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Distribution of the premature stages of the whitefly, *Bemisia tabaci* (Gennadius) on melon leaves

A. G. LANJAR, N. BALOCH*, M. A. RUSTMANI AND M. K. LOHAR

*Department of Entomology, Sindh Agriculture University, Tandojam

Corresponding author Naheed Baloch, email: nbbaloch12@yahoo Cell.No.03366632208

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Abstract: The present studies were carried out on melon crop in the experimental fields of the Faculty of Crop Protection, Sindh Agriculture University, Tandojam. When the plants were fully grown, a 30- leaf sample from the third and fourth node of randomly selected creepers from the field were plucked. The leaves were tentatively sub-divided into four Sectors (A, B, C and D). The sector A and D were presenting the proximal half of the leaf whereas B and C the distal half of the leaf. The whitefly egg and nymphs were separately counted on these sectors. The overall mean eggs of 30 leaves on sector A (32.88±2.55), B (20.76±1.82), C (17.10±1.30) and D (24.58±1.71) were recorded. Egg-density on the proximal leaf Sectors A and D was 34.49% and 25.78%, respectively, which was higher than sector B (21.78%) and C (17.93%). The population percentages of nymphs on sectors A, B, C and D were 21.09, 26.92, 29.35 and 22.62%, respectively. The overall mean number of nymphs on sector A was121.73±9.29, B 155.37±10.71, C 169.41±11450 and D 130.59±11.39, respectively. The Analyses of variance showed that the distribution of whitefly eggs varied significantly ($P<0.001$) on leaf sectors. However, the nymphs were significantly more in number on Sector B and C than on A and D ($P<0.05$). It was also confirmed by DMR test.

Keywords: Whitefly, Eggs, nymphs, distribution, leaf sectors, melon.

1. INTRODUCTION

Leaf age and morphological characters such as color, hairiness and shape are major factors influencing host selection by *Bemisia tabaci*. The morphological characters and plant architecture contribute to higher densities of adult whitefly (Khan *et al*., 2011). Ashraf *et al.* (1999) reported that leaf morphology plays vital role in avoiding or restricting the whitefly. Leaf physical characters influence oviposition of whitefly(Balaji and Veeravel, 1994). Trichome density on leaf and their arrangement at different lengths changes population pattern (Flint and Parks, 1990; Kishaba (1992). Butter and Vir (1989) and Rao *et al.* (1990) mentioned that hair density and leaf thickness have great impact on population density. Trichome types which vary by length, presence or absence of glandules in the apical extremity may interfere with oviposition, fixation and feeding of insects (Oriani *et al*., 2011). Mohanty *et al.* (1996) reported that the leaf pigmentation and spongy leaf texture less hairy leaves were preferred by the females. Chu *et al.* (1999) mentioned that lamina thickness and distance between the abaxial epidermis and phloem tissue play a vital role for adult, egg and nymphal densities on leaves. Since, physical factors of plant leaves influenced much more on population densities of various life stages of *B. tabaci.* The present study was under taken to observe the population behavior of the whitefly on melon leaf. The results of the present work will help to design effective sampling techniques for the management of this noxious pest.

2. MATERIALS AND METHODS

Investigations were conducted at Experimental Field, Faculty of Crop Protection, Sindh, Agriculture University Tandojam. Melon crop was sown in March 2001, and insecticides were not applied. When the crop was fully grown, a 30- leaf sample from the third and fourth node of randomly selected creepers from the field were collected. The leaves were tentatively sub-divided into four Sectors, which were delineated by main leaf vein. Naranjo and Flint (1994) adopted more or less the same procedure of dividing the creeper leaf as disc (Sector) in cotton crop. In the present investigation as well each melon leaf was cut up into four Sectors (A, B, C and D) such that it fitted with major leaf veins. By this way each leaf was divided in to four quarter, sector A and D were presenting the proximal half of the leaf whereas B and C the distal half of the leaf. Each Sector was thus numbered from left to right and the under side of the leaf was twisted up to facilitate observations for each sector of whitefly eggs and

* Department of Zoology, University of Sindh, Jamshoro

nymphs were separately counted with the aid of a binocular dissecting microscope (10^x). All nymphal stages from crawlers through terminal stage (pupae) were noted. The worth counting leaves were observed on the day of the collection and preserved in plastic bags and kept at 6°C. In general, all counts were completed within two days. Sector and total leaf area were determined for 10 leaves per node. This procedure was repeated after a 15-days interval till the harvest of melon crop.

3. RESULTS AND DISCUSSION

The whitefly eggs densities on each leaf Sector are given in **(Fig. 1)**. The overall means of 30 leaves of four Sectors as A (32.88±2.55), B (20.76±1.82), C (17.10±1.30) and D (24.58±1.71), respectively. The proximal Sectors having longer surface area and closeness to petiole favored slightly larger number of eggs than the distal ones. Egg-density on the proximal leaf Sectors A and D showed 34.49% and 25.78% respectively. It was more than the sector B and C (21.78%) and (17.93%), respectively **(Fig. 2)**.

The population percentages of nymphs (Fig. 4) on sectors A.B.C. and D were: 21.09% 26.92%, 29.35% and 22.62%, respectively, which was vise versa to the egg densities. The reason was that the 1st insatr nymphs move a bit and left the densest area of the eggs. The overall means of 30 leaves of four Sectors as A (121.73±9.29), B (155.37±10.71), C (169.41±11450) and (130.59±11.39), respectively **(Fig. 3)**. These means were subjected to the ANOVA. This showed that whitefly eggs were generally distributed significantly. (F=17.5:P<0.001, df=3), on Sector A and D than on B and C. Also a significant difference was found between date and Sector interactions (F=0.45.P>0.05, d.f=3) and confirmed by applying Duncan's Multiple Range test (Fig. 1). On each sampling date the number of whitefly was significantly more on Sectors A and D than B and C. However, the nymphs were significantly more in number on Sector B and C than on A and D (F=5.92, P<0.05.d.f=3). It was also conformed by DMR test on individual leaf the nymphs of white flies were differently infesting on all four Sectors **(Fig. 3and 4)**.

The result of the present investigation indicated that more egg-density was recorded on the proximal leaf sectors A and D than on B and C (distal) and more nymphal density on B and C. This difference is probably due to preference of proximal sectors of the host leaves by adult females that are nearer to the leaf petiole then the newly emerged crawlers after a little movement find their place away from the area which had more egg density. It is in agreement with those of Gerling *et al.* (1980) they reported that the population of immatures was disproportionally greater on distal parts than of eggs on proximal. This was due to the behavior of newly hatched crawlers, which started crawling on leaf sheath to locate appropriate place and adhering on host leaves. Ghahhari *et al.* (2001) reported that oviposition preferences based on leaf age, leaf height and surface orientation. Ohnesorge and Rapp (1986b) found third and fourth instars in high number disproportionately on distal Sectors of cotton leaves. However, the result is partially disagreed with those (Rao *et al.,* 1991) they reported that nymphs and eggs were abundant on the lateral half of the cotton leaf Sectors A and D. Ohnesorge and Rapp (1986a) found significantly more nymphs inhabiting cotton leaves near the stem. This is because nymph crowded around sectors B and C of proximal part.

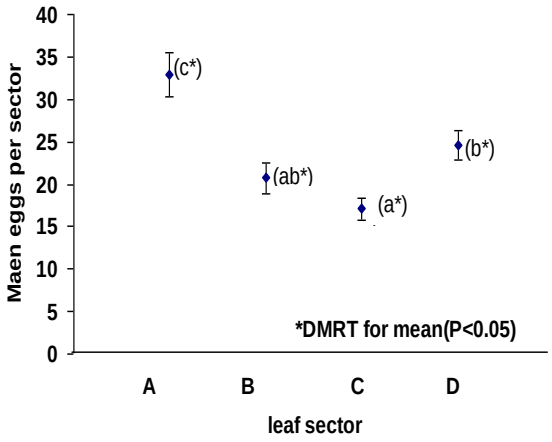


Fig 1. Mean population of eggs of *B. tabaci* on different sectors of melon leaf.

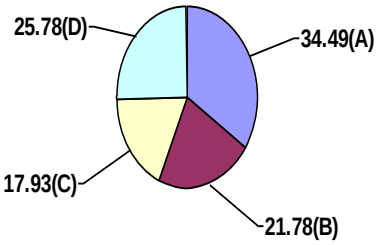


Fig 2. Percentage of eggs laid by female of *B. tabaci* on different sectors (A, B, C and D of melon leaf.

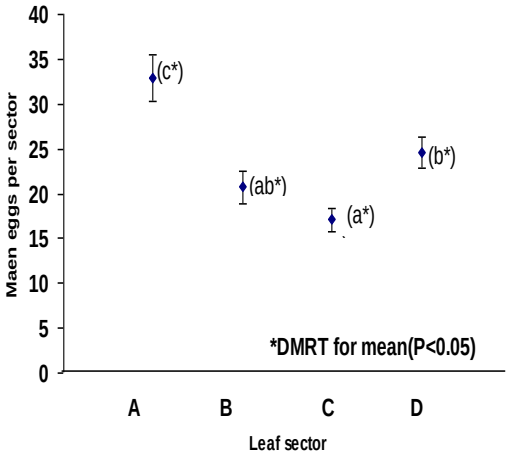


Fig 3. Mean of population nymph of *B. tabaci* on different sectors of melon leaf.

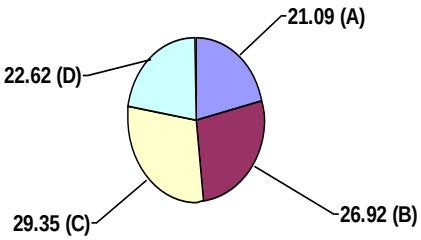


Fig 4. Percentage of nymphs of *B. tabaci* on different sectors (A, B, C and D of melon leaf.

REFERENCES:

Ashraf, M., Z. U. Zafar, McNeilly and C. J. Veltkamp (1999) Some morpho-anatomical characteristics of cotton (*Gossypium hirsutum* L.) in relation to resistance to cotton leaf curl virus (CLCuV). *Angewandte Botanik*. 73 **(3/4):** 76-82.

Balaji, K. and R. Veeravel. (1994) Leaf morphological and biochemical studies on the four varieties of brinjal in relation to whitefly (*Bemisia tabaci* Genn.) incidence.. *Progressive Horticulture*.26 **(1/2):** 45-52.

Butter, N. S. and B. K. Vir. (1989) Morphological basis of resistance in cotton to the whitefly *Bemisia tabaci*. *Phytoparasitica*.17 **(4):** 251-261.

Chu C. C., A. C. Cohen, E. T. Natwick, G. S. Simmons and T. J. Henneberry. (1999) *Bemisia tabaci* (Hemiptera: Aleyrodidae) biotype B colonisation and leaf morphology relationships in upland cotton cultivars. *Australian J. of Entomol.* 38 **(2):** 127-131.

Gerling, D., U. Motro and R. Horowitz. (1980) Dynamics of *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae) attacking cotton in the coastal plain of Israel. *Bull. of Entomol. Res.*.70 **(2):** 213-219.

Ghahhari, H., H. Bayat-Asadi and M. Shojai. (2001) Effects of leaf factors and insecticide residues on behavior and biology of sweetpotato whitefly *Bemisia tabaci* (Hom.: Aleyrodidae). *J. of Entomol. Soc. Of Iran*. 21 **(2):** 1-23.

Khan, M. R., A. G. Idris, M. R. Khan, A. Ghaffar and A. Tamkeen. (2011) Host plant selection and oviposition behaviour of whitefly, *Bemisia tabaci* (Gennadius) in a mono and simulated polyculture crop habitat. *African J. Biotechenol*. 10 **(8):** 1467-1472.

Mohanty, A. K., A. K. Kar, P. N. Sethi and A. Dhal. (1996) Brinjal varieties as sources of rearing host plants for *Bemisia tabaci* Genn. *Crop Res. Hisar*. 11 **(3):** 386-387.

.Naranjo, S. E. and H. M. Flint, (1994) Spatial distribution of preimaginal *Bemisia tabaci* (Homoptera: Aleyrodidae) in cotton and development of fixed-precision sequential sampling plans. *Environ. Entomol*. 23(2): 254-266.

Ohnesorge, B. and G. Rapp, (1986a) Methods for estimating the density of whitefly nymphs (*Bemisia tabaci* Genn.) in cotton. [Spanish and French summaries]. Trop. Pest Manage. 32 **(3):** 207-211.

Ohnesorge, B. and G. Rapp. (1986b) Monitoring *Bemisia tabaci:* A review. *Agric. Ecosys. Environ.* **(17):** 21-27.

Oriani, M. Auxiliadora de Godoy, J. D. Vendramimand C. J. Vasconcelos. (2011) No-choice ovipositional nonpreference of *Bemisia tabaci (*Gennadius*)* B biotype on tomato genotypes. *Sci. Agríc.* (USP. Impresso), 68 **(2):** 147-153.

Rao, N. V.; A. S. Reddy and K. T. Rao. (1991) Monitoring of cotton whitefly *Bemisia tabaci* Genn. with sticky traps. *Madras Agril. J.* 78 **(1-4):** 1-7.

Rao, N. V., A. S. Reddy, R. Ankaiah, Y. N. Rao and S. M. Khasim. (1990) Incidence of whitefly (*Bemisia tabaci*) in relation to leaf characters of Upland cotton (*Gossypium hirsutum*). *Indian J. of Agril Sci*. 60 **(9):** 619-624.