

## Seasonal Activity of *Oligonychus indicus* (Acari : Tetranychidae) and its Predators on Sorghum\*

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### ABSTRACT

The seasonal fluctuations of the mite *Oligonychus indicus* Hirst was studied on sorghum for a period of 18 months. The mite occurred throughout the year. It started building up during December and reached to peak activity during April, May, August and September. Predators and rainfall appeared to be regulatory factors. The predators observed to prey upon *O.indicus* were *Stethorus pauperculus* Weise, *Oligota oviformis* Casey and *Scolothrips sexmaculatus* Pergande, *Tapinoma melanocephalum* F. and phytoseiid mites belonging to *Amblyseius* sp. Increases in mite population were associated with periods of less rainfall, lower relative humidity and higher mean temperature.

KEY WORDS : Seasonal activity, *Oligonychus indicus*, predators, weather factors

*Oligonychus indicus* Hirst is an important mite pest of sorghum in Karnataka. It assumes at times serious proportions especially in the dry seasons and limits the crop yields. Several workers (Rahaman and Sapra, 1940, Cherian 1933; Puttarudraiah, 1947; Channa Basavanna and Puttarudraiah, 1957; Reddy and Jagadish, 1977; Maragal and Channa Basavanna, 1979; Mote 1983) have reported the seasonal fluctuation of sorghum mite with a mere record of its natural enemies. Knowledge on the seasonal pattern as influenced by weather factors and natural enemies is a prerequisite for development of sound pest management programme. To this end seasonal population fluctuation of *O.indicus* along with its predators on continuously grown sorghum hybrid CSH-1 crop at Karnataka was studied and the results are presented.

### MATERIALS AND METHODS

Studies on the seasonal activity of *O.indicus* on sorghum was undertaken at the Main Research Station, University of Agricultural Sciences, Dharwad (15.26° N, 76.07°E)

during 1984-1985 for a period of 18 months. Sorghum (CSH-1) was sown at monthly intervals starting from 8th July 1984 to 16th December 1985. The sowings were done in a plot 10.80 x 2.0 m with the recommended spacing (Anonymous, 1982) in ten lines of 2 m length in three replications. Every second line was kept blank for next sowing. Leaf samples were taken from 10 plants in each plot. Three leaves, basal, middle and top were chosen in each of the 10 plants. Active stages of mites per 3 cm<sup>2</sup> and predators on the foliage were counted under a 20 x stereobinocular microscope. The weather data temperature, relative humidity, rainfall and number of rainy days were recorded from meteorological observatory during the study period. Simple and multiple correlations for change in mite population with the natural enemies and weather factors were worked out as outlined by Snedecor (1956).

### RESULTS AND DISCUSSION

The populations of *O.indicus* were found to occur throughout the year, with the lowest during November and December in 1984 and

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Table 1. Seasonal activity of *Oligonychus indicus* and its predators on Sorghum

Date of Sampling	Mean active stages of mite per 3cm <sup>2</sup>	Natural enemies per leaf					Total
		<i>Stethorus pauperculus</i>	<i>Oligota oviformis</i>	<i>Tapinoma melanocephalum</i>	<i>Scolothrips sexmaculatus</i>	<i>Amblyseius</i> spp.	
8 - 7 1984	103.17	1.22	0.33	-	0.22	-	1.77
23 - 7 - 84	107.84	3.11	0.89	2.33	-	-	6.33
7 - 8 - 84	135.36	3.27	0.59	-	-	-	3.86
22 - 8 - 84	235.00	9.10	0.60	0.10	0.40	0.70	10.90
6 - 9 - 84	206.70	4.80	0.90	0.60	1.40	5.10	12.80
21 - 9 - 84	237.20	0.70	0.60	0.90	2.60	4.60	9.40
6 - 10 - 84	129.60	1.30	1.10	1.22	1.00	5.89	10.51
21 - 10 - 84	94.69	11.56	3.67	1.67	1.89	6.33	25.12
5 - 11 - 84	30.01	3.56	4.11	4.22	1.10	6.44	18.43
20 - 11 - 84	17.86	3.56	0.78	1.22	1.10	9.00	15.66
5 - 12 - 84	7.04	0.04	0.44	0.11	0.33	2.50	3.72
29 - 12 - 84	16.86	1.77	2.66	2.18	4.22	3.44	14.27
6 - 1 - 1985	37.46	0.33	1.44	3.33	5.22	4.33	14.65
20 - 1 - 85	66.42	2.30	1.44	3.11	5.77	1.22	13.84
4 - 2 - 85	97.66	1.00	0.22	0.11	4.78	2.44	8.55
19 - 2 - 85	107.80	2.60	0.17	0.55	4.00	1.77	9.69
6 - 3 - 85	131.30	1.66	0.88	0.55	0.66	0.77	4.52
21 - 3 - 85	147.92	1.33	1.77	1.33	2.05	0.66	7.14
5 - 4 - 85	147.67	1.77	1.22	2.30	9.11	2.11	16.51
20 - 4 - 85	293.55	4.66	0.77	1.00	9.11	2.50	18.04
3 - 5 - 85	295.33	5.20	0.22	0.66	8.88	2.00	16.96
20 - 5 - 85	96.55	5.00	0.30	0.60	6.50	1.50	13.90
4 - 6 - 85	84.57	2.00	0.80	1.80	1.80	2.00	8.40
19 - 6 - 85	46.17	2.60	1.00	0.44	0.11	2.80	6.95
4 - 7 - 85	21.84	2.22	0.44	0.33	0.11	3.00	6.10
19 - 7 - 85	86.60	2.50	0.88	1.00	0.55	7.11	12.01
3 - 8 - 85	84.55	1.44	3.00	0.22	0.55	3.11	8.32
18 - 8 - 85	231.44	3.11	4.00	0.77	-	3.44	11.32
2 - 9 - 85	203.55	4.77	6.80	0.55	-	5.22	17.32
17 - 9 - 85	210.66	3.33	8.88	0.22	0.11	5.44	17.98
2 - 10 - 85	129.11	2.56	4.44	1.77	-	2.22	10.99
17 - 10 - 85	132.22	1.33	2.22	0.22	-	4.60	8.37
1 - 11 - 85	105.44	0.33	2.23	-	-	0.66	3.32
16 - 11 - 85	101.66	0.88	1.44	0.22	-	2.11	4.65
1 - 12 - 85	70.66	0.44	0.88	0.11	0.55	1.22	3.20
16 - 12 - 85	35.22	1.11	0.22	-	0.11	0.44	1.88

early January, late June to early July and December in 1985 (Table 1). The highest populations of the mites were encountered in late August and September in 1984, April, May, August and September in 1985. It was evident that the mite population started to build up in the later part of December, which steadily increased attaining peak during April, May, August and September. Conver-

sely the lowest mite populations were found in the months of June, November, December and January thus indicating differential population pressure of the pest throughout the year.

With regard to the influence of natural enemies, both insect and acarine predators appeared to regulate the mite population (Table 1 and Fig. 1). The peak population of

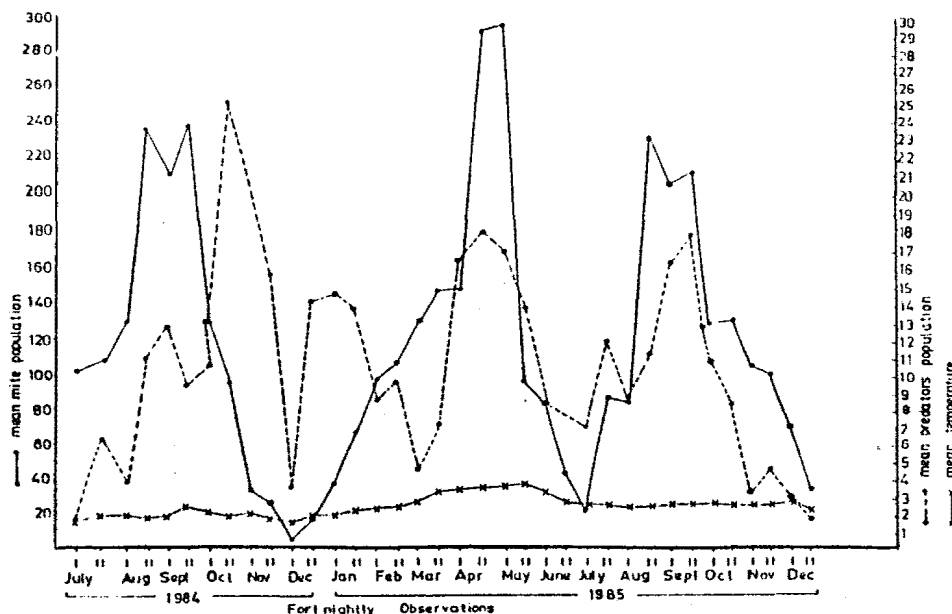


Fig 1. Seasonal activity of *Oligonychus indicus* with its Predators and Temperature

*Stethorus paupercules* were found during August, early September, October and November in 1984, late April, May and September in 1985. The highest populations of *Oligota oviformis* were encountered during late October and early November in 1984 and August, September and October during 1985. *Tapinoma melanocephalum* attained peak numbers during October, November and end of December in 1984 and January and April in 1985. Since this predator fed on flower nectar and sugary substance excreted by Homopteran insects, it is a less specific mite predator. The thrips *Scolothrips sexmaculatus* was found in large numbers during second fortnight of December in 1984 and January, February, April and May in 1985. The population of thrips closely followed the mite population during April and May 1985.

*Amblyseius longispinosus* Evans and *A. ovalis* Evans, belonging to Phytoseiidae were found feeding on the active stages of *O. indicus*. *A. longispinosus* appeared to have more preference to eggs. However, both the species remained in high density during August and September in both the years. They

were noticed even on lowest prey mite density indicating their potential to survive and control the mites even under low prey density.

Fluctuation of *O. indicus* was associated with weather factors. The correlation and regression analysis between mite population and weather factors were although insignificant for relative humidity and rainfall, it was significant for mean temperature ( $r=0.45$  and regression equation  $Y = -260.49 + 15.94X$ ). It was found (Fig.1) that the lowest minimum temperature prevailed during second fortnight of November and December in 1984, January, February, November and December in 1985. The increase in minimum temperature, combined with fairly high relative humidity enhanced the mite population, while low minimum temperature combined with fairly high humidity contained them. The incidence of lower populations of *O. indicus* at low temperature and high relative humidity confirms the report of Maragal (1977) who obtained long duration of 18.3 days at 25°C and 96 to 98 per cent relative humidity, for the development from egg to adult on sorghum.

Rainfall, an inimical factor to mites was presumed to act; firstly by rapid build up of relative humidity and lowering the temperature, and secondly by washing the active stages of mites from the host plant. In the present study, due to scanty rains, mites safely remained underneath the leaves. However, reduction in their number was considerable after rains during October 1984 and May, June and August 1985. Similar findings were obtained by Cherian (1933), Rahaman and Sapra (1940), and Venkataraman and Sharma (1960) in *O.indicus*.

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