Short communication
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Influence of weather parameters on the occurrence of groundnut leaf miner (*Aproaerema modicella* Deventer, Lepidoptera: Gelechiidae)

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Groundnut is an important oilseed crop of Anantapur district in Andhra Pradesh. Among the biotic factors causing yield loss, leaf miner/leaf webber (*Aproaerema modicella* Deventer) is the most damaging pest in India. Initially small blister like mines are observed on the upper surface of leaf near the mid rib. As the feeding advances, mines increase in size and the entire leaflet becomes brown and it rolls, shrivels and finally dries up. Severely infested plants may die and the affected crop gives a burnt appearance (Rai, 1976). It is a major pest in Andhra Pradesh, Karnataka (Channa Basavanna, 1957), Maharashtra and Tamilnadu (Nair, 1975; Rai, 1976) and is also reported from Gujarat (Kapadia *et al.*, 1982). The leaf miner populations fluctuate dramatically between years, seasons and even between generations at the same location. Weather factors are most commonly cited explanation for these fluctuations; though there is no consensus which factors are responsible. Lewin *et al.* (1979) found that temperature positively and rainfall negatively correlated with groundnut leaf miner pest. Logeswaran *et al.* (1982) observed significant negative correlation of the pest with maximum and minimum temperature but no correlation with rainfall. Khan and Radeo (1987) found none of the weather parameters to be responsible for the fluctuations. Wheatley *et al.* (1989) reported that the groundnut leaf miner was more abundant on drought stressed plants. Though the leaf miner abundance may be greater under low rainfall conditions, rainfall is not a direct mortality factor for leaf miner eggs and larvae (Shanower *et al.*, 1995). Differences in yield of protected and non-protected plots are 92% (Krishnanda and Kaiwar, 1965), 89% (Abdul Kareem and Subramanyam, 1976; Sanjappa and Ali,1977), 76% Vittal *et.al.* (1964), 39% and 24% (Palaniswamy and Ramachandran, 1978). Hence a field experiment was conducted at Agricultural Research Station, Anantapur since 1993 to study the influence of the weather parameters on the occurrence of leaf miner on groundnut and to know the yield reduction due to this pest.

The experiment was conducted on red sandy loam soils at Agricultural Research Station, Anantapur during *kharif* season of 1993-1998 under rainfed conditions. The soils were 20-25 cm deep, low in nitrogen,

and medium in available phosphorus and potassium with a pH of 5.6. The experiment was conducted with two dates of sowing (normal and late) and two spray treatments (spray and no spray) replicated five times in factorial randomized block design. Monocrotophos @ 1.6ml per liter of water was sprayed in the spray plots. Recommended agronomic practices were adopted for the crop during all the years of experimentation (1993-98). The pest incidence was recorded on the plants in one square meter area. Randomly selected one meter row length which is away from the edge of the field was chosen to record the total number of plants, number of leaves per plant, number of leaves damaged by leaf miner per plant, total number of larvae found on each plant and the percentage infestation was calculated. The meteorological data recorded in the class 'B' observatory near the experimental site was collected. The results on the occurrence of the pest and pest infestation are presented in Table 1 and 2 and the weather parameters are depicted in Fig. 1.

The leaf miner pest on groundnut was noticied during the years 1993, 1994 and 1997 only. During 1993, the leaf miner pest was noticed three times, during August and September, both in normal and late sown crop (Table 1), coinciding with flowering, pegging and pod development stage. During the first incidence, there was a sudden increase in maximum temperature by 3°C on 14.8.93 (31.6° C to 34.6° C), which persisted, followed by a dry spell (Fig.1A). The pest incidence was recorded on 18.8.93.

Table 1: Occurrence of leaf miner infestation at Anantapur during *kharif* 1993 - 98

Year	Date of sowing	Temperature raise by 2°C	Pest occurrence	Pest infestation (percentage)							
				Before spraying				After spraying			
				D_1		D_2		D_1		D_2	
				T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
1993	23-7	14-8-93	18-8-93	15.8	16.3	--	--	--	0.8	--	--
		9-9-93	14-9-93	13.6	14.8	8.6	12.7	33.1	0.8	12.7	0.8
	26-8	26-9-93	1-10-93	31.0	31.8	33.0	32.1	92.8	0.8	94.7	1.8
1994	12-8	27-9-94	30-9-94	26.4	28.4	21.5	24.8	18.3	1.2	13.6	1.6
	22-8	---	---								
1997	11-8	3-10-97	10-10-97	7.4	20.4	33.7	23.0	26.8	1.4	40.6	0.0
	8-9	--	--								

*Leaf miner was not noticed during 1995, 96 and 1998.

D1: Normal date of sowing, D2: late sowing, T1: No spray and T2: pesticide spray

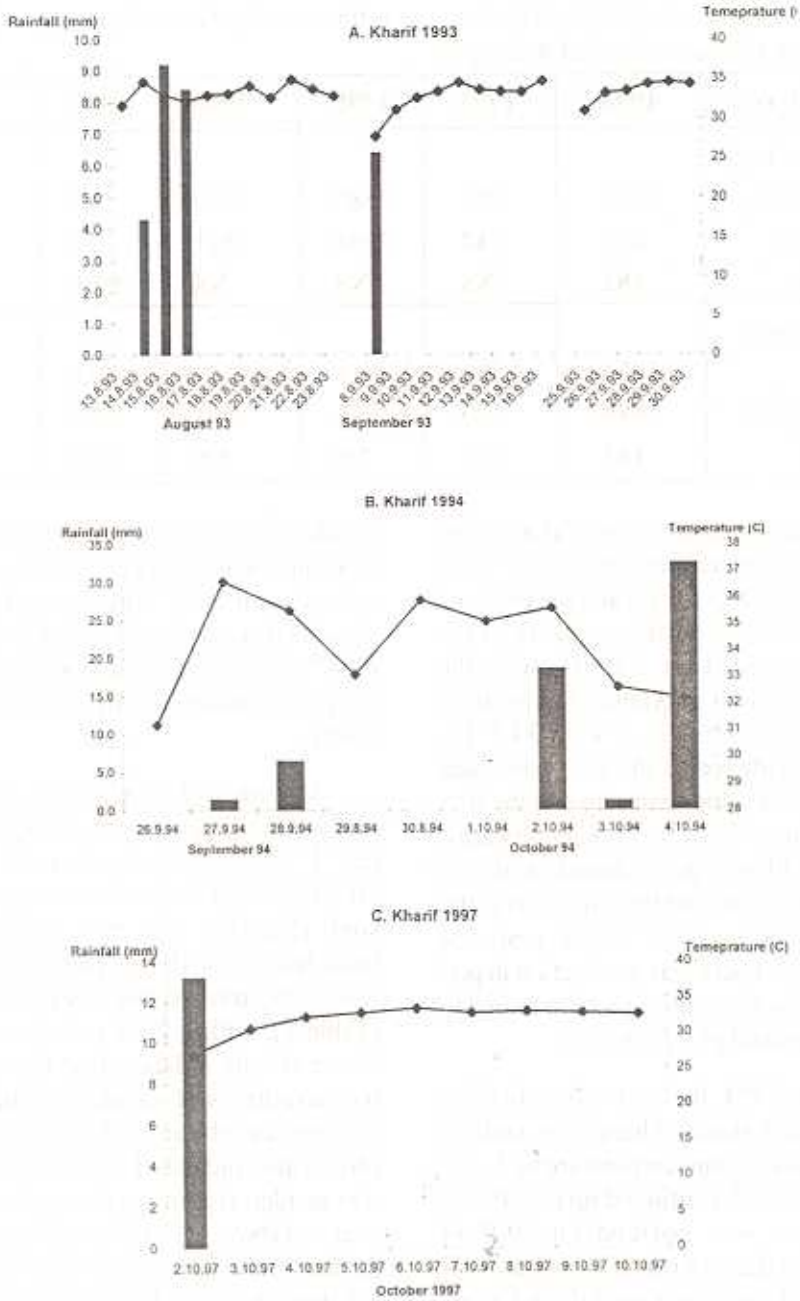

Fig. 1: Temperature and rainfall during leaf miner infestation period

Table 2: Pod yield of groundnut (kg ha^{-1}) as influenced by dates of sowing and pesticide spray against the leaf miner pest

Treatment/Year	1993	1994	1995	1996	1997	1998
Date of sowing						
Normal sowing	2106	794	2589	1499	187	1495
Late sowing	816	788	2068	1511	27	834
CD at 5%	**182**	**NS**	**NS**	**NS**	**10.3**	**153**
Pesticide spray						
Control	1034	784	1811	1505	95	1167
Pesticide Spray	1889	790	1846	1503	118	1162
CD at 5%	**182**	**NS**	**NS**	**NS**	**10.3**	**NS**

In the second incidence, there was a sudden rise of maximum temperature by 2.3° C on 9.9.93 (31.1° C to 33.4° C) and the pest was noticed on 14.9.93. Third incidence of the pest was recorded on 1.10.93, with the sudden increase in maximum temperature by 2.3°C on 26.9.93 (31.1° C to 33.9° C). The third incidence of the pest coincided with the pod development stage. In the first instance, due to rains on 26.8.93 onwards, the pest incidence got reduced in all the plots. In the second and third incidence, the pest incidence was low in the pesticide sprayed plots. There was a reduction in pod yield (82%) in the control plot compared to pesticide sprayed plot (Table 2).

During 1994, the pest was noticed at pod initiation stage. There was sudden increase in maximum temperature by 5.4°C on 27.9.94, which continued up to 2.10.94, and the pest was noticed on 30.9.94 (Fig.1B). But due to a rainfall from 28.9.94 up to 4.10.94 (60.2 mm rainfall in 3 rainy days), there was a reduction in the pest incidence in all the plots and there was no influence on the pod yield (Table 2). Similar reduction in leaf miner population was observed after heavy rainfall by Amin (1987); however overhead irrigation did not lower leaf miner density (Wheatley *et al.*, 1995).

During 1997, there was increase in maximum temperature by 3.5°C on 3.10.97 (27° C to 30.5°C), which continued up to 10.10.97 (32.6° C) with corresponding dry spell (Fig.1C). The pest incidence was recorded on 10.10.97. The pod yield was low compared to the previous seasons (Table 2), with a 25% reduction in yield. These results indicate that the maximum temperature and rainfall influence the occurrence of the leaf miner pest. The results also indicated that whenever, there was sudden rise in maximum temperature over and above 2°C, followed by a dry spell, the leaf miner pest could occur within next 4-8 days. Similar effect of temperature on this pest was observed by Lewin *et al.*

(1979) and Senguttuvan (1999). But, when there were continuous rain after the pest occurrence (as during 1994) the incidence of the pest got reduced. Pod yield reduction ranged from 25% (1997) to 82% (1993) in non sprayed plots due to this pest (Table 2). Similar reduction in pod yield of groundout was reported by many workers (Vittal *et al.*, 1964; Krishinanda and Kaiwar, 1965; Abdul Kareem and Subramanyam, 1976; Sanjappa and Ali, 1977; Palaniswamy and Ramachandran, 1978). Monocrotophos spraying @ 1.6ml/liter of water against the pest effectively checks the pest incidence. However, during 1995, 1996 and 1998, leaf miner pest was not noticed on groundnut, since the above favorable meteorological conditions did not occur.

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