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Studies on the seasonal incidence of coconut eriophyid mite *Aceria guerreronis* Keifer (Acari: Eriophyidae)

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The seasonal incidence of coconut eriophyid mite, *A. guerreronis* was studied during November 2000 to December 2001 in coconut plantations at Kadavasal, Chidambaram, Tamil Nadu. The incidence of mite was found throughout the year. But the peak incidence was observed during dry climate April, May and June and started declining during wet climate July. The correlation between temperature, rainfall and mite population revealed that the population density was positively correlated with temperature and negatively correlated with rainfall. The prediction model has been developed for the given set of parameters.

Key words : Eriophyid mite, Seasonal incidence, Prediction model.

INTRODUCTION

The coconut palm, *Cocos nucifera* L. is one of the plantation crops in the world. Among the various non-insect pest that have been reported on coconut palm eriophyid mite, *A. guerreronis* Keifer (Acari: Eriophyidae) is a serious one. This was first described in 1965 from coconuts of Guerrero State, Mexico (Keifer,1965). As a pest first reported from Ernakulam district of Kerala, a major coconut growing state, the pest has appeared simultaneously in adjoining states of Tamil Nadu and Karnataka and within a few years it has spread to almost all coconut growing states. On coconut the mites are seen in the floral bracts and the soft portion beneath the perianth. The infestation by the mite follows immediately after pollination. Appearance of elongated white streaks below the perianth is the first external manifestation of mite infestation on young buttons. Further these white streaks form triangular yellow patches. Draining of sap by the feeding activity of the colony resulting in drying of the tissues causing browning of the affected portion. As the nut grows, warts and longitudinal fissures appear on the nut surface. Severe infestation causes drying and shedding of buttons or malformation of nuts as a result of retarded growth. Considerable reduction in copra content and malformation. The incidence of eriophyid mite was more severe in relatively dry climates or during the dry season of wet climates (Zuluaga and Sanchez, 1971). However, in other localities there was no clear relationship between coconut mite populations and wet or dry weather, or, if such relationship exists, it was obscured by other factors (Mariau, 1977; Howard *et al.*, 1990 ; Ramaraju *et al.*, 2000). Haq (1979a) studied the correlation between temperature and rainfall with mite population and found that the population density of the mite was positively correlated with temperature and negatively correlated with rainfall.

MATERIALS AND METHODS

The study was conducted from November 2000 to December 2001 in coconut plantations at Kadavasal village. Field samples were collected at fortnightly intervals. The experiments was laid out in randomized block design with three replications, each replication consists of one palm which was maintained unsprayed. In such selected trees, third bunch from top was selected. From the selected bunch, one nut was taken at random and observations on number of mites per $8mm^2$ area at three places were recorded and mean population was assessed. Simultaneously, the meteorological data such as maximum and minimum temperature, rainfall, relative humidity, wind velocity and sunshine hours were collected from the meteorological centre at Annamalai University, Annamalai Nagar Tamil Nadu. Simple correlation and multiple regressions between these parameters were worked out (Swamiappan *et al.*, 2001).

RESULTS AND DISCUSSION

During, the present investigation, it was noted that the mite population was started developing from the month

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Table 1 : Seasonal incidence of eriophyid mite, *A. guerreronis* during November 2000 to October 2001

Month	Fortnights	Temperature (^{0}C) Maximum	Minimum	Relative humidity #	Wind velocity (km/h) #	Sunshine hours #	Rainfall #	* Mite population/8 mm^2
November 2000	I	31.15	24.07	79.71	3.91	9.31	2.70	189.76
	II	29.62	23.54	82.40	4.55	8.57	17.01	186.86
December 2000	I	29.20	22.94	82.00	5.10	7.60	2.07	188.23
	II	28.34	20.14	72.57	6.00	9.92	0.00	185.66
January 2001	I	28.28	22.41	81.28	4.51	8.14	1.15	184.59
	II	28.20	21.71	79.00	5.18	7.31	0.00	187.83
February 2001	I	29.98	21.48	50.17	3.27	8.27	0.00	191.83
	II	30.77	18.80	75.71	2.77	10.34	0.00	193.89
March 2001	I	31.21	21.60	74.71	3.21	10.02	0.00	182.33
	II	32.14	21.67	74.85	2.95	9.64	0.00	190.39
April 2001	I	33.14	25.08	76.85	4.48	8.86	0.00	201.79
	II	32.37	25.21	78.14	4.78	4.12	2.48	201.15
May 2001	I	36.67	26.48	68.57	7.98	10.68	7.45	221.86
	II	37.27	27.67	64.42	8.91	10.30	0.08	217.56
June 2001	I	32.41	25.41	75.00	5.11	2.68	9.35	209.46
	II	34.27	25.72	66.28	8.76	4.73	0.00	211.03
July 2001	I	37.28	27.48	58.28	7.92	2.60	7.47	207.28
	II	36.85	26.42	60.71	9.14	5.10	6.38	183.03
August 2001	I	33.18	24.57	71.42	6.10	3.60	3.85	184.80
	II	34.98	26.00	66.71	6.80	4.20	9.07	181.73
Septem2001	I	36.41	25.42	64.85	5.87	5.10	9.05	178.62
	II	26.14	24.42	69.57	4.95	3.60	9.35	178.78
October 2001	I	32.34	24.87	76.42	3.87	3.58	4.67	176.66
	II	32.04	25.08	83.42	3.37	5.70	5.98	180.69

* Values, mean of three replications

\# Values mean of fortnightly observations

Table 2 : Simple correlation matrix between the incidence of *A. guerreronis* and weather factors during November 2001 to October 2001

	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1.00						
X_2	0.733**	1.00					
X_3	-0.387*	-0.137*	1.00				
X_4	0.651**	0.692**	-0.294*	1.00			
X_5	-0.108*	-0.199*	0.170*	-0.289*	1.00		
X_6	0.153*	0.432*	0.111*	0.163*	-0.245*	1.00	
X_7	0.492	0.410	-0.126	0.489	-0.124	-0.110	1.00

X_1 -Maximum temperature (^{0}C) X_2- Minimum temperature (^{0}C) X_3 - Relative humidity (%)

X_4 -Wind velocity (km/hr) X_5- Rainfall (mm) X_6 -Sunshine hours

X_7 -Mite population

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

Table 3 : Prediction model for incidence of mite population *A. guerreronis* during November 2000 to October 2001

S. No	Infestational yardsticks	Regression coefficient (b)						Intercept (a)	Regression Equation	Coefficient of determination (R^2)
		bX_1	bX_2	bX_3	bX_4	bX_5	bX_6			
								116.1391	$Y=116.1391+ 1.311X_1 + 0.678X_2- 0.182X_3+ 1.701X_4 - 0.158X_5- 0.825X_6$	0.361
1	Mite population /8mm^2	1.311	0.678	-0.182	1.701	-0.158	-0.825	116.1391		

X_1 - Maximum temperature (^{0}C) X_5 -Rainfall (mm)
X_2 - Minimum temperature (^{0}C) X_6 -Sunshine hours
X_3 - Relative humidity (%) Y - Mite population (8mm^2)
X_4 - Wind velocity (km/hr) R^{2-} Coefficient of determination b- Regression coefficient

of November, reached a peak during May thereafter it started declining. In India the pest activity has been observed throughout the year with a peak during the summer months (Nampoothiri *et al.*, 2002). Such a seasonal pattern of incidence was earlier reported by Haq (1999a), Ramaraju (1999), Nair *et al.* (1999), Nair and Koshy (2000), Kanniyan *et al* (2000). They also reported that the mite population was higher during March, April and May. Studies on population dynamics in Tamil Nadu indicated that population was maximum during November and May. Mathew *et al.* (2000) observed monthly variation in total population of mite with a peak in February-March and sharp decline in subsequent rainy months indicating a negative relationship between mite population and rainfall. Kanniyan *et al.* (2000) and Swamiappan *et al.* (2001) observed that fairly high mite population was found even during rainy months like September, October and November and this was in accordance with the present findings. The reports of Zuluaga and Sanchez (1971) revealed that the coconut mite was more severe in relatively dry climates or during the dry season of wet climate. Haq (1999a) who stated that the population density of mite was positively correlated with rainfall. This is in accordance with the present findings. However, Mariau (1977), Howard *et al.* (1990) and Ramaraju *et al.* (2000) reported that there was no clear relationship between wet and dry weather factors. Correlation analysis on the influence of weather parameters on mite population did not reveal any clear relationship (Marimuthu *et al.*, 2003).

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