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## Effect of dates of sowing of Okra, *Abelmoschus esculentus* (L.) Moench on the incidence of Mite, *Tetranychus cinnabarinus* (Boisduval)

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**Abstract**

The effect of dates of sowing of okra, Okra, *Abelmoschus esculentus* (L.) Moench on the incidence of Mite, *Tetranychus cinnabarinus* (Boisduval) was studied at S.K.N. College of Agriculture, Jobner (Rajasthan) during *kharif* 2004 and 2005. In the four dates of sowing the peak population of mite was recorded during third week of September. Significantly minimum population (3.05 mites/3 leaves) was recorded in 28<sup>th</sup> July sown crop followed by 5<sup>th</sup> July sown crop and it was maximum in 12<sup>th</sup> July sown crop (4.18 mites/3 leaves). The maximum yield (45.10 q/ha) was obtained in second date of sowing (5<sup>th</sup> July) and proved significantly superior from all other dates of sowing.

**Keywords:** Dates of sowing, Okra, Incidence and Mite, *Tetranychus cinnabarinus* (Boisduval)

**1. Introduction**

Okra, *Abelmoschus esculentus* (L.) Moench also known as *Bhindi* or lady's finger, is grown throughout India for its immature fruits and occupies an important position among vegetables (Saroda and Lal, 1981). In India, it occupied over 0.31 million hectares area with an annual production of 3.65 million tonnes (FAO Report, 2007), whereas, Rajasthan occupied 4456.0 hectares area with an annual production of 11447.0 tonnes during 2005-06 (Anonymous, 2006). The fully ripened fruits and stem contain carbohydrate (7.7%), protein (2.2%), fat (0.02%), fibres (1.2%), minerals (0.7%), calcium (0.9%) and are also good source of iron, iodine and vitamins (Chauhan, 1965).

The okra crop is attacked by several species of insect pests, right from the germination to the harvest (Ambegaonkar and Bilapate, 1984). In the recent years, the importance of mites as a pest of vegetable crops has been appreciated all over the world. The main contributing factor has been the excessive reliance on pesticide leading to serious upset in natural balance (Baker and Pritchard, 1960). Among the vegetable crops, okra and brinjal are the most affected crops by mites causing economic loss throughout the country. The red spider mites *viz.*, *Tetranychus cinnabarinus* (Boisduval), *Tetranychus ludeni* Zacher and *Tetranychus neocaledonicus* Andre are of major significance to vegetable crops in India (Gupta, 1991 and Rai *et al.*, 1991). Among the mite pests, *T. cinnabarinus* become abundant and cause appreciable damage to okra crop particularly during dry months of the year, even under drought conditions as high as 20 per cent loss in okra has been estimated (Shankarappa *et al.*, 1981).

The mite is polyphagous in nature and has been reported to infest more than 110 plants including fruits, vegetables and field crops (Jeppson *et al.*, 1975). It sucks the cell sap from the leaves and produce white spots which latter get covered by thick web. In windy weather, these webs are filled with soil particles. The photosynthetic activity is retarded, affected leaves loose green colour, dry up and drop pre mature, finally resulting in poor fruit setting (Rahman and Sapra, 1945; Khot and Patel, 1956; Bharodia and Talati, 1976 and Puttaswamy and Reddy, 1980). Expanding vegetable cultivation due to availability of high yielding hybrids is providing sufficient food and congenial environment for the mite to multiply on regular basis. The present study was conducted to general information about the effect of dates of sowing on incidence of mite, *T. cinnabarinus*.

**Material and Methods**

The experiment was laid out in a simple randomized block design with four treatments and five replications with each plot measuring 2.25 x 3.90 m<sup>2</sup> with row to row and plant to plant

distance of 45 cm and 30 cm, respectively. Different sowing dates (28<sup>th</sup> June, 5 July, 12 July and 19 July) were considered as treatments in this experiment. In all four dates of sowing were kept at seven days interval starting from the last week of June 2004 and 2005, one before the normal and two after the normal date of sowing. All the agronomical practices were followed from time to time. The variety, Arka Anamika was sown for this purpose. The observations of mite, *T. cinnabarinus* were recorded as weekly numerical counts on okra commencing from one month after germination to the last picking of fruits. The observations were recorded on randomly selected five plants. The three leaves one each from top (young), middle (mature) and bottom (old) portions of tagged okra plants were plucked randomly, collected in separate properly labeled polythene bags and brought to the laboratory without disturbing mites for assessing population under stereo binocular microscope. Both upper and lower portions of the leaves were examined. The data so obtained were subjected to statistical analysis of variance.

### Results and Discussion

It was evident from the results of 2004 (Table 1), that the population started to increase slowly on the crop sown on 28<sup>th</sup> June, 5<sup>th</sup> July, 12<sup>th</sup> July and 19<sup>th</sup> July and reached to peak in the third week of September with counts of 11.79, 12.39, 14.40 and 13.98 mites/3 leaves, respectively. Thereafter, a gradual decline in population was observed reaching to negligible level in the second week of October where such counts were 0.46, 0.66, 1.26 and 1.26 mites/3 leaves, respectively. Moreover, minimum mite population (3.03 mites/3 leaves) was observed in early sown crop (28<sup>th</sup> June) whereas, it was maximum in the crop sown on 12<sup>th</sup> July (4.17 mites/3 leaves). The fruit yield was significantly higher, in the

crop sown on 5<sup>th</sup> July (45.50 q/ha) as compared to other dates of sowing.

The same trend of population was observed on crop sown on 28<sup>th</sup> June, 5<sup>th</sup> July, 12<sup>th</sup> July and 19<sup>th</sup> July, 2005 (Table 2). The corresponding peak population of 11.86, 12.40, 14.53 and 14.00 mites/3 leaves, respectively were recorded in the third week of September. A gradual decline in population was observed in all dates of sowing latter on, reaching to a level of 0.53, 0.60, 1.20 and 1.13 mites/3 leaves in the second week of October. On the basis of mean mite population, minimum mite population (3.07 mites/3 leaves) was observed in 28<sup>th</sup> July sown crop followed by next sowing (3.28 mites/3 leaves) and maximum counts were obtained in 12<sup>th</sup> July sown crop (4.18 mites/3 leaves). No significant difference existed among fruit yield of different sowing dates.

On the basis of pooled data, the peak population of mite was recorded in the third week of September in all the dates of sowing (Table 3). Significantly minimum population (3.05 mites/3 leaves) was recorded in 28<sup>th</sup> July sown crop followed by 5<sup>th</sup> July sown crop and it was maximum in 12<sup>th</sup> July sown crop (4.18 mites/3 leaves). The maximum yield was obtained in second date of sowing (45.10 q/ha) and it was significantly superior from all other treatments. Abiotic factors were explaining the dominance in the buildup of mite population up to extent of 85 per cent. Lingeri *et al.* (1998) and Sharma (2006) observed same trend of building only one peak for *Polyphagotarsonemus latus* and *T. cinnabarinus*, fully support the present findings. The low population density of the mite population in early sown crops *i.e.* 28<sup>th</sup> June and 5<sup>th</sup> July as compared to crop sown on 12<sup>th</sup> July. The possible reason for higher mite population in late sown crop might be due to change in chemical composition of the leaves.

**Table 1:** Effect of sowing time on the incidence of *Tetranychus cinnabarinus* (Boisduval) infesting okra in *kharif*, 2004

| S. No. | Dates of sowing             | Mean mite population/3 leaves |                |                |                |                |                |                |                |                 |                |                |                | Mean           | Fruit yield (q ha <sup>-1</sup> ) |
|--------|-----------------------------|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|-----------------------------------|
|        |                             | 28.7.04                       | 5.8.04         | 12.8.04        | 19.8.04        | 26.8.04        | 2.9.04         | 9.9.04         | 16.9.04        | 23.9.04         | 30.9.04        | 7.10.04        | 14.10.04       |                |                                   |
| 1      | 28 <sup>th</sup> June, 2004 | 0.00<br>(0.71)                | 0.00<br>(0.71) | 1.86<br>(1.54) | 2.13<br>(1.62) | 2.40<br>(1.70) | 2.66<br>(1.78) | 3.40<br>(1.97) | 3.60<br>(2.02) | 11.79<br>(3.50) | 4.98<br>(2.34) | 3.18<br>(1.92) | 0.46<br>(0.98) | 3.03<br>(1.88) | 41.65                             |
| 2      | 5 <sup>th</sup> July, 2004  | 0.00<br>(0.71)                | 0.08<br>(0.76) | 1.93<br>(1.56) | 2.26<br>(1.66) | 2.66<br>(1.77) | 2.80<br>(1.81) | 3.60<br>(2.02) | 3.73<br>(2.05) | 12.39<br>(3.58) | 5.39<br>(2.42) | 2.40<br>(2.16) | 0.66<br>(1.08) | 3.30<br>(1.94) | 45.50                             |
| 3      | 12 <sup>th</sup> July, 2004 | 0.00<br>(0.71)                | 0.11<br>(0.78) | 2.73<br>(1.80) | 3.06<br>(1.88) | 3.20<br>(1.92) | 3.53<br>(2.01) | 4.26<br>(2.18) | 4.40<br>(2.21) | 14.40<br>(3.85) | 7.38<br>(2.80) | 5.79<br>(2.50) | 1.26<br>(1.33) | 4.17<br>(2.16) | 42.25                             |
| 4      | 19 <sup>th</sup> July, 2004 | 0.00<br>(0.71)                | 0.66<br>(1.08) | 2.80<br>(1.82) | 2.93<br>(1.85) | 3.13<br>(1.90) | 3.40<br>(1.97) | 4.13<br>(2.15) | 4.33<br>(2.20) | 13.98<br>(3.80) | 6.99<br>(2.73) | 5.54<br>(2.16) | 1.26<br>(1.33) | 4.09<br>(2.14) | 40.10                             |
|        | SEm <sub>±</sub>            | 0.00                          | 0.007          | 0.040          | 0.043          | 0.046          | 0.048          | 0.054          | 0.055          | 0.105           | 0.070          | 0.061          | 0.023          | 0.053          | 1.34                              |
|        | CD at 5%                    | 0.00                          | 0.022          | 0.124          | 0.133          | 0.141          | 0.147          | 0.166          | 0.170          | 0.321           | 0.216          | 0.188          | 0.070          | 0.162          | 4.11                              |

Figures in parentheses are  $\sqrt{x + 0.5}$  transformed values

**Table 2:** Effect of sowing time on the incidence of *Tetranychus cinnabarinus* (Boisduval) infesting okra in *kharif*, 2005

| S. No. | Dates of sowing             | Mean mite population/3 leaves |                |                |                |                |                |                |                |                 |                |                |                | Mean           | Fruit yield (q ha <sup>-1</sup> ) |
|--------|-----------------------------|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|-----------------------------------|
|        |                             | 28.7.05                       | 5.8.05         | 12.8.05        | 19.8.05        | 26.8.05        | 2.9.05         | 9.9.05         | 16.9.05        | 23.9.05         | 30.9.05        | 7.10.05        | 14.10.05       |                |                                   |
| 1      | 28 <sup>th</sup> June, 2004 | 0.00<br>(0.71)                | 0.00<br>(0.71) | 1.80<br>(1.52) | 2.26<br>(1.66) | 2.46<br>(1.72) | 2.60<br>(1.76) | 3.46<br>(1.99) | 3.66<br>(2.04) | 11.86<br>(3.51) | 5.00<br>(2.34) | 3.26<br>(1.94) | 0.53<br>(1.01) | 3.07<br>(1.89) | 40.75                             |
| 2      | 5 <sup>th</sup> July, 2004  | 0.00<br>(0.71)                | 0.00<br>(0.71) | 1.86<br>(1.53) | 2.33<br>(1.67) | 2.66<br>(1.77) | 2.73<br>(1.79) | 3.66<br>(2.03) | 3.73<br>(2.05) | 12.40<br>(3.57) | 5.40<br>(2.42) | 4.06<br>(2.12) | 0.60<br>(1.05) | 3.28<br>(1.93) | 44.70                             |
| 3      | 12 <sup>th</sup> July, 2004 | 0.00<br>(0.71)                | 0.13<br>(0.79) | 2.80<br>(1.81) | 3.00<br>(1.87) | 3.26<br>(1.94) | 3.46<br>(1.90) | 4.33<br>(2.20) | 4.40<br>(2.21) | 14.53<br>(3.87) | 7.40<br>(2.81) | 5.73<br>(2.49) | 1.20<br>(1.30) | 4.18<br>(2.16) | 42.90                             |
| 4      | 19 <sup>th</sup> July, 2004 | 0.00<br>(0.71)                | 0.46<br>(0.98) | 2.73<br>(1.80) | 2.86<br>(1.83) | 3.20<br>(1.92) | 3.33<br>(1.96) | 4.20<br>(2.17) | 4.46<br>(2.23) | 14.00<br>(3.81) | 6.93<br>(2.72) | 5.53<br>(2.45) | 1.13<br>(1.28) | 4.06<br>(2.13) | 40.60                             |
|        | SEm <sub>±</sub>            | 0.00                          | 0.006          | 0.048          | 0.053          | 0.057          | 0.058          | 0.068          | 0.069          | 0.131           | 0.087          | 0.075          | 0.025          | 0.065          | 1.38                              |
|        | CD at 5%                    | 0.00                          | 0.017          | 0.149          | 0.164          | 0.175          | 0.179          | 0.209          | 0.212          | 0.403           | 0.266          | 0.229          | 0.077          | 0.200          | 4.23                              |

Figures in parentheses are  $\sqrt{x + 0.5}$  transformed values

**Table 3:** Effect of sowing time on the incidence of *Tetranychus cinnabarinus* (Boisduval) in *kharif*, 2004 and 2005 (Pooled)

| S. No. | Dates of sowing             | Mean mite population/3 leaves |                |                |                |                |                |                |                |                 |                |                |                | Mean           | Fruit yield (q ha <sup>-1</sup> ) |
|--------|-----------------------------|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|-----------------------------------|
|        |                             | I                             | II             | III            | IV             | V              | VI             | VII            | VIII           | IX              | X              | XI             | XII            |                |                                   |
| 1      | 28 <sup>th</sup> June, 2004 | 0.00<br>(0.71)                | 0.00<br>(0.71) | 1.83<br>(1.53) | 2.20<br>(1.64) | 2.43<br>(1.71) | 2.63<br>(1.77) | 3.43<br>(1.98) | 3.63<br>(2.03) | 11.83<br>(3.51) | 0.99<br>(2.34) | 3.22<br>(1.93) | 0.50<br>(1.00) | 3.05<br>(1.88) | 41.20                             |
| 2      | 5 <sup>th</sup> July, 2004  | 0.00<br>(0.71)                | 0.04<br>(0.73) | 1.90<br>(1.54) | 2.30<br>(1.67) | 2.66<br>(1.77) | 2.77<br>(1.80) | 3.63<br>(2.02) | 3.73<br>(2.05) | 12.40<br>(3.57) | 5.40<br>(2.42) | 4.13<br>(2.14) | 0.63<br>(1.06) | 3.29<br>(1.94) | 45.10                             |
| 3      | 12 <sup>th</sup> July, 2004 | 0.00<br>(0.71)                | 0.12<br>(0.79) | 2.77<br>(1.80) | 3.03<br>(1.88) | 3.23<br>(1.93) | 3.50<br>(2.00) | 4.30<br>(2.19) | 4.40<br>(2.21) | 14.47<br>(3.86) | 7.39<br>(2.81) | 5.76<br>(2.50) | 1.23<br>(1.31) | 4.18<br>(2.16) | 42.57                             |
| 4      | 19 <sup>th</sup> July, 2004 | 0.00<br>(0.71)                | 0.56<br>(1.03) | 2.77<br>(1.81) | 2.90<br>(1.84) | 3.17<br>(1.91) | 3.37<br>(1.96) | 4.47<br>(2.16) | 4.40<br>(2.21) | 13.99<br>(3.80) | 6.96<br>(2.73) | 5.54<br>(2.46) | 1.20<br>(1.30) | 4.08<br>(2.14) | 40.35                             |
|        | SEm <sub>±</sub>            | 0.00                          | 0.005          | 0.031          | 0.034          | 0.037          | 0.038          | 0.044          | 0.045          | 0.084           | 0.056          | 0.048          | 0.017          | 0.042          | 0.96                              |
|        | CD at 5%                    | 0.00                          | 0.013          | 0.092          | 0.100          | 0.107          | 0.110          | 0.127          | 0.129          | 0.245           | 0.163          | 0.141          | 0.049          | 0.122          | 2.80                              |

Figures in parentheses are  $\sqrt{x + 0.5}$  transformed values

### Conclusion

The peak population of mite was observed during third week of September. Significantly minimum population (3.05 mites/3 leaves) was recorded in 28<sup>th</sup> July sown crop followed by 5<sup>th</sup> July sown crop and it was maximum in 12<sup>th</sup> July sown crop (4.18 mites/3 leaves). The maximum yield was obtained in second date (5<sup>th</sup> July) of sowing (45.10 q/ha) and proved significantly superior from all other dates of sowing.

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