Incidence of leafminer Aproaerema Modicella Deventer (Stomopteryx subsecivella Zell) on groundnut in relation to the time of sowing and weather factors.

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The results of an experiment conducted during irrigated season 1979 with TMV-7 and TMV-10 groundnut varieties, to fix up the optimum time of sowing so as to avoid the incidence of leafminer and to get higher yields are reported. Attempts were also made to correlate the different weather factors with the incidence and the findings reported. In both the varieties, morning relative humidity % showed a significantly negative correlation, while the maximum temperature and the minimum temperature showed a significantly positive association with the incidence, which in turn exhibited a negative correlation with the yield. From the co-efficient of determination, it was found X that 83 % of the variation is contributed by Relative humidity% and maximum temperature in the case of TMV-7 variety and.90 % by maximum, minmum temperature in the case of TMV-10 variety. Earlier sowings in the irrigated season, taken up to 15th January will held inavoiding the incidence besides fetching high yield of TMV-7 groundnut, under Tindivanam conditions.

INTRODUCTION

The leafminer *Aproaerema modicella* Deventer (*Stomopteryx subsecivella* zell) popularly called as surulpoochi is a serious pest of groundnut in almost all the places where this crop is grown. Chemical control measures are being recommended with success, but they are costly.

Many workers have pointed out the relationship between the time of sowing and weather factors on the pest incidence and crop yields. The impact of weather factors on the incidence of gingelly shoot webber (*Antigastra-catalaunalis* Dup) has been studied by Radhakrishnan (1978). He has concluded that a unit increase in mean maximum temperature (1°C) + a unit increase in rainfall (1 mm) would result in an increase of 0.55 + 0.44% in shoot webber incidence and reported that sowings taken up from 22-11-76 to 7-3-77 recorded minimum incidence and high yields. Seetharaman *et. el.* (1979) studied the functional relationship between weather factors and sorghum shootfly (*Atherigona approximata* R) incidence and reported that rainfall and maximum temperature is more contributive to shootfly incidence than rainfall and relative humidity. They also recorded maximum incidence in the sowings taken up from 22-7-77 to 22-8-77 and minimum incidence in the sowings taken up from 22-12-77 to 7-2-78 The effects of planting dates of Bengalgram on the infestation of *Haliothis armigera* Hubner and the yield were correlated by Basu and Pramanik (1969). They found that with a delay

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planting, the percentage infestation gradually increased and the yield decreased. When the effect of infestation factor was eliminated the association between planting date and yield became small and non-significant indicating that the infestation was not the sole factor responsible for reduction in yield. Taking into consideration that the time of sowing and inturn weather factors have a definite influence on the incidence of pests, an experiment was conducted to fix the optimum time of sowing so as to skip over the severity of the incidence of leafminer on groundnut and thereby get increased yield. Attempts were also made to establish the relationship between the weather factors and incidence of the pest, the results of which are reported below.

MATERIAL AND METHODS

The experiment was laid out during the irrigated season in the year 1979 at the Oilseeds Experiment station, Tindivanam. Fifteen weekly sowings were taken up with two replications using TMV-7 and TMV-10 groundnut varieties in a plot size of 4.8 X 3.6m. Though TMV-10 variety is not recommonded for irrigated season, it has been included in the experiment as it is moderately resistant to leafminer attack, with a view to study the influence of weather factors on this variety. The fifteen weekly sowings were done from 6.12.78 to 14.3.79. The percentage incidence of leafminer on leaflet basis was estimated four times i.e. on 20th, 35th, 50th and 65th day after each sowing. From each plot, ten plants were selected at random and from each selected plant the effected leaflets in the top twenty leaflets were counted.

The percentage of incidence was calculated from the total number of leaflets i.e. 200 and the affected leaflets. The weather data viz., maximum-minimum temperature °C, rainfall in mm and relative humidity % were collected daily. For purpose of finding out the relationship between the incidence with weather factors and yield, the final counts taken for each sowing on the 65th day of sowing were considered. The mean weather fectors viz., relative humidity % (recorded at 8.10 hrs) maximum temperature in°C (recodedat 14.10 hrs)minimum temperature in °C (recorded at 8.10 hrs.) and relative temperature difference in°C (maximum temperature recorded at 14.10 hrs. minus minimumtemperatsture at 8.10 hrs.)that prevailedfifteen days prior to final count of the respective sowings were teken into consideration. Regression equations were woked out independently having leafminer incidence as dependant variable (Y) and individual weather factors as independent variables (X) Since the rainfall received in the season is negligible the incidence was not correlated withthe rainfall. Besides,regression equationwas also worked out between the yields of unpicked dry pods(Y) and incidence (X). Partial regression equation were worked out to estimate the quantum of contribution made by(1) relative humidity and maximum temperature (2) relative humidity and minimum temperature and (3) maximum temperature and minimum temperature in influencing the incidence. All the above equations were worked out separately for TMV-7 and TMV-10 varieties.

RESULTS AND DISCUSSIONS

a) *Influence of time of sowing on the leafminer incidence and yield of groundnut.*

The data on the incidence of leafminer and yield for different times of sowing in respect of TMV-7 and TMV-10 varieties are furnished in Table I. In both the varieties, the differences in the incidence and yield due to the various times of sowing are highly significant indicating a definite relationship between the time of sowing and incidence as well as yield. Minimum incidence and high yields were observed during the sowings taken up from 6-12-78 to 17-1-79 in respect of TMV-7 variety. With regard to TMV-10 variety, minimum incidence was noticed during the early sowing taken up from 6-12-78 to 20-12-78, but maximum yield was obtained in the sowings taken up from 17-1-79 to 31-1-79. However the yield trend is generally low in the season. The normal sowing season of irrigated groundnut is from 15th December to 15th January in Tindivanam tract. In certain cases if the Sowing is delayed due to circumstances beyond the control of the farmers severe leafminer incidence is encountered resulting in poor yields.

b) *Influence of weather factors on the leafminer incidence on TMV. 7 groundnut*

The regression coefficients worked out to assess the relationship between the incidence and the weather factors are furnished in Table II and the distribution of observed values in the case of relative humidity and maximum temperature are plotted in respectively. It may be seen that among the weather factors, relative humidity showed a negatively significant correlation with the incidence at a probability of 0.01%, whereas maximum and minimum temperature revealed a positively significant association at the same probability level. Though the relative differences between maximum and minimum temperature showed a positive association, their 'r' value did not reach the level of significance. The combined effect of relative humidity and temperature exerted a highly significant association revealing that 83% of the variation is contributed by these two factors and that one percent increase in relative humidity will result in 1.1% decrease in leafminer incidence, and 1°C increase in maximum temperature will result in 1.59% increase in the incidence. The combined effect of relative humidity and minimum temperature did not reach the level of significance. In the irrigated groundnut season, with negligible rainfall, the maximum temperature increases progressively as the age of the crop increases and hence a late sown crop will get severely affected even when they are in pre-flowering phase resulting in decreased yield.

c) *Influence of weather factors on the leafminer incidence on TMV-10 groundnut*

The regression coefficients worked out to assess the relationship between the incidence and the weather factors are furnished in Table III and the distribution of observed values in the case of relative humidity and maximum temperature are plotted in graph 3 and 4 respectively. It may be seen that among

the four weather factors studied, relative humidity exhibited a negatively significant association with the incidence at a probability of 0.05%, whereas maximum temperature showed a positively significant association at a probability of 0.01% level. The minimum temperature and relative temperature difference showed a positively significant correlation at a probability of 0.05% level. The combined effect of maximum temperature and minimum temperature exhibited a highly significant association revealing that 98% of the variation is contributed by these two factors and 1°C increase in maximum temperature will result in 2.37% increase in the incidence and 1°C increase in minimum temperature will results in 1.59% decrease in the incidence. The combined effect of relative humidity + maximum temperature and relative humidity + minimum temperature on incidence did not reach the level of significance.

d) Comparative influence of weather factors on the leafminer incidence in the two varieties.

In both the TMV-7 and TMV-10 groundnut, the relative humidity showed a negative association while maximum and minimum temperature showed a positive association. But, it could be seen from Table II and III, that the degree of influence of these factors, exerted on the two varieties vary, in that TMV-7 is more affected due to greater incidence of the leaf miner pest than TMV-10 variety for the same unit of variation in the weather factors.

e) Influence of leafminer incidence on the yield of groundnut

The regression coefficients worked out to estimate the relationship between the yield of groundnut and leafminer incidence are tabulated in Table IV. With regard to the variety TMV-7, the incidence exerted a significantly negative correlation with yield at a probablity of 0.01% showing that with every one percent increase in leafminer incidence there is a reduction of 12.84kgs/ha of dried unpicked groundnut pods and that 64% variation in yield is due to the incidence. With regard to TMV-10 groundnut the incidence exhibited a negative association with the yield, but the 'r' value did not reach the level of significance. The regression equation arrived at, revealed that for every one percent increase in the leafminer incidence there is a reduction of 12.48 kgs of pods per hectare.

CONCLUSION : In both TMV-7 and TMV-10 groundnut varieties, morning relative humidity showed % a negative correlation with leafminer incidence, while maximum and minimum temperature showed a positive correlation. The incidence in turn exhibited a negative correlation in the yield of both the varieties. The differences in the incidence and yield due to the different dates of sowing are highly significant, revealing a definite relationship between them. Taking into consideration. the above results, it can be concluded that for irrigated season in Tindivanam tract, earlier sowings, but in any case not later than 15th January, will be

conducive to avoid the incidence of leafminer so as to get high yield in TMV-7 groundnut.

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Table-I

Data on Leaf Miner Incidence and Yield

Date of sowing	TMV-7		TMV-10	
	Incidence T. V.	Yield kg ha	Incidence T. V.	Yield kg ha
6-12-78	12.49	434	10.12	296
13-12-78	14.94	376	10.40	296
20-12-78	16.85	441	11.89	298
27-12-78	17.77	499	16.16	299
3-1-79	18.19	269	10.98	295
10-1-79	14.63	233	14.19	293
17-1-79	14.58	250	14.72	616
24-1-79	18.87	133	17.24	570
31-1-79	21.83	128	15.82	579
7-2-79	21.12	124	18.25	203
14-2-79	22.12	134	17.95	145
21-2-79	23.89	133	20.09	217
28-2-78	24.49	124	19.98	159
7-3-79	27.30	119	22.35	174
14-3-79	27.70	113	21.74	116
C. D. (0.01%)	5.52	54.63	2.21	71.18

Table II : Regression coefficients between the leaf miner incidence and weather factors (TMV-7)

Factors	'b' value	'r' value	Equation
Incidence(Y) X Morning relative humidity $_o/^o$	- 2.4448	XX 0.6698	Y=228.79 – 2.4448X
Incidence (Y) X Max. Temp. °C	2.0462	0.8039	Y= –53.05+2.0462X
Incidence (Y) X Min. Temp.°C	3.1554	XX 0.8892	Y= – 54.06+3.1554X
Incidence (Y) X Relative differences between max. and min. Temp°C	1.4646	0.2964 N. S.	Y=0.28+1.4649X
Incidence (Y) X Relative humidity % (X1) and Max. Temp. °C (X2).	– 1.0851 (b_1) 1.5946 (b_2)	XX 0.8383 (R)	Y=56.5827 1.0851X1 +1.5846X2
Incidence (Y) X Relative humidity % (X1) and Min. Temp. °C (X2).	1.5146(b_1) 4.4374(b_2)	0.4074(R) N. S.	Y=214.12+1.5146X1 4.4374X2
Incidence (Y) X Max. Temp. (X1) and min. Temp °C (X2).	0.4409(b_1) 2.6320(b_2)	0.4483(R) N. S.	Y=57.27+0.4409X1+ 2.6320X2

Table III. Regression coefficients between the Leaf Miner incidence and weather Factors (TMV-10)

Factors	(b) value	'r' value	Equation
Incidence (Y) X Morning Relative Humidity %	-1.2970	X 0.5862	X=124.7496 -1.2970X
Incidence (Y) X Max Temp.°C	1.3998	XX 0.9072	Y= 35.7372+1.3998X
Incidence (Y) X Min. Temp.°C	1.2140	X 0.5644	Y=-14.9633+1.2140X
Incidence (Y) X Relative differences between max and min. Temp°C	1.7036	X 0.5745	Y=7.6133+1.7063x
Incidence (Y) X Relative humidity % (X1) and Max. Temp. °C	-0.6886 (b₁) 0.1613 (b₂)	0.5266 N. S.	Y=66.8067 -0.6886x1+0.16132x
Incidence (Y) Relative humidity (X1) and Min. Temp. °C (X2).	-0.8671(b₁) -0.4838(b₂)	0.5972(R) N. S.	Y=76.5702 -0.8671X1 +0.4838X2
Incidence (Y) X Max Temp. °C (X1) and min. Temp °C (X2).	2.3709 b₁) -1.5953(b₂)	XX 0.9876(R)	Y=33.0384+ 2.370X1 -1.5953X2

Table-IV. Regression Coefficient between the yield and leaf Miner Incidence (TV-7 and TMV-10)x

Factors	'b' value	'r' value	Equation
TMV7			
Yield (Y)X incidence	-12.8468	XX -0.6483	Y=459.07-12.8468x
TMV-10			
Yield (Y) X incidence	-12.4752	-0.3290 N. S.	Y=458.82-12.4752x