African Journal of Agricultural Research Vol. 8(4), pp. 380-385, 6 February, 2013
Available online at http://www.academicjournals.org/AJAR
DOI: 10.5897/AJAR12.1622
ISSN 1991-637X ©2013 Academic Journals

*Full Length Research Paper*

# Effect of yellow mite, *Polyphagotarsonemus latus* (banks) density on hosts (*Corchorus olitorius* L.) phenology and assessment of yield loss under net house condition

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Accepted 21 January, 2013

**The yellow mite, *Polyphagotarsonemus latus* Banks (Acari: Tarsonemidae) is one of the most serious pests of jute crop (*Corchorus olitorius* L.) in Bangladesh. Jute plants of tossa (*C. olitorius*) varieties were considered as treatments including, O-9897,O-72,OM-1 and O-795. The paired plot treatments (miticide treated and miticide untreated control) were laid out under net house condition. The impact of yellow mite, were studied on three stages of jute plants: 60, 90 and 120 DAS. The higher number of mite stages observed up to 90 DAS then declined afterward up to 120 DAS in var. OM-1 among four C. olitorius varieties. A damage index scale (0-5) was to assess yellow mite injury to jute plants. The percent infestation and damage index was also used to relate yellow mite injury to different yield contributing characters of plants infested at three different phenological stages. The yield contributing characters of untreated plots showed significant damage at 60, 90 and 120 DAS in *C. olitorius* varieties compared to treatment plots. The highest fibre yield losses due to mite infestation was found in the variety OM-1 (74.71%) followed by O-795 (72.98%), O-72 (68.14%) and the lowest was in O-9897 (50.11%); the highest stick yield losses in OM-1(57.18%) followed by O-795 (49.43%), O-9897 (49.35%), the lowest was in O-72(48.92%)and the highest seed yield losses in O-795(64.34%)followed by O-72(48.21%),OM-1(44.55%), he lowest was in O-9897(42.69%) under net house condition. High yellow mite population in the untreated check decreased plant growth and showed significant fibre and stick weight loss in the variety OM-1 and seed weight loss in the variety O-795.**

**Key words:** *Polyphagotarsonemus latus*, *Corchorus capsularis*, abundance, yield.

## INTRODUCTION

The yellow mite, *Polyphagotarsonemus latus* (Banks), is a polyphagous pest that has been reported on more than 100 different plant species including crops such as cotton, beans, citrus, potatoes, mango, papaya, jute and several ornamental plant species (Schoonhoven et al., 1978; Beattie and Gellatley, 1983; Aubert et al., 1981; Hooper, 1957; Nemestothy et al., 1982; Laffi, 1982; Hath, 2000). Because of this mite's short generation time (approximately 5 days), high fecundity, small size and protected habitat, the injury it produces is often confused with diseases and phytotoxicity. Jeppson et al. (1975) reported that some of the plant symptoms following yellow mite attack were formerly considered to be caused by various diseases including plant viruses (Aubert et al., 1981). Yellow mite damage has also been confused with herbicide toxicity or micronutrient deficiency (Beattie and Gellatley, 1983; Cross and Bassett, 1982). Yellow mites

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feed by sucking plant juices and, inject toxic compounds in tender plant tissues, where they prefer to feed (Gerson, 1992). During vegetative growth, the damage is mainly limited to the terminal shoots and young leaves. Typical symptoms are distorted leaves that later become neurotic. The mite, who attacks young, growing plant parts, is very small and difficult to detect, and usually feeds on the lower leaf surface and causes leaf edges to become rigid and roll under, and causes distortion and/or discoloration of flowers and blistering of fruits. After the terminal growth has been damaged and if mites are then successfully controlled, the recovery of the plants is very slow. As a consequence, the damage caused by these mites at early stages of development reduces the stand of plants and substantially delays plant growth.

Gerson (1992) stated that the variety of symptoms on different hosts reflects specific plant reactions to the pest's feeding and putative toxins. Yellow mites reduce market yield and injury plants by reducing and deforming leaves, flowers and fruits (Schoonhoven et al., 1978; Gerson, 1992). Plants under heavy attack cease growing and die (Moutia, 1958).

The objective of this study was the damage and the plant response to infestation at morphological and phenological levels and measuring the impact of mite density on yield under net house condition.

## MATERIALS AND METHODS

This study was conducted in the field of the Department of Entomology, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) of Gazipur during the period from March to August, 2009.

### Collection and rearing yellow mite

*P. latus* were collected from the infested jute plant of the research field of Bangladesh Jute Research Institute, Dhaka in March 2009. The collected mites from infested leaves were transferred into the potted jute plants kept outside the laboratory. Fifteen plants were infested to have constant supply of mite for the study purpose.

Jute plants of tossa *(C. olitorius* L) varieties considered as treatments *viz.*, O-9897, O-72, OM-1 and O-795 were sown in earthen pots (5 plant/pot) at 15 March, 2009. Plants were fertilized with a spoonful of 15-2-3-4 NPKS and irrigated by sprinklers twice daily. When the jute plants were as about 28$^{th}$ days of age, yellow mite (12 pairs female and male) infestation was allowed to build up by artificial inoculation.

The paired treatments were laid out in a completely randomized design (strip trial) with three replications under net house condition (100% shaded by 0.05 mash white colored net). After population build up in the net house, the treatment pots were treated with miticide (Mycosul 80 WDG at 3 g/L of water) and the treatment was repeated after 7 days interval until harvest to kill the nymphs which may hatch out after these treatments (kabir, 1975) and control pots were left untreated. Young 3$^{rd}$ leaf by each plant from the tip (from5 plants/pot) described by Alagarmalai et al. (2009) were collected at 60, 90 and 120 days after sowing (DAS), because yellow mites are commonly found on the lower surfaces of young apical leaves and flowers, where they deposit their eggs. The number of mite stages (egg, larva, pupa, female and male) per square centimeter of leaf was counted under a stereomicroscope.

### Damage index at different plant ages

The experiment consisted of yellow mite infested plants and uninfested plants of each variety at different age (60, 90 and 120 DAS), where the percentage of infestation, rating score of yellow mite infested plants were recorded at three stages of plants pre and post harvesting. To establish a damage index per plant, plants were separated into 5 categories of damage followed by Pradhan (1988) method. The rating scores of the categories were: 0=Fresh and healthy leaves, without any changes in colour, 1=Slight changes in colour of leaves, 2=Curling of leaves, 3=1 to 3 infested leaves dropped from the top, 4=All infested leaves fall prematurely but top shoot alive and 5=Top shoots dead.

Different phenology *viz.*, leaf area, fresh leaf weight, dry leaf weight, number of leaves, plant height, base diameter, fibre weight, stick weight, number of flowers per plant, number of pods per plant, pod weight, number of seed per pod, seed weight per plant and 1000' seed weight from both treated and untreated plots was also assessed at 3 stages (60, 90 and 120 DAS) of plants during the course of study. Leaf area was determined with a leaf area meter (LI-COR, Lambda Instruments Corporation, Lincoln, NE) and water content was determined by subtracting dry leaf weight from fresh leaf weight.

### Assessing yield loss

The difference between the weight of yield in treated and untreated plots was considered as loss. The percent loss in yield was calculated using the following formula (Khosla, 1977):

$$\text{Percent loss in yield} = \frac{X_1 - X_2}{X_1} \times 100$$

Where $X_1$ is the mean yield in treated plots $X_2$ is the mean yield in untreated plots

### Data analysis

The experimental data were analyzed statistically after appropriate transformation. Density of mite population data were transformed into square root transformation and Tukey's test (P=0.05) was done using the program MSTAT and analysis of variance (ANOVA) was used to determine differences among varieties.

Differences in categories for treated and untreated plants were analyzed by t-test (P=0.05) using the program MSTAT and analysis of variance (ANOVA) was used to determine differences among plant ages.

Yield data for both treated and untreated condition were transformed in to square root/ logarithm transformation where necessary, percent data were transformed into arcsin (y = sin-1 x) or square root (y = x + 0.5) and means were separated by Tukey's test Test (Steel and Torrie, 1960).

## RESULTS AND DISCUSSION

### Mite dynamics related to plant age

The number of mite stages varied for different' plant stages. The mean number of eggs, larvae, pupae, female

**Table 1.** Comparison of mean number of population at different stages of yellow mite per $cm^2$ of leaf at three DAS of *C. olitorius* under net house condition.

| Variety | Egg | | | Larva | | | Pupa | |
|---|---|---|---|---|---|---|---|---|
| | 60 DAS | 90 DAS | 120 DAS | 60DAS | 90 DAS | 120 DAS | 60 DAS | 90 DAS |
| O-9897 | $39.78^{c}$ (6.30) | $81.22^{c}$ (9.01) | $13.22^{c}$ (3.64) | $30.22^{ab}$ (5.50) | $36.00^{a}$ (5.99) | $17.67^{b}$ (4.20) | $2.89^{a}$ (1.69) | $3.11^{b}$ (1.76) |
| O-72 | $43.44^{bc}$ (6.59) | $88.67^{bc}$ (9.42) | $17.44^{b}$ (4.17) | $29.45^{b}$ (5.42) | $37.89^{a}$ (6.15) | $20.22^{b}$ (4.50) | $3.22^{a}$ (1.79) | $3.78^{b}$ (1.95) |
| OM-1 | $55.78^{a}$ (7.47) | $100.00^{a}$ (10.00) | $27.78^{a}$ (5.27) | $36.33^{a}$ (6.03) | $40.78^{a}$ (6.38) | $29.78^{a}$ (5.45) | $3.44^{a}$ (1.85) | $5.55^{a}$ (2.36) |
| O-795 | $50.44^{ab}$ (7.10) | $89.45^{b}$ (9.46) | $25.00^{a}$ (5.00) | $32.45^{ab}$ (5.69) | $37.11^{a}$ (6.09) | $22.89^{b}$ (4.78) | $3.44^{a}$ (1.85) | $5.11^{a}$ (2.26) |
| **Variety** | **Pupa** | | **Female** | | | **Male** | | |
| | **120 DAS** | **60 DAS** | **90 DAS** | **120 DAS** | **60 DAS** | **90 DAS** | **120 DAS** | |
| O-9897 | $2.89^{b}$ (1.70) | $4.67^{a}$ (2.14) | $7.67^{b}$ (2.76) | $4.66^{c}$ (2.16) | $3.89^{a}$ (1.97) | $4.33^{a}$ (2.08) | $2.33^{b}$ (1.52) | |
| O-72 | $2.89^{b}$ (1.70) | $5.33^{a}$ (2.31) | $12.44^{a}$ (3.52) | $5.22^{bc}$ (2.28) | $4.33^{a}$ (2.08) | $4.67^{a}$ (2.16) | $2.78^{ab}$ (1.66) | |
| OM-1 | $3.67^{a}$ (1.92) | $6.22^{a}$ (2.49) | $14.89^{a}$ (3.86) | $7.33^{a}$ (2.71) | $4.67^{a}$ (2.16) | $5.22^{a}$ (2.29) | $3.56^{a}$ (1.88) | |
| O-795 | $3.56^{ab}$ (1.88) | $5.89^{a}$ (2.43) | $12.45^{a}$ (3.57) | $6.33^{ab}$ (2.52) | $4.00^{a}$ (2.00) | $4.89^{a}$ (2.21) | $3.44a^{b}$ (1.85) | |

Means followed by same letter in columns do not differ by Tukey's test (P = 0.05). Figures in the parentheses are the square root transformed mean values.

and males per square centimeter of leaf in different varieties *viz.,* O-9897, O-72, OM-1 and O-795 (*C. olitorius*) at different plant stages under net house condition is presented in Table 1. Number of eggs, larvae, pupae, females and males increased over time up to 90 DAS then decreased. There are significant differences in the population of eggs, larvae, pupae, females and males among the different varieties of jute. The maximum number of eggs, larvae, pupae, females and males population was found at 90 DAS with *C. olitorius* variety, OM-1. The ascending orders of infestation in case of egg population among the varieties were O-9897 (81.22) < O-72 (88.67) < O-795 (89.45) < OM-1 (100.00); for larvae population those were O-9897 (36.00) < O-795 (37.11) < O-72 (37.89) < OM-1 (40.78); for pupal population those were O-9897 (3.11) < O-72 (3.78) < O-795 (5.11) < OM-1 (5.55); for female population among the varieties were O-9897 (7.67) < O-72 (12.44) < O-795 (12.45) < OM-1 (14.89) and for male population among the varieties were O-9897 (4.33) < O-72 (4.67) < O-795 (4.89) < OM-1 (5.22), respectively.

Similar trend of result were reported by De Coss-Romero and Peña (1998) in pepper plant. Apparently, tarsonemid mouthpart appendages are unsuitable for effective penetration of renitent tissues (Jeppson et al., 1975). Thus *P. latus* may not be able to puncture the more lignified tissues found in after 90 days old plants as opposed to those tissues in 60 to 90 days old plants. These data may be of value in programs for evaluating resistance of jute to *P. latus.* Assessments of plant resistance to *P. latus* carried out at early growth stages of jute would be particularly effective for identifying highly resistant plants.

## Incidence of *P. latus* on host *(C. olitorius)* phenology and yield

Yellow mites significantly reduced the leaf sizes of untreated plants compared to the treated plants in all varieties (O-9897, O-72, OM-1 and O-795) at three plant growth stages (Table 2). Fresh leaf weight was reduced at all the three plant stages, but significant reductions in dry weight were observed at 120 DAS in O-9897, O-72, OM-1 and O-795. The level of significance associated with the soluble solids was also reduced at all the three plant growth stages (Table 3). The numbers of leaves per plant, plant heights, base diameter, fibre weight, stick weight, number of flowers, number of pods, pod weight, number of seed per pod, seed weight and 1000 seed weight per plant were also affected by mite injury as observed at three plant growth stages in all the varieties and was significantly reduced compared to those of uninfested plants (Tables 4 and 5). The data supported that yellow mite reduced height in the infested plants, and induced lateral shoot growth.

Fibre weight, stick weight and seed weight both in treated and untreated situation in varieties, O-9897, O-72, OM-1 and O-795 (*C. olitorius*) and their respective yield loss due to yellow mite infestation are presented in Table 6. The differences in the fibre weight, stick weight and seed weight in different varieties, which could be minimized by the insecticidal treatment. The weight and percent yield losses have been found to vary in different varieties. Both in treated and untreated situation

**Table 2.** Comparison of mean percent infestation, damage rating, leaf area of jute plants infested with yellow mite at three plant stages under net house condition.

| Variety | Infestation (%) | | | | | | Damage rating | | |
|---|---|---|---|---|---|---|---|---|---|
| | 60 DAS | | 90 DAS | | 120 DAS | | 60 DAS | | 90 DAS |
| | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated |
| O-9897 | 0.00[b] | 93.33[a] | 0.00[b] | 40.00[a] | 0.00[b] | 40.00[a] | 0.00[b] | 2.20[a] | 0.00[b] |
| O-72 | 0.00[b] | 80.00[a] | 0.00[b] | 46.67[a] | 0.00[b] | 66.67[a] | 0.00[b] | 1.53[a] | 0.00[b] |
| OM-1 | 0.00[b] | 93.33[a] | 0.00[b] | 60.00[a] | 0.00[b] | 80.00[a] | 0.00[b] | 2.73[a] | 0.00[b] |
| O-795 | 0.00[b] | 80.00[a] | 0.00[b] | 40.00[a] | 0.00[b] | 53.33[a] | 0.00[b] | 2.00[a] | 0.00[b] |

| Variety | Damage rating | | | | Leaf area | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 90 DAS | | 120DAS | | 60 DAS | | 90 DAS | | 120DAS |
| | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control |
| O-9897 | 2.50[a] | 0.00[b] | 2.00[a] | 4.73[a] | 2.83[b] | 18.80[a] | 12.70[b] | 13.30[a] | 11.77[b] |
| O-72 | 2.39[a] | 0.00[b] | 1.33[a] | 5.27[a] | 3.40[b] | 17.63[a] | 11.67[b] | 15.60[a] | 11.77[b] |
| OM-1 | 3.39[a] | 0.00[b] | 3.00[a] | 5.77[a] | 3.82[b] | 17.77[a] | 11.17[b] | 16.07[a] | 11.70[b] |
| O-795 | 2.22[a] | 0.00[b] | 3.00[a] | 5.43[a] | 3.58[b] | 19.53[a] | 13.60[b] | 11.47[a] | 7.03[b] |

Means for each parameter within rows followed by the same letter are not significantly different (t-test, P=0.05).

**Table 3.** Comparison of mean fresh leaf weight, dry leaf weight and soluble solids at three jute plant stages infested with yellow mite under net house condition.

| Variety | Fresh leaf weight | | | | | | Dry leaf weight | | |
|---|---|---|---|---|---|---|---|---|---|
| | 60 DAS | | 90 DAS | | 120 DAS | | 60 DAS | | 90 DAS |
| | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated |
| O-9897 | 0.10[a] | 0.08[b] | 0.20[a] | 0.13[b] | 0.22[a] | 0.11[b] | 0.02[a] | 0.02[a] | 0.05[a] |
| O-72 | 0.10[a] | 0.07[b] | 0.21[a] | 0.17[b] | 0.23[a] | 0.11[b] | 0.02[a] | 0.03[a] | 0.05[a] |
| OM-1 | 0.12[a] | 0.09[b] | 0.22[a] | 0.11[b] | 0.22[a] | 0.11[b] | 0.03[a] | 0.03[a] | 0.05[a] |
| O-795 | 0.12[a] | 0.09[b] | 0.25[a] | 0.16[b] | 0.25[a] | 0.10[b] | 0.04[a] | 0.02[a] | 0.07[a] |

| Variety | Dry leaf weight | | | | Soluble solids | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 90 DAS | | 120 DAS | | 60 DAS | | 90 DAS | | 120 DAS |
| | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control |
| O-9897 | 0.03[a] | 0.05[a] | 0.02[b] | 0.08[a] | 0.06[b] | 0.15[a] | 0.10[b] | 0.17[a] | 0.09[b] |
| O-72 | 0.04[a] | 0.04[a] | 0.01[b] | 0.07[a] | 0.05[b] | 0.16[a] | 0.13[b] | 0.19[a] | 0.09[b] |
| OM-1 | 0.05[a] | 0.04[a] | 0.02[b] | 0.09[a] | 0.06[b] | 0.16[a] | 0.06[b] | 0.18[a] | 0.09[b] |
| O-795 | 0.04[a] | 0.04[a] | 0.02[b] | 0.08[a] | 0.06[b] | 0.18[a] | 0.12[b] | 0.20[a] | 0.08[b] |

Means for each parameter within rows followed by the same letter are not significantly different (t-test, P=0.05).

the highest fibre weight was obtained in the variety O-795 (20.67 g/plant) followed by O-72 (20.33 g/plant), OM-1 (17.56 g/plant) and the lowest fibre weight was obtained in O-9897 (14.22 g/plant). Yield loss varied because of mite population fluctuations due to host phenology and environmental condition. The highest fibre yield losses due to mite infestation was found in the variety OM-1 (74.71%) followed by O-795 (72.98%), O-72 (68.14%) and the lowest fibre yield losses was obtained in O-9897 (50.11%). The highest stick weight was obtained in the variety O-795 (40.78 g/plant) followed by O-72 (29.11 g/plant), O-9897 (28.55 g/plant) and the lowest stick weight was obtained in OM-1 (25.78 g/plant).

The highest stick yield losses was found in the variety OM-1 (57.18%) followed by O-795 (49.43%), O-9897 (49.35%) and the lowest were in O-72 (48.92%). The highest seed weight was obtained in the variety O-9897(6.94 g/plant) followed by O-795 (6.42 g/plant), O-72

**Table 4.** Comparison of mean number of leaves, plant height and base diameter at three jute plant stages infested with yellow mite under net house condition.

| Variety | Number leaves/plant | | | | | | Plant height | | |
|---|---|---|---|---|---|---|---|---|---|
| | 60 DAS | | 90 DAS | | 120DAS | | 60 DAS | | 90 DAS |
| | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated |
| O-9897 | 20.87[a] | 18.47[b] | 39.40[a] | 29.40[b] | 40.17[a] | 31.33[b] | 1.37[a] | 1.12[b] | 2.06[a] |
| O-72 | 21.47[a] | 18.73[b] | 26.65[a] | 19.50[b] | 28.50[a] | 22.39[b] | 1.31[a] | 1.15[b] | 1.89[a] |
| OM-1 | 22.07[a] | 18.67[b] | 29.56[a] | 19.31[b] | 50.33[a] | 27.33[b] | 1.12[a] | 0.92[b] | 1.71[a] |
| O-795 | 22.60[a] | 19.73[b] | 31.35[a] | 21.33[b] | 36.17[a] | 27.00[b] | 1.45[a] | 1.07[b] | 1.92[a] |

| Variety | Plant height | | | Base diameter | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 90 DAS | 120DAS | | 60 DAS | | 90 DAS | | 120DAS | |
| | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control |
| O-9897 | 1.53[b] | 2.92[a] | 2.35[b] | 6.00[a] | 4.47[b] | 9.23[a] | 7.31[b] | 9.67[a] | 1.89[b] |
| O-72 | 1.68[b] | 2.78[a] | 2.40[b] | 5.80[a] | 4.43[b] | 8.17[a] | 6.44[b] | 8.78[a] | 2.33[b] |
| OM-1 | 1.40[b] | 2.34[a] | 1.95[b] | 5.20[a] | 4.20[b] | 9.11[a] | 7.03[b] | 8.89[a] | 3.11[b] |
| O-795 | 1.67[b] | 2.69[a] | 2.37[b] | 5.27[a] | 4.13[b] | 8.69[a] | 6.93[b] | 8.78[a] | 3.11[b] |

Means for each parameter within rows followed by the same letter are not significantly different (t-test, P=0.05).

**Table 5.** Comparison of mean fibre weight, stick weight, number of flowers, number of pods, pod weight, number of seed per pod, seed weight and 1000 seed weight recorded at three jute plant stages infested with yellow mite under net house condition.

| Variety | Fibre weight | | Stick weight | | No. flowers | | Pod/plant | |
|---|---|---|---|---|---|---|---|---|
| | 120 DAS | | 120 DAS | | 120 DAS | | 120DAS | |
| | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control |
| O-9897 | 14.89[a] | 6.89[b] | 28.55[a] | 14.45[b] | 98.88[a] | 46.95[b] | 74.67[a] | 24.33[b] |
| O-72 | 20.33[a] | 6.44[b] | 29.11[a] | 14.89[b] | 49.76[a] | 34.45[b] | 35.50[a] | 16.80[b] |
| OM-1 | 17.89[a] | 4.43[b] | 25.78[a] | 11.00[b] | 63.06[a] | 38.46[b] | 46.17[a] | 16.83[b] |
| O-795 | 20.67[a] | 5.56[b] | 40.78[a] | 20.67[b] | 83.51[a] | 23.44[b] | 61.67[a] | 5.00[b] |

| Variety | Pod weight/plant | | Seed/pod | | Seed weight/plant | | 1000 seed weight | |
|---|---|---|---|---|---|---|---|---|
| | 120 DAS | | 120 DAS | | 120 DAS | | 120 DAS | |
| | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control | Treated | Untreated control |
| O-9897 | 32.66[a] | 13.68[b] | 154.82[a] | 136.33[b] | 6.94[a] | 3.98[b] | 1.87[a] | 1.53[b] |
| O-72 | 9.36[a] | 4.42[b] | 142.43[a] | 112.40[b] | 5.88[a] | 3.03[b] | 1.57[a] | 1.40[b] |
| OM-1 | 19.26[a] | 14.09[b] | 138.00[a] | 105.49[b] | 5.88[a] | 2.91[b] | 2.10[a] | 1.40[b] |
| O-795 | 18.78[a] | 2.73[b] | 129.38[a] | 56.86[b] | 6.42[a] | 2.29[b] | 1.43[a] | 0.70[b] |

Means for each parameter within rows followed by the same letter are not significantly different (t-test, P=0.05).

(5.88 g/plant) and the lowest seed weight was found in OM-1 (5.87 g/plant). The highest seed yield losses was found in the variety O-795 (64.34%) followed by O-72 (48.21%), OM-1 (44.55%) and the lowest was found in O-9897 (42.69%).

High levels of stress induced by *P. latus* feeding resulted in reduction in vegetative growth, flower development and reduction in quantity and quality of seed might be in response to some anatomical, physiological or biochemical differences between vegetative and reproductive stage of plants. These reductions were due to chronic feeding on plants younger leaf tissue, which appear to be more susceptible than plants with greater numbers of mature leaves. This effect has been shown to vary with the phenological development of hedera, reported by Nemestothy et al. (1982). Plants with younger hirsute leaves suffered the strongest damage compared to older plants with leaves with less hairs and where cell differentiation has already occurred. These results are in agreement with the reports of Smith (1935) who stated that the yellow mite cannot survive longer on the tough, mature leaves of most plants.

**Table 6.** Yield loss of *C. olitorius* varieties due to *P. latus* infestation under net house condition.

| Variety | Fibre weight/plant (g) | | | Stick weight/plant (g) | | | Seed yield weight/plant (g) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Treated | Untreated control | Loss (%) | Treated | Untreated control | Loss (%) | Treated | Untreated control | Loss (%) |
| O-9897 | 14.22$^{b}$(3.76) | 6.89$^{a}$(2.62) | 50.11$^{b}$(45.07) | 28.55$^{b}$(5.34) | 14.45$^{b}$(3.80) | 49.35$^{b}$(44.61) | 6.94 $^{a}$(2.63) | 3.98 $^{a}$(1.99) | 42.69$^{b}$(40.76) |
| O-72 | 20.33$^{a}$(4.51) | 6.44$^{a}$(2.54) | 68.14$^{a}$(55.63) | 29.11$^{b}$(5.39) | 14.89$^{b}$(3.85) | 48.92$^{b}$(44.37) | 5.88 $^{b}$(2.42) | 3.03$^{b}$c(1.74) | 48.21$^{b}$(43.96) |
| OM-1 | 17.56$^{ab}$(4.19) | 4.43$^{b}$(2.10) | 74.71$^{a}$(59.84) | 25.78$^{b}$(5.07) | 11.00c(3.32) | 57.18$^{a}$(49.11) | 5.87 $^{b}$(2.42) | 3.25$^{ab}$(1.80) | 44.55$^{b}$(41.81) |
| O-795 | 20.67$^{a}$(4.54) | 5.56$^{ab}$(2.36) | 72.98$^{a}$(58.67) | 40.78$^{a}$(6.39) | 20.67$^{a}$(4.54) | 49.43$^{b}$(44.65) | 6.42$^{ab}$(2.53) | 2.29 c(1.51) | 64.34$^{a}$(53.32) |

In a column, treatment means having the same letter(s) are not significantly different by Tukey's test (P=0.05). Figures in the parentheses are the transformed mean values.

It was reported that about 15.50% (O-9897) and 10.00% (CVL-1) of fibre yield were decreased by the attack of yellow mite in potted plants and 12.30% (O-9897) of fibre yield was decreased under field condition (Faruquzzaman, 1987). De Coss-Romero and Peña (1998) reported about 80% of yield reduced by *P. latus* in green house pepper plant.

The above discussion concluded that the variety OM-1of *C. olitorius* showed most susceptible against *P. latus* under net house condition. The knowledge that the damage arises from mite responses to the phenological stage of the crop can enhance the efficiency and value of yellow mite monitoring programs and control strategies by focusing attention on the critical periods in jute crop. We observed in economic crop jute, *C. olitorius* L., those rapid increases of yellow mite numbers coincided with different stages of the plant.

However, yield responses to yellow mite damage under field conditions may differ from those observed under conditions in the net house.

## ACKNOWLEDGMENTS

The authors are grateful to Dr. Md. Zinnatul Alam for reviewing the manuscript. Dr. Ramiz Uddin Miah and Dr. Md. Mofazzal Hosssain provided useful comments on an earlier draft. We also acknowledge Md. Fazler Rahman, Abdul Mazid Mia, Razzob Ali, Abdul Quader for laboratory assistance and to Dr. khandokar saif Uddin for statistical advice. This study was partially funded by a development project of "Jute production, diversified use of jute products and its extension" by Bangladesh Jute Research Institute (BJRI).

## REFERENCES

Alagarmalai J, Grinberg M, Soroker V (2009). Host Selection by the Herbivorous Mite *Polyphagotarsonemus latus* (Acari: Tarsonemidae). J. Insect Behav. 22:375–387.

Aubert B, Lossois P, Narchal J, Rabaud J, De Bousvilliers P (1981). Mise en evidence de degats causes par *Polyphagotarsonemus latus* (Banks) sur papayer a l'ile de la Réunion. Fruits 36:9-24.

Beattie G, Gellatley J (1983). Mite pests of Citrus. Agfacts H2, AE3, Dept. Agriculture, New South Wales. p. 6.

Cross JV, Bassett P (1982). Damage to tomato and aubergine by broad mite, *Polyphagotarsonemus latus* (Banks). Plant Pathol. 31:391-393.

De Coss-Romero M, Pena J E (1998). Relationship of broad mite (Acari: Tarsonemidae) to host phenology and injury levels in Capsicum annuum. Florida Entomol. 81:515–526.

Faruquzzaman AKM (1987). Determination of economic threshold of jute pests. Annual report of Bangladesh Jute Research Institute. Manik Mia Avenue, Dhaka 1207:91-94.

Gerson U (1992). Biology and control of the broad mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae). Exp. Appl. Acarol. 13:163-178.

Hath TK (2000). Distribution of yellow mite (*Polyphagotarsonemus* latus Banks) population on leaves of different jute varieties. Environ. Ecol. 18:578-580.

Hooper GHS (1957). The potato broad mite. Queensland Agric. J. 83:56-58.

Jeppson LR, Keiffer HH, Baker EW (1975). Mites injurious to economic plants Univ. California Press, Los Angeles.

Kabir AKMF (1975). Jute pest of Bangladesh. Bangladesh Jute Research Institute. Dacca. 15:28-36.

Khosla RK (1977). Techniques for assessment of losses due to pests and diseases of rice. Indian J. Agric. Sci. 47:171-174.

Laffi F (1982). Occurrence of *Polyphagotarsonemus latus* (Banks) on capsicum sedbedsin North Italy. Informatore Fitopatologico 32:55-57.

Moutia LA (1958). Contribution to the study of some phytophagous Acarina and their predators in Mauritius. Bull. Entomol. Res. 49:59-75.

Nemestothy K, Volcsansky E, Simon N (1982). Influence of damage of the mites *Tarsonemus pallidus* and *Polyphagotarsonemus latus* Banks (Acari: Tarsonemidae) on the morphological properties of fashedera and hedera leaves. Novenyvedelem 10:437-442.

Pradhan SK (1988). Evaluation of jute and kenaf/mesta germplasm for pest resistance. Procedings of the training course on breeding for varietal improvement of jute, kenaf and allied febres. 12-21 April, 1988. IJO, JARI. Barrakpure, India. p.185.

Schoonhoven A, Piedrahita J, Valderrama R, Galvez G (1978). Biology, daño y control del tropical mite, *Polyphagotarsonemus latus* (Banks) (Acarina: Tarsonemidae) en frijol. Turialba 28:77-80.

Smith FF (1935). Control experiments on certain *Tarsonemus* mites onornamentals. J. Econ. Entomol. 28:91-98.

Steel RGD, Torrie JH (1960). Principles and Procedures of Statistics. McGraw Hill Book Co. Inc. NewYork. pp. 107-109.