*) exhibited a negative correlation in 2009-10. In addition,Rahman, and

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Gajendra[19] discovered that evaporation (r=0.743** and 0.527**) and maximum temperature (r=0.679** and 0.702**) during 2007-08 and 2008-09 as well as bright sunlight hours/day (r=0.435*) during 2008-09 were positively correlated with mango hopper population. ~~Consequently, t~~These studies closely align with the findings of the present investigation.

Seasonal incidence of mango hopper *A. atkinsoni* in a variety ofSindhu (mango)

It ~~wa~~ is observed (Table 1) that in the 11th and 20thMSW,maximum hopper population of 31.33~~hopper/panicle~~ and 31.33/panicle ~~hopper population~~ were seen ~~maximum population~~ on the mango tree (Sindhu), followed by 4th, 6th and 16thMSW (30.33 hopper/panicle), and minimum population was observed during 41th and 40thMSW (13.33~~hopper/panicle~~ and 15.33 hoppers/panicle~~)~~respectively~~).,the mean of~~ During 11th and 20thMSW, maximum temperature ~~(~~ of 31.80°C and 36.25°C was recorded~~)~~ and minimum temperature of ~~(~~16.91°C and 24.52°C~~),.w~~While the morning relative humidity in 7th and 8thMSW was recorded ~~at morning~~ as 75.57 and 71.25 %~~i;e~~ while evening RH was ~~at~~ recorded as 31.42 and 26.50 %. In 18th, 19th and 20thMSW ~~seen~~ mango hopper population of 27.67~~hopper/panicle~~,25.67~~hopper/panicle~~ and 31.33 hoppers/panicle and in this MSW maximum temperature of 37.27~~°C~~, 38.51~~°C~~ and 36.25°C, respectively were recorded..

The data on correlation coefficient between weather parameters and hopper population revealed that the correlation ~~between~~ with maximum temperature and minimum temperature was positive ~~correlation coefficient~~ (r = 0.19 and r = 0.02) and non-significant in the year. The correlation ~~between~~ withmorning and evening relative humidity was negative (r = -0.48**and r = -0.34*) significant in the year(Table ~~4~~3~~.~~).The correlation between ~~rain fall~~rainfall and hopper population was positive (r = 0.23*) and non-significant.

Following regression equation was developed to predict the incidence of hoppers.

Y=82.17-0.56X1-0.177X2-0.301X3-0.341X4-0.18X5

The regression equation revealed that the various abiotic factors were to be the most influencing factors, which contributed (R^2= 0.376) 37 per cent variation in hopper population.

In accordance with the findings of Kumar *et al*[12], the maximal incidence of mango hopper *Idioscopus* spp. occurred during the 49thMSW ~~standard week~~, and the insect pest disappeared on the 13thMSW. While, Sarode and Mohite[21] observed the appearance of mango hoppers (adults) beginning with the panicle emergence stage in February and March, with a peak of 9.6 to 14.2 in wild and all cultivars during May and June. Adult hoppers during inactive stages

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of plant growth remained alive without feeding in the cracks and crevices of the trunk, and heavy shower monsoons exceeding 100 mm in a straight line had a washing effect on the hopper population [14].

The present study supports with Jha*et al*[7], who found a significant positive correlation between atmospheric temperature (r = 0.69), maximum temperature (r = 0.32), and minimum temperature (r = 0.40), and a significant negative correlation between morning relative humidity (r = -0.75) and evening relative humidity (r = -0.40). There was a negative but insignificant correlation between total rainfall and hopper population. Joshi and Kumar [8] and Rahman and Kuldeep[18] also reported that temperature had a positive and significant impact on mango hopper population, while relative humidity had a negative and significant effect.

Seasonal incidence of mango hopper *A. atkinsoni* in a variety ofLangra (mango)

It ~~wa~~ is observed (Table 1) that in the 6thMSW hopper population of 32.33hoppers/panicle ~~hopper population~~ were seen as maximum population on the mango tree (Amrapali),followed by 16th and 4thMSW (31.67 ~~hopper/panicle~~ and 31.33 hopper/panicle, respectively) and minimum population was seen on ~~SW~~ 40th and 4thMSW (11.67 ~~hopper/panicle~~ and 12.33 hoppers/panicle, respectively) ~~Respectively, the mean of~~= During6th MSW ~~6th~~the maximum temperature ~~(23.01°C)~~ and minimum temperatures were ~~(~~23.01 and12.21°C, respectively~~)~~, while the relative humidity ~~6th and week was recorded at~~ morning ~~86.57~~ and evening were ~~at~~ recorded as 86.57 and 54.58%, respectively. In 40th, 41th and 42thMSW population of mango hopper was 11.67 ~~hopper/panicle~~, 12.33~~hopper/panicle~~ and 15.67hoppers/panicle, respectively.

The data on correlation ~~coefficient between the correlation between~~ with maximum temperature was positive and minimum temperature was negativewith hopper population (r = 0.09 and r = -0.02) and non-significant in year. The correlation ~~between~~ with morning and evening relative humidity was negative (r = -0.34**and r = -0.21) ~~and highly significant in the year~~(Table .4).The correlation between ~~rain fall~~rainfall and hopper population was positive (r = 0.11*) and significant.

Following regression equation was developed to predict the incidence of hopper

Y=67.54-0.162X1-0.268X2-0.368X3-0.099X4-0.0583X5

The regression equation revealed that the various abiotic factors were to be the most influencing factors, which contributed (R^2= 0.432) 43 per cent variation in hopper population.

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Patel et al [16] studied insect population abundance in agroforestry systems in Mizoram, India, from 2000 to 2002 and found that summer and winter seasons had substantially higher and lower abundances, respectively. Kannan and Rao [9] conducted field experiments in Andhra Pradesh, India, and reported that host plants and climatic parameters influenced the population dynamics and abundance of the mango hopper, *A. atkinsoni*. They also observed negative correlations between hopper incidence and minimum temperature, relative humidity, and ~~evening~~ precipitation, as well as positive correlations between hopper incidence and maximum temperature and morning relative humidity.

CONCLUSIONS

The mature individuals of *Amritodusatkinsoni* L. emerged when the panicle formed, and the highest population was observed during February and March when the mango tree was in full bloom. The second highest population was observed in August-September across all four cultivars being studied. Subsequently, the insect relocated to the fissures and crevices of the tree trunk in order to hibernate. This suggests that the organism has two distinct periods for reproduction, resulting in two separate generations: one in the spring and one in the summer. The spring generation is more harmful or damaging compared to the summer generation. The mean maximum and lowest temperature exhibited a strong positive link with the expansion of the hopper population, while the relative humidity (both in the morning and evening) had a notable negative impact. The variable rainfall did not have any impact on the expansion of the hopper population due to its fluctuating nature.

Table 1:Seasonal incidence of mango hopper *A. atkinsoni* during the year 2022-2023

MSW: Meteorological standard week

MSW	Hopper Population /Panicle/Week				Temperature (°C)		Relative Humidity (%)		Rainfall (mm)
	Dasheri	Amrapali	Sindhu	Langra	Max.	Min.	Morning	Evening	
40	10.33	13.33	15.33	11.67	31.20	20.10	88.25	46.52	0
41	11.33	16.33	13.33	12.33	31.35	19.10	86.21	45.22	0
42	7.00	14.67	18.33	15.67	29.00	17.00	87.25	46.21	0
43	12.67	22.67	19.33	23.67	31.50	18.60	85.23	44.35	0
44	9.67	20.67	20.67	27.67	28.40	17.50	86.74	43.21	0
45	14.00	21.33	26.33	24.33	30.51	18.30	86.28	44.28	0
46	11.33	22.33	22.67	25.00	28.75	16.90	84.71	44.30	0
47	15.00	24.67	26.33	18.67	27.87	13.47	84.71	35.85	0
48	11.33	25.33	23.67	17.67	27.80	12.38	83.71	38.85	0
49	9.00	23.33	23.67	26.33	26.85	11.70	88.14	40.14	0
50	15.00	25.33	16.67	24.33	25.70	11.10	84.57	46.71	0
51	16.00	23.33	27.33	27.67	24.38	10.37	82.56	52.14	0
52	12.67	26.67	27.33	26.33	23.87	11.32	87.14	46.85	0
1	22.67	20.33	17.67	18.33	18.57	9.17	85.14	59.57	0
2	15.00	23.33	22.67	26.67	12.27	8.48	83.57	73.14	0
3	16.33	26.33	20.67	18.33	16.80	7.52	85.14	64.71	0
4	12.67	31.33	30.33	31.33	22.52	8.08	83.85	45.85	0
5	18.00	29.33	29.33	29.67	23.97	12.44	85.28	55.57	0
6	22.00	28.33	30.33	32.33	23.01	12.21	86.57	54.58	0
7	22.00	31.33	27.33	22.33	25.77	12.00	77.42	39.14	0
8	21.67	31.33	29.67	28.33	27.47	12.08	86.00	42.42	0
9	24.33	27.33	29.67	26.67	29.65	14.80	80.42	36.71	0
10	20.67	24.33	28.33	27.33	31.10	16.42	76.42	34.00	0
11	24.67	30.67	31.33	27.33	31.80	16.91	75.57	31.42	0
12	25.00	28.33	24.67	28.67	29.72	18.05	81.00	44.14	1.24
13	24.67	30.33	24.33	27.33	31.11	16.84	77.14	30.57	1.48
14	27.00	27.33	27.67	27.67	33.12	17.23	72.00	28.00	0
15	22.67	29.33	23.33	27.67	35.31	17.54	74.00	27.25	0
16	25.67	29.67	30.33	31.67	36.25	19.11	72.00	24.15	2.5
17	24.67	25.67	29.67	25.67	35.24	18.25	68.50	26.34	0
18	16.33	29.67	27.67	24.33	37.27	19.52	66.02	27.50	3
19	24.67	25.67	25.67	28.33	38.51	23.25	70.05	25.25	0
20	19.33	30.67	31.33	27.33	36.25	24.52	71.25	26.50	0

Table 2: Correlation coefficient and regression value of hopper population and weather parameters

Sr.No	Weathers Parameters	Varieties			
		Dasheri	Amrapali	Sindhu	Langra
1.	Maximum Temp (Tmax)	0.28	0.10	0.19	0.09
2.	Minimum Temp (Tmin)	0.17	-0.11	0.02	-0.02
3	Morning RH (RHmor)	-0.65**	-0.50**	-0.48**	0.34*
4.	Evening RH (RHeve)	-0 .40*	-0.34*	-0.39*	-0.21
5.	Rainfall (mm)	0.147*	0.30	0.23	0.11

Table 3: Multiple regressions between weather parameters and seasonal incidence of mango hopper during 2022-2023.

Sr. No	**Varieties**	**Regression Equation**	**R^2 Value**	**Predicted Value (%)**
1.	Dasheri	Y= 101.39 -0.367X1+0.074X2-0.875X3-0.066X4-2.824X5	0.549	54%
2.	Amrapali	Y=82.32-0.354X1-0.558X2-0.332X3-0.279X4+0.839X5	0.529	52%
3.	Sindhu	Y=82.17-0.56X1-0.177X2-0.301X3-0.341X4-0.18X5	0.376	37%
4.	Langra	Y=67.54-0.162X1-0.268X2-0.368X3-0.099X4-0.0583X5	0.432	43%

Fig 1. Effect of abiotic factors on seasonal abundance of *Amritodusatkinsoni* (adults) on Dashehari

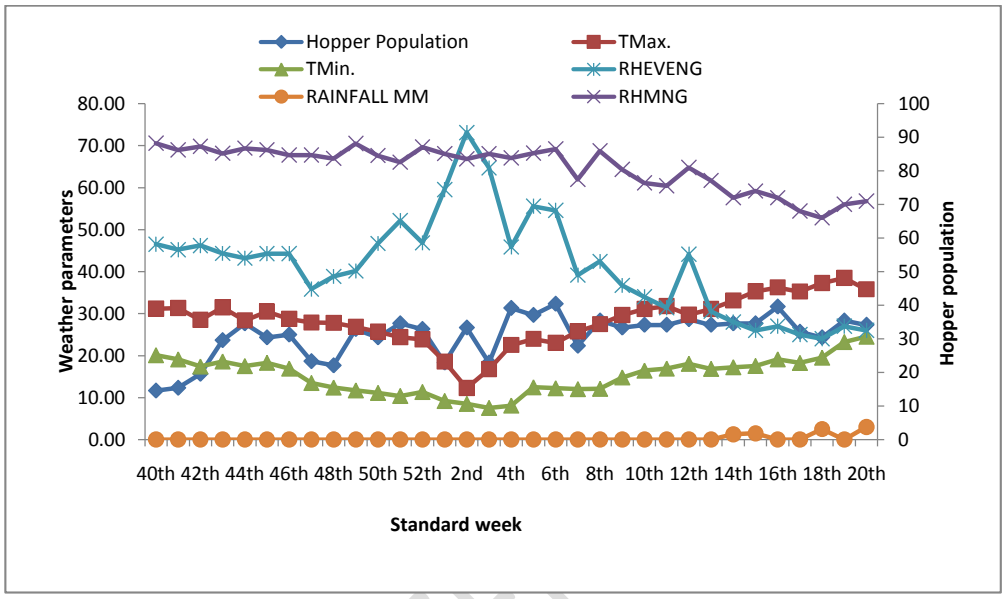


Fig 2. Effect of abiotic factors on seasonal abundance of *Amritodusatkinsoni* (adults) on Amrapali

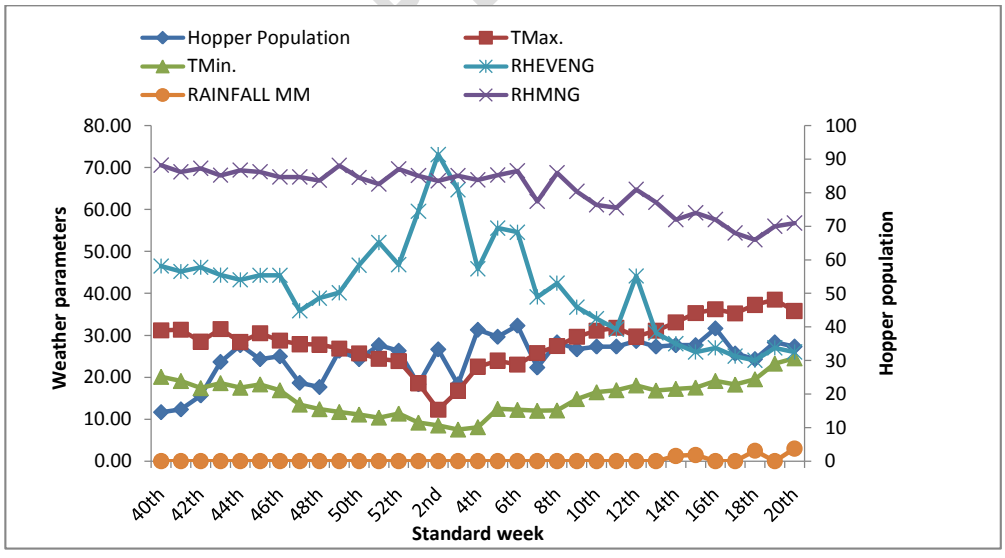


Fig 3. Effect of abiotic factors on seasonal abundance of *Amritodusatkinsoni* (adults) on Sindhu

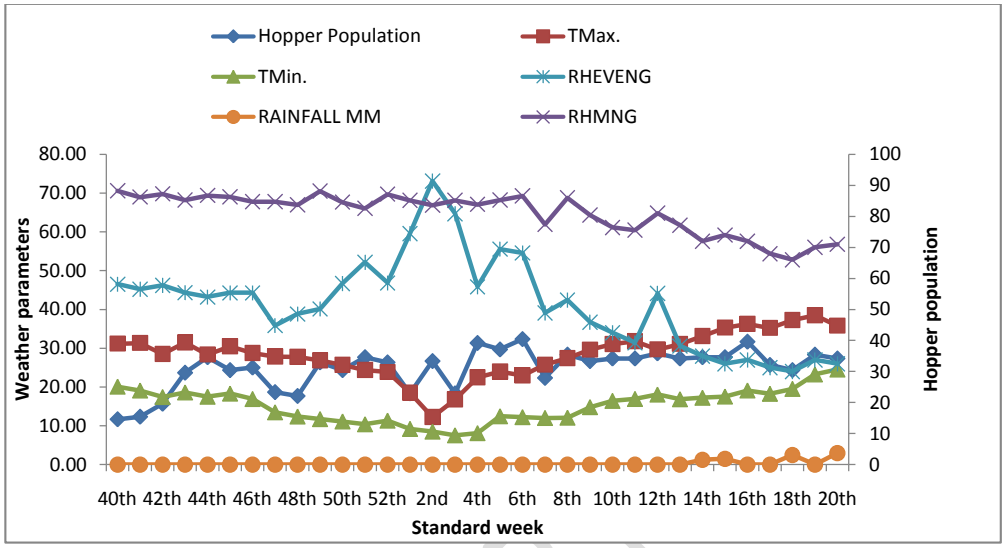
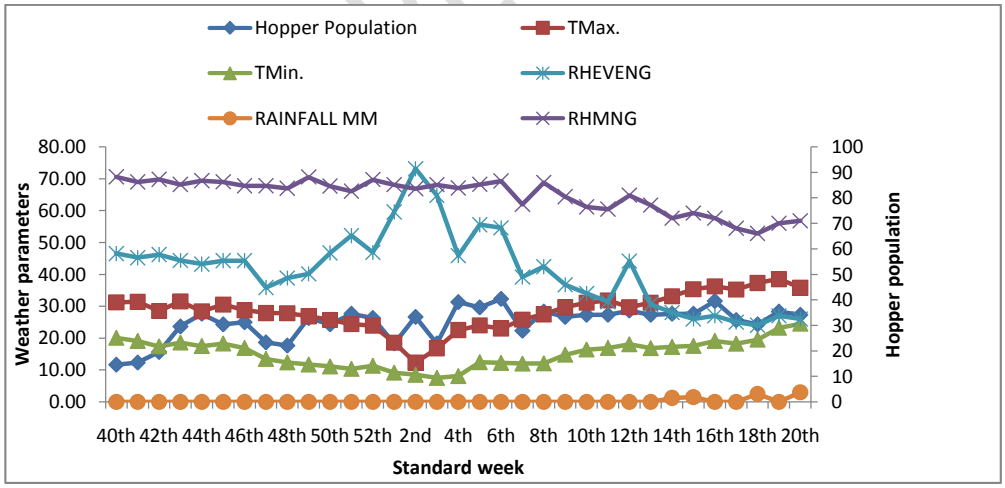


Fig 4. Effect of abiotic factors on seasonal abundance of *Amritodusatkinsoni* (adults) on Langra



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