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Studies on Host Range, Host Preference and Population Dynamics of Whitefly, *Bemisia tabaci* (Gennadius) in South Gujarat, India*

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ABSTRACT

In the study of host range of whitefly, *Bemisia tabaci* (Gennadius), out of twenty alternate host plants observed, mustard, soybean, bottle gourd and cowpea were recorded for the first time as host in Gujarat. The population was found increasing from August, reaching to the peak in December, declining gradually thereafter and reaching to zero in May, June and July. November, December and January were found most favourable months for multiplication and better servival of *B. tabaci* on various host plants. Sunflower, brinjal, sesamum, Indian bean and mustard were found most preferred host plants, while black gram, cowpea, sweet potato and groundnut were least preferred host plants in field condition.

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INTRODUCTION

The whitefly, *Bemisia tabaci* (Gennadius) is polyphagous in nature and its occurance has been reported on many crop plants and weed hosts. As many as 25 host plants at Pusa in Bihar (Misra and Lamba, 1929), 75 plant species belonging to 17 families at Nainital in Uttar Pradesh (Naresh and Nene, 1980), 99 plant species at Delhi (Pimpale and Summanwar, 1983) and 82 plants belonging to 14 families at Jobner in Rajasthan (Bhardwaj and Kushwaha, 1984) have been reported by various workers. This types of study on host plants, oviposition preference and population dynamics of the pest in various agroclimatic zone is very essential in developing a integrated pest management programme. The variation in weather parameters has also an effect directly or indirectly on pest population. The present paper deals with the studies on host range, oviposition preference and population dynamics of *B. tabaci* in South Gujarat region.

MATERIALS AND METHODS

For studies on host range and population dynamics of *B. tabaci*, various cultivated plants on the College Farm of Gujarat Agricultural University, Navsari were observed at one month interval during the year 1987-88. At each observation, samples of ten leaves selected randomly from several plant species were taken and they were observed under microscope in laboratory for presence of eggs and/or nymphs of *B. tabaci* on them. Counts of eggs and nymphs were also made to study the population dynamics of the pest.

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RESULTS AND DISCUSSION

Host range

During the studies on host range, twenty plant species were found to be the hosts of *B. tabaci* during different months of the year (Table 1). These plants were : okra (*Abelmoschus esculentus* (L.) Moench) (September-March), sesamum (*Sesamum indicum* L.) (October-March), chilli (*Capsicum annuum* L.) (October-February), clusterbean (*Cyamopsis tetragonaloba* (L) Taub.) (October-February), amaranthus (*Amaranthus viridis* L.) (October-February), sweet potato (*Ipomoea batatas* L. Lam.) (October-February, September), cowpea (*Vigna catjang* Walp.). (December-March), blackgram (*Vigna mungo* L. Wilczek) (November-December), Indian bean (*Dolichos lablab* L.) (October-February), soybean (*Glycine hispida* Merr.) (August- October), cotton (*Gossypium* spp.) (September-April), brinjal (*Solanum malongena* L.) (September-March), mustard (*Brassica juncea* Linn.) (November-February), tomato (*Lycopersicon esculentum* Mill.) (October-March), groundnut (*Arachis hypogaea* L.) (March-April), bottle gourd (*Lagenaria leucantha* Rusby) (March-April), sunflower (*Helianthus annuus* L.) (November-April), potato (*Solanum tuberosum* L.) (March-April), watermelon (*Citrullus vulgaris* Schrad.) (November-February), cucumber (*Cucumis sativus* L.) (September-October). The available literature on the host range of *B. tabaci* (Misra and Lamba, 1929; Patel *et al.*, 1970; Naresh and Nene, 1980; Pimpale and Summanwar, 1983 and Bhardwaj and Kushwaha, 1984) have indicated that the crops *viz.*, mustard, soybean, bottle gourd and cowpea as host plants of *B. tabaci* observed during present study have not been reported earlier. Thus, these plants were found for the first time over here as host plants for *B. tabaci*.

Host preference

Based on the data of average number of eggs per leaf, the descending order of host plants for egg laying preference by *B. tabaci* in field was : sunflower, brinjal, sesamum, mustard, Indian bean, tomato, okra, cotton, chilli, bottle gourd, cluster bean, watermelon, amaranthus, cucumber, soybean, sweet potato, groundnut, potato, cowpea and black gram. While, based on the data of average number of nymphs per leaf, the descending order of preference of host plants was : mustard, brinjal, sunflower, Indian bean, sesamum, okra, tomato, chilli, cotton, bottle gourd, cluster bean, watermelon, amaranthus, soybean, cucumber, blackgram, sweet potato, groundnut, cowpea and potato. Thus, sunflower, brinjal, sesamum, Indian bean and mustard were observed to be most preferred host plants, while black gram, cowpea, potato, sweet potato and groundnut were least preferred hosts by *B. tabaci*. The review of available literature indicated that no work has been done on preference by *B. tabaci* for different host plants in the field, therefore, the present results could not be compared with the work done elsewhere on this aspects.

Population dynamics

The data on average population of *B. tabaci* on different hosts in different months presented on Table 1 and depicted in figure 1 indicated that the population of this pest started increasing from August, reached the peak in December and declined gradually therefter reaching to zero in May, June and July. Thus, November, December and January were the months most favourable for multiplication and better survival of *B. tabaci* on various host plants as 12 to 15 host plants were found to be infested during this period. Further, during August, the *B. tabaci* was found only on

TABLE 1

Average population of whitefly (*Bemisia tabaci*) per leaf on different host plants in different months (1987-88).

Host	Stage of white-fly	PERIOD OF INCIDENCE 1987												Average population
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
Okra	Egg	01.30	02.50	11.00	09.40	00.90	00.90	—	—	—	—	—	00.40	03.77
Abelmoschus esculentus (L.) Moench	Nymph	01.50	01.80	21.90	13.30	01.10	00.40	—	—	—	—	—	00.20	05.74
Amaranthus	Egg	00.20	00.40	01.50	00.90	00.50	—	—	—	—	—	—	—	00.70
Amaranthus viridis L.	Nymph	—	00.70	01.80	02.70	00.70	—	—	—	—	—	—	—	01.48
Groundnut	Egg	—	—	—	—	—	00.70	00.40	—	—	—	—	—	00.55
Arachis hypogaea L.	Nymph	—	—	—	—	—	00.90	00.20	—	—	—	—	—	00.55
Mustard	Egg	—	05.00	30.00	20.00	06.00	—	—	—	—	—	—	—	15.25
Brassica juncea (L.) Coss.	Nymph	—	07.00	70.00	50.00	08.70	—	—	—	—	—	—	—	33.93
Chilli	Egg	01.50	03.50	01.50	—	—	—	—	—	—	—	—	—	02.17
Capsicum annuum L.	Nymph	01.80	04.00	08.10	07.60	01.20	—	—	—	—	—	—	—	04.54
Watermelon	Egg	—	00.70	02.50	00.90	00.40	—	—	—	—	—	—	—	01.13
Citrullus vulgaris Schrad.	Nymph	—	00.90	00.80	02.50	—	—	—	—	—	—	—	—	01.40
Cucumber	Egg	00.90	—	—	—	—	—	—	—	—	—	—	00.50	00.70
Cucumis sativus L.	Nymph	01.10	—	—	—	—	—	—	—	—	—	—	00.70	00.90
Cluster bean	Egg	01.30	05.00	01.10	00.60	00.40	—	—	—	—	—	—	—	01.68
Cyamopsis tetragonoloba (L.) Taub.	Nymph	01.40	05.40	01.40	00.80	00.30	—	—	—	—	—	—	—	01.86
Indian bean	Egg	05.00	10.00	30.00	10.00	02.50	—	—	—	—	—	—	—	11.50
Dolichos lablab L.	Nymph	07.00	10.50	32.50	15.00	04.00	—	—	—	—	—	—	—	13.80
Soybean	Egg	00.60	—	—	—	—	—	—	—	—	—	00.90	00.50	00.67

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
Glycine hispida Merr.	Nymph	01.10	—	—	—	—	—	—	—	—	—	01.10	00.70	00.97
Cotton	Egg	00.20	03.50	09.00	06.00	01.50	00.50	00.40	—	—	—	—	00.90	02.75
Gossypium spp.	Nymph	—	04.50	09.50	06.50	01.00	00.70	00.30	—	—	—	—	00.11	03.23
Sunflower	Egg	—	30.60	60.00	55.20	02.50	00.70	00.80	—	—	—	—	—	24.97
Helianthus annuus L.	Nymph	—	20.00	70.00	32.40	05.00	00.50	00.40	—	—	—	—	—	21.38
Sweet potato	Egg	00.50	00.90	00.60	00.50	00.30	—	—	—	—	—	—	00.60	00.57
Ipomea batatas (L.) Lam.	Nymph	00.80	01.10	00.90	00.30	00.20	—	—	—	—	—	—	00.70	00.67
Tomato	Egg	03.50	04.00	11.00	08.00	00.50	00.70	—	—	—	—	—	—	04.62
Lycopersicou esculentum Mill.	Nymph	01.50	09.00	12.50	09.00	01.00	00.90	—	—	—	—	—	—	05.65
Bottle gourd	Egg	—	—	—	—	—	02.50	01.50	—	—	—	—	—	02.00
Lagenaria leucantha Rusby.	Nymph	—	—	—	—	—	03.00	01.60	—	—	—	—	—	02.30
Sesamum	Egg	01.40	02.00	50.00	43.30	02.50	00.20	—	—	—	—	—	—	16.57
Sesamum indicum L.	Nymph	01.70	02.90	60.00	02.90	02.40	00.70	—	—	—	—	—	—	11.77
Brinjal	Egg	15.00	40.00	80.00	20.00	05.00	02.50	—	—	—	—	—	10.00	24.64
Solanum melongena L.	Nymph	20.00	30.00	90.00	70.00	06.00	03.00	—	—	—	—	—	09.00	32.57
Potato	Egg	—	—	—	—	—	00.40	00.10	—	—	—	—	—	00.25
Solanum tuberosum L.	Nymph	—	—	—	—	—	00.20	00.10	—	—	—	—	—	00.15
Cowpea	Egg	—	—	—	—	—	—	—	—	—	—	—	—	00.00
Vigna catjang Walp.	Nymph	—	—	00.70	00.90	00.10	00.20	—	—	—	—	—	—	00.48
Black gram	Egg	—	—	—	—	—	—	—	—	—	—	—	—	00.00
Vigna mungo (L.) Wilczek	Nymph	—	00.80	00.60	—	—	—	—	—	—	—	—	—	00.70
Number of host infested	Egg	12	13	13	12	12	09	05	00	00	00	01	06	18(Total)
	Nymph	10	14	15	14	13	10	05	00	00	00	01	06	20(Total)
Average population	Egg	02.62	08.32	22.17	14.57	01.92	01.01	00.64	00.00	00.00	00.00	00.90	02.15	
	Nymph	03.79	07.01	25.38	15.98	02.44	01.05	00.52	00.00	00.00	00.00	01.10	01.90	

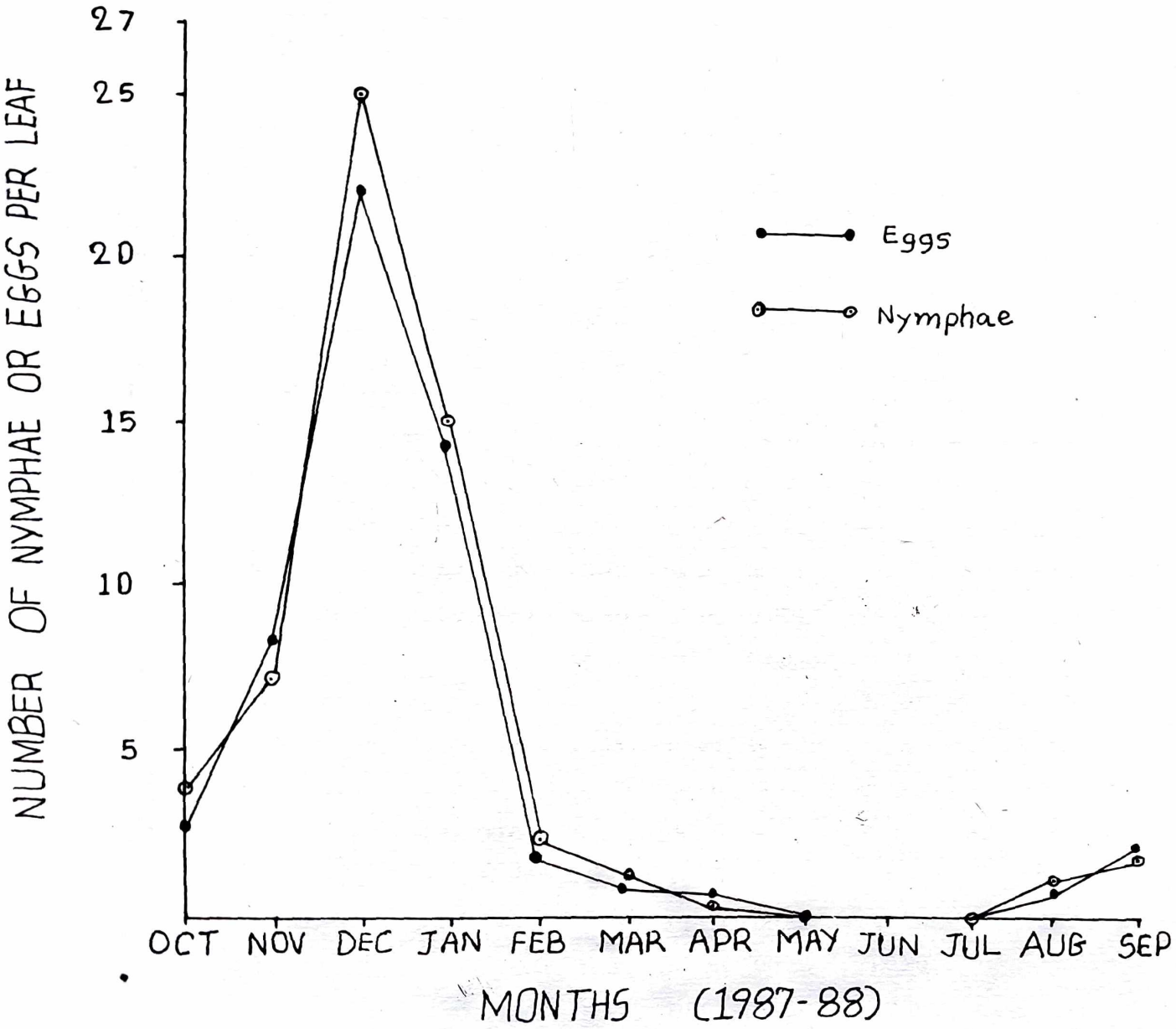

Figure 1 : Egg and nymphal population of B. tabaci in different months of the

soybean, while in September it was also found on okra, sweet potato, cotton, brinjal, cucumber. Therefore, these plants must have worked as host plants for development of *B. tabaci* population during latter period of rainy season. Bhardwaj and Kushwaha (1984) have reported that the incidence of *B. tabaci* on tomato commence from August and continued till end of January in monsoon crop and from February to April in summer crop, but higher intensity was from October to November. The above report closely tally with present finding.

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