

RESEARCH ARTICLE

Impact of environmental factors on infestation of cashew leaves by leaf miner, *Acrocercops syngamma* Meyrick in Gujarat

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SUMMARY

Studies were conducted in a cashew plantation at Waghai, Gujarat, India during 2017 – 19 on cashew variety vengurla-4 throughout two consecutive years to determine the pest status of leaf miner, *Acrocercops syngamma* Meyrick and their relation with environmental factor. Damage to cashew leaf by leaf miner was prevailed only from July to December with maximum damage (2.19%) in the month of November 45th SMW in hilly area of the Dangs. Further, pest infestation on leaves found to have significant positive correlation with maximum temperature, mean temperature, bright sunshine and evaporation, while negative with morning relative humidity, evening relative humidity, mean relative humidity and wind speed.

Key Words : Environmental factor, Cashew, Leaf miner, *Acrocercops syngamma* M.

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Cashew (*Anacardium occidentale* L.) is the evergreen tropical plantation crop grown in many tropical countries as well as India. More than 175 insect pests damage to cashew, of which cashew leaf miner, *Acrocercops syngamma* M. (Lepidoptera: Gracillariidae) is of substantial status (Sundararaju, 1984). Leaf miner is one of the crucial pests of cashew for the duration of post monsoon period all over the nation. The caterpillars after emerging from the eggs, start mining the epidermal coating on the upper surface of the tender cashew foliage as well as tender new growth. As a result of feeding, the affected area form scorched blotches of

greyish white colour. As the infested leaves matured, the injury marked as big holes. New plants are observed to be more susceptible to damage by this pest. Up to 15 larvae have been observed on a single leaf by Athalye and Patil (1999). Throughout the growing period, leaf miner caterpillars are dull white and turn pinkish in advance pupation. Afterward complete development, the caterpillars drop off to the soil where they pupate and arise after 7-9 days. The adult is a silvery grey moth, lays eggs on tender foliage. The incubation, larval and pupal periods lasted for 4.6, 8, 9.26 and 8.33 days, respectively and the total life cycle varied between 18 to 42 days (Athalye and Patil, 1999). Overall, leaf damage of 3 to 78 per cent by leaf miner has been documented on cashew in different cashew rising areas of the country (Ayyanna *et al.*, 1985; Jena *et al.*, 1985 and Chatterjee, 1989). While in the fluctuating situation, accurate determination of pest position for the nuisances on a specific crop is essential to develop right management practices. Hence, the present research meant to find leaf miner status based on the damage on leaves and impact of environmental factors on this pest.

MATERIAL AND METHODS

A field trial was conducted during 2017-18 and 2018-19 on cashew variety Vengurla-4 at farmer's field in mountainous area of the Dangs, Gujarat. The incidence of leaf miner in cashew ecosystem was studied in relation to weather parameters. The observation on incidence of leaf miner of cashew was recorded throughout the year at weekly interval. For record the observations, three cashew trees were designated randomly from investigational plot area. The entire investigational plot was kept free from any insecticide application.

Thirteen leader shoots in each direction (East, West, North and South) on three randomly selected trees were observed for the total number of damaged leaves by leaf miner and total number of leaves. The recorded data were converted into percentage on the basis of formula given below:

$$\text{Per cent damage} = \frac{\text{Number of damaged leaves}}{\text{Total number of leaves}} \times 100$$

The meteorological data of temperature, relative humidity, bright sunshine hours, wind speed and evaporation of different standard meteorological weeks were obtained from the Meteorological Observatory, Hill Millet Research Station, NAU, Waghai. With a view to study the impact of different weather parameters on pest

incidence, a simple correlation between per cent damage and weather parameters were worked out.

RESULTS AND DISCUSSION

The data presented in the Table 1 indicated that, damage of leaf miner prevailed only from July to December, while it remained absent from January to June under field condition in hilly area of the Dangs. The data further indicated that, it ranged from 0.61 to 2.61 per cent with an average of 1.12 per cent damage throughout its occurrence during the year 2017-18. It was (0.78%) observed from July 30th SMW to December 52th SMW (0.65 per cent). As high as 2.61 per cent damage was recorded in November 45th SMW.

Almost similar range of per cent damage of leaf miner was observed in the year 2018-19. The damage of leaf miner was observed from August 32nd SMW to December 50th SMW. It was ranged from 0.63 to 2.08 per cent with an average of 0.78 per cent damage. The maximum per cent of damage (2.08 per cent) was recorded in November 44th SMW (Table 1).

The mean data of two years (2017-18 and 2018-19) on seasonal incidence of leaf miner presented in Table 1 indicated that, the average per cent damage ranged from 0.32 to 2.19 per cent with an average of 0.95 per cent.

Average data of two years on per cent damage clearly indicated that, the activity of leaf miner was initiated in the month of July in hilly area of the Dangs. It was well coincided with arrival of new leaves. Thereafter, population found increasing and it was maximum in November during which abundant new leaves were made available to the larvae of leaf miner. After the month of December, new damage of leaf miner was not observed.

It is indicative from the available literature that, the leaf miner damage was higher during November as per the findings of Jena and Satapathy (1993) in Orissa, Chatterjee (1988) in West Bengal, Thirumalaraju *et al.* (1991) in Karnataka, Ramakrishnarao and Haribabu (2003) in Andhra Pradesh, Jalgaonkar *et al.* (2015) in Maharashtra and Sahu *et al.* (2018) in Chhattisgarh. Thus, the results of present investigation are found similar with those of earlier findings.

Effect of weather parameters on leaf miner :

Looking to the data (Table 2) of relationship between weather parameters and per cent damage by leaf miner shown significantly negative correlation with

morning relative humidity, evening relative humidity, mean relative humidity and wind speed at 5% level, while significant positive correlation with maximum temperature at 1% level and sunshine at 5% level. All

the other weather parameters did not show any significant influence on leaf miner during 2017-18.

Almost similar relationship obtained during 2018-19. It exhibited significantly negative correlation with

Month and week		SMW	Per cent damaged leaves		
			2017-18	2018-19	Average
July	IV	30	0.78	0.00	0.39
August	I	31	0.67	0.00	0.33
	II	32	1.41	0.68	1.04
	III	33	0.72	0.68	0.70
	IV	34	0.70	0.65	0.67
September	I	35	0.66	0.66	0.66
	II	36	0.68	0.65	0.66
	III	37	1.33	0.64	0.98
	IV	38	1.25	0.71	0.98
	V	39	1.33	0.66	0.99
October	I	40	1.38	1.35	1.36
	II	41	0.70	1.40	1.05
	III	42	1.45	0.71	1.08
	IV	43	1.42	1.43	1.42
November	I	44	2.00	2.08	2.04
	II	45	2.61	1.77	2.19
	III	46	2.00	1.29	1.64
	IV	47	1.41	0.64	1.02
December	I	48	0.67	0.64	0.65
	II	49	0.64	0.65	0.64
	III	50	0.61	0.63	0.62
	IV	51	0.65	0.00	0.32
	V	52	0.65	0.00	0.32
Not appeared during January to June					
Mean			1.12	0.78	0.95

Weather parameters	Per cent damaged leaves		
	2017-18	2018-19	Average
Maximum temperature (°C)	0.553**	0.709**	0.755**
Minimum temperature (°C)	-0.217	-0.304	-0.256
Mean temperature (°C)	0.0316	0.481*	0.538**
Morning relative humidity (%)	-0.450*	-0.614**	-0.630**
Evening relative humidity (%)	-0.462*	-0.529**	-0.534**
Mean relative humidity (%)	-0.468*	-0.619**	-0.604**
Bright sunshine hours (hr/day)	0.419*	0.423*	0.517*
Wind speed (km/hr)	-0.479*	-0.530**	-0.552**
Evaporation(mm/day)	0.408	0.367	0.446*

* Significant at 5% level ** Significant at 1% level

morning relative humidity, evening relative humidity, mean relative humidity and wind speed at 1% level, while significant positive correlation with maximum temperature at 1% level as well as mean temperature and sunshine at 5% level.

It is evident from the average data (Table 2) of two years (2017-18 and 2018-19) pertaining to weather parameters and per cent damage by leaf miner that, morning relative humidity, evening relative humidity, mean relative humidity and wind speed showed significant negative correlation at 1% level, while significant positive correlation with maximum temperature as well as mean temperature at 1% level and sunshine as well as evaporation at 5% level.

In previous investigation, significantly positive correlations with evaporation and bright sunshine hours were reported in Gujarat (Anonymous, 2015 and Anonymous, 2016) which are in agreement with the present results. However, significant positive correlation with relative humidity was observed by Ramakrishnarao and Haribabu (2003), Anonymous (2004) and Rao *et al.* (2006) in Andhra Pradesh, Kar and Poduval (2016) in West Bengal and Sahu *et al.* (2018) in Chhattisgarh which are mismatched with the present study. In addition, non significant association with temperature and relative humidity were reported by Mohapatra and Lenka (2003) in Orissa, Rao *et al.* (2006) in Andhra Pradesh, Chakraborti and Majumder (2007) in West Bengal and Jalgaonkar *et al.* (2015) which are also mismatched with the present study. It might be due to the difference in location and magnitudes of the abiotic factors.

Conclusion:

From the present study, it is concluded that, Damage to leaf by leaf miner was maximum during November and it was positively influenced by temperature, bright sunshine and evaporation, while negatively influenced by relative humidity and wind speed.

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REFERENCES

Anonymous (2004). *Annual Report 2003-04*. All India Coordinated Cashew Improvement Project, National

Research Centre for Cashew, Puttur, Karnataka, India, pp. 59-66.

Anonymous (2015). *11th Plant Protection Sub-Committee Report*, Agriculture Experimental Station, Navsari Agricultural University, Paria, Gujarat, India, pp. 25-28.

Anonymous (2016). *12th Plant Protection Sub-Committee Report*, Agriculture Experimental Station, Navsari Agricultural University, Paria, Gujarat, India, pp. 25-30.

Athalye, S.S. and Patil, R.S. (1999). Bionomics, seasonal incidence and chemical control of cashew leaf miner. *Journal of Maharashtra Agricultural Universities*, **23**(1): 29-23.

Ayyanna, T., Tejkumar, T. and Ramadevi, M. (1985). Distribution and status of pests on cashew in coastal districts of Andhra Pradesh. *Cashew Causerie*, **7**(2): 4-5.

Chakraborti, S. and Majumder, A. (2007). Meteorological determinants of the incidence of insect pests and their damage on cashew in coastal region of West Bengal. *Indian Journal of Agricultural Sciences*, **77**(4):264-266.

Chatterjee, M.L. (1988). Seasonal occurrence of pest complex on cashew (*Anacardium occidentale* L.) in West Bengal. *Cashew Bulletin*, **25**(12):11-14.

Chatterjee, M.L. (1989). Insect pests on cashew in West Bengal and status of some important pests. *The Cashew*, **3**: 19-20.

Jalgaonkar, V.N., Chavan, S.A. and Naik, K.V. (2015). Seasonal incidence of insect pests of cashew in Coastal Maharashtra. *Annals of Plant Protection Sciences*, **23** (2):390-417.

Jena, B., Patnaik, N.C. and Satapathy, C.R. (1985). Insect pests of cashew. *Cashew Causerie*, **7**(3): 10-11.

Kar and Poduval (2016). Seasonal incidence of insect pests in cashew in relation with weather conditions in red and laterite zone of West Bengal. *The Ecoscan*, **10**(3&4):535-537.

Mohapatra, R. and Lenka, P.C. (2003). Correlation of weather parameters with the incidence of major foliage and flower pests of cashew in Orissa, *Journal of Plantation Crops*, **31**(1) : 64-65.

Ramakrishnarao, A. and Haribabu, K. (2003). Seasonal incidence of cashew pest complex in Tirumala hills of Andhra Pradesh. *Madras Agricultural Journal*, **90** (4-6) : 282-285.

- Rao, Y.S., Rajsekhar, P., Rama Subbarao, V. and Srinivas Rao, V. (2006). Seasonal occurrence of leaf-eating caterpillars of cashew in Andhra Pradesh. *Journal of Plantation and Environment*, **3**(1):132-135.
- Sahu, K.R., Shukla, B.C. and Saxena, R.R. (2018). Effect of climatic factors on diversity of lepidopteran insect pests on cashew in Chhattisgarh. *International Journal of Agriculture Sciences*, **10**(9):5897-5900.
- Satapathy, C.R. (1993). Bioecology of major insect pests of cashew (*Anacardium occidentale* L.) and evaluation of certain management practices. Ph.D. Thesis, University of Agricultural Sciences, Bangalore, Karnataka, pp. 224.
- Sundararaju, D. (1984). Studies on cashew pests and their natural enemies in Goa. *Journal of Plantation Crops*, **12**:38-46.
- Thirumalaraju, G.T., Krishnappa, K.S., Venkatesh Gowda, T.N., Chandre Gowda, M. and Shankaranarayana, V. (1991). Seasonal occurrence of Major pests in maidan part of Karnataka. *The Cashew*, **5**(2):10-18.

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