



Report of *Dictyla cheriani* (Hemiptera: Tingidae) on Indian cherry (*Cordia myxa*) in Rajasthan, India: Incidence and morphometric analysis

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Cordia myxa L. commonly called Indian cherry (synonyms: clammy chery, franrant manjack, lasora, shelu, cinnanakkeru, bahubara, chokri, lahsoda, lahsua, gonda, gondi) belongs to Boraginaceae family, this tree is a multipurpose species distributed in hot arid and semi-arid regions of India, originated in North-Western part of the country (Stewart and Brandis 1992) and distributed in warmer regions of Myanmar, Afghanistan, China, Africa, Australia etc. and more recently also in the America. Singh *et al.* (1999) identified two types of lasora fruits based on fruit maturity one early type with small, turnip shaped fruits and another late type with large size and spherical shape fruits. There are no standard varieties of lasora, however, they can be grouped into two on the basis of their fruit size namely bold and small fruits (Kaushik and Dwivedi 2004, Malik *et al.* 2010). Unripe fresh fruits are acrid and used for vegetable and pickle. Ripe fruits are eaten as fresh. Fruit pulp is rich in carbohydrates, extractive matter and ash. Fruit is highly mucilaginous and used in cough mixture to cure diseases of chest and is given as laxative for bilious infections (Malik *et al.* 2010).

According to the National Tree Seed Project (1999), insect damage on *Cordia africana* seeds was 45%, 30% and 20% from Sekoru, Arjo and Wondo Genet places, respectively. Tibebu (2002) studied pre-dispersal insect seed predators on seeds of these two tree species, 10 and found 20% of *Cordia africana* seeds collected from Sekoru, and 8-10% of seeds collected from Denbi, Jimma and Arjo places. Few studies were made on the bug, *D. cheriani* infestation on *Cordia* sp. (India) and bug, *D. monotropidia* infestation on *Cordia verbenacea* (Brazil) by Daniel *et al.* (2008). However no attempts were made on the incidence and morphological characterization of *Dictyla cheriani* on *Cordia myxa* which is widely cultivated in Indian condition. Here, we report the

information on the incidence of *D. cheriani* on Indian cherry, its morphological characters.

Twenty Indian cherry trees were randomly selected in each of 3 replicates at the Experimental Farm of the Central Institute for Arid Horticulture (CIAH) (N 28° 06' E 73° 21' and at altitude of 234.84 m above sea level). Incidence of infested trees, number of lace bugs observed on each leaves and symptoms of damage and decline (in comparison with un-infested plants) were recorded from August 2010 to July 2011. The sampling was done by visual observation and manual counting. Average incidence was calculated as the percent of whole trees infested with *D. cheriani*. Average number of lace bugs per leaves was calculated on the basis of observations recorded on ten randomly selected leaves of whole plant with 3 replications. Twenty lace bugs (10 males and 10 females) were used for observation and measurements. The average linear measurements of various body parts of male and female lace bugs were obtained under a stereo binoculars microscope (Radical Instruments, Ambala, Haryana, India) using Jenoptic Pro 2.8.0 software. The terminology used to denote different parts of the body of the coreid lace bug followed Albrecht (1955) The lace bug samples collected from the CIAH farm and other fields were preserved in 70 per cent alcohol and deposited at the Insect Biosystematic Section, Division of Entomology, Indian Agricultural Research Institute, New Delhi for taxonomic identification. Statistical Analysis: Square root transformation values were used as necessary to achieve normality in the data before analysis. The data on incidence and population of lace bugs were analyzed through one-way ANOVA using SPSS software (O'Connor 2000). The means of significant parameters, among tested month wise incidence and population were compared using Turkey's honestly significant difference (HSD) tests for paired comparisons at probability level of P=0.05. The standard error of the mean was calculated by this formula $\frac{s}{\sqrt{n}}$ where, 's' is the sample standard deviation and 'n' is the size (number of observations) of the sample.

Lace bugs were observed on Indian cherry tree in the hot

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Table 1 Mean per cent of *Cordia myxa* trees infested the *Dictyla cheriani* and their mean number per *Cordia myxa* leaves in 2010 at the experimental farm of the Central Institute for Arid Horticulture, Bikaner district, Rajasthan, India.

| Month | Mean Incidence (%) | | Mean No. <i>D. cheriani</i> /leaves | |
|-------------|---------------------------------|---------------------------------|-------------------------------------|-------------------------------|
| | Broad leaves | Small leaves | Broad leaves | Small leaves |
| August | 38.33 (38.23) ^{ef} | 58.33 (49.78) ^{fg} | 6.50 (2.74) ^f | 16.73 (4.20) ^e |
| September | 46.67 (43.07) ^{gh} | 65.00 (53.74) ^{gh} | 7.63 (2.94) ^{fg} | 20.37 (4.62) ^f |
| October | 51.67 (45.94) ^h | 76.67 (61.20) ⁱ | 8.80 (3.12) ^g | 25.97 (5.18) ^g |
| November | 41.67 (40.18) ^{fg} | 68.33 (55.75) ^h | 7.27 (2.87) ^{fg} | 22.43 (4.84) ^{fg} |
| December | 23.33 (28.84) ^b | 40.00 (39.20) ^{bcd} | 3.33 (2.08) ^c | 12.43 (3.66) |
| January | 11.67 (19.88) ^a | 21.67 (27.70) ^a | 0.50 (1.22) ^a | 4.50 (2.33) ^a |
| February | 23.33 (28.84) ^b | 35.00 (36.22) ^b | 1.77 (1.66) ^b | 8.50 (3.08) ^b |
| March | 25.00 (29.91) ^{bc} | 38.33 (38.23) ^{bc} | 2.60 (1.90) ^{bc} | 9.83 (3.29) ^{bc} |
| April | 28.33 (32.13) ^{bc} | 45.00 (42.10) ^{cd} | 3.40 (2.10) ^{cd} | 12.10 (3.62) ^{cd} |
| May | 33.33 (35.24) ^{cde} | 53.33 (46.89) ^f | 4.57 (2.35) ^{de} | 13.60 (3.82) ^{de} |
| June | 30.00 (33.15) ^{cd} | 46.67 (43.07) ^{de} | 3.60 (2.15) ^{cde} | 12.67 (3.70) ^{de} |
| July | 35.00 (36.22) ^{def} | 55.00 (47.86) ^e | 4.70 (2.39) ^e | 15.17 (4.02) ^{de} |
| SE (m) | 1.35 | 1.47 | 0.08 | 0.14 |
| CD (P=0.05) | 3.98 | 4.34 | 0.25 | 0.41 |
| CV (%) | 6.80 | 5.64 | 6.28 | 6.19 |

* Parentheses contain the angular transformation value of percent infested trees, ** Parentheses contain the square root transformation value of number of lace bug/leaves.

arid region of north-western India (i.e. Thar Desert) and identified as *Dictyla cheriani* (Drake). During the present study, the average incidence of lace bugs on trees ranged between 11.67 to 51.67 per cent in bold seeded plants and 21.67 to 76.67 per cent in small seeded plants (Table 1). The incidence and the numbers were higher in the months of (August to November) than during other months and the maximum incidence of 76.67 per cent on small seeded plants was recorded in October and the minimum in Jan. Thus the highest mean number of this lace bug species per leaves was recorded in Oct (8.8 and 25.97/leaves on bold and small seeded plant, respectively) followed by Nov (22.43/leaves on small seeded plants) and the lowest was in Jan (0.5 and 4.5/leaves on bold and small seeded plants, respectively) (Table 1). The lace bugs were found to be aggregated on the leaves of the plants. During a survey of the natural vegetation, the population of this pest was found to be higher on small



Fig 1 Aggregation of *Dictyla cheriani* on the Boraginaceae tree, Indian cherry (*Cordia myxa*) during main infestation: Upper left, healthy plant; upper right infested plant; lower left, infested leaves; lower right, adult at the Central Institute for Arid Horticulture, Bikaner, India.

seeded plants than the bold seeded plants. The lace bugs sucked the sap from newly emerging leaves and young branches, which led to the leaves turned yellow and suppression of growth of the tree through drying of leaves and young branches (Fig 1). Livingstone (1978) reported that nymphal instars of the summer species of Tingidae possess body out growths which are morphologically different from those of the winter forms. The peak population of the summer species coincides with the onset and progress of monsoon. Lara (1980) reported that the lace bug, *Dictyla monotropidia* (Stal) a pest of *Cordia* spp. in Colombia. Vayssières (1983) reported that the tingids, *Dictyla echii* (Schr.) and *D. nassata* (Put.) are common in the Mediterranean region on various Boraginaceae, including *Echium plantagineum*, where they have 2-3 generations in a year and reduce or even prevent seed formation. The plants used to test the food-plant range of the tingids included Boraginaceae, closely related plants, and plants representative of the families on which these and other species of *Dictyla* have been recorded. Only Boraginaceae family were attacked. Korcz (2004) study on Heteroptera revealed the occurrence of Eurasian lace bug (*Dictyla echii*) on cultivated medicinal plants of *Borago officinalis* in Poland.

Data on linear measurements of *D. cheriani* have been presented in Table 2. The female was distinctly larger than the male in respect to all body parts. This lace bug was typically characterized as having body oblong, pale testaceous with brownish or fuscous markings, with collar and hood yellowish brown, body beneath reddish dark with thoracic sterna darker. Antenna is yellowish brown; 1/3 part of 4 segment blackish. Antenna is rather slender, segmental measurements: I, 0.12 mm; II, 0.09 mm; III, 0.80 mm; IV, 0.22 mm. Length of body is 2.25 mm and width 0.88. Head

Table 2 Mean linear morphometric measurements of various traits of adult males and females of *Dictyla cheriani*, which was found infesting *Cordia myxa* trees in 2010. Each body part was measured on 10 individuals, and all measurements are expressed in millimeters

| Body parts measured (mm) | Male | Female |
|--------------------------------|-------------|-------------|
| | Mean ± S Em | Mean ± S Em |
| Length of scap (antenna) | 0.047±0.002 | 0.065±0.002 |
| Length of pedicel (antenna) | 0.075±0.002 | 0.095±0.002 |
| Length of flagellum (antenna) | 1.135±0.005 | 1.233±0.005 |
| Length of hemielytra | 1.623±0.003 | 1.777±0.004 |
| Width of hemielytra | 0.462±0.003 | 0.505±0.004 |
| Length of hind wing | 1.422±0.004 | 1.487±0.002 |
| Width of hind wing | 0.571±0.003 | 0.598±0.002 |
| Length of body up to genitalia | 1.796±0.004 | 1.885±0.007 |
| Length of body up to wing tip | 2.166±0.003 | 2.341±0.004 |
| Width of body | 0.819±0.004 | 0.942±0.003 |
| Width of vertex | 0.032±0.003 | 0.035±0.001 |
| Vertical diameter of eye | 0.134±0.001 | 0.144±0.001 |
| Transverse diameter of eye | 0.118±0.003 | 0.125±0.001 |
| Length of sternum region | 0.524±0.005 | 0.583±0.004 |
| Width of sternum region | 0.642±0.004 | 0.710±0.002 |
| Length of rostrum | 0.457±0.003 | 0.491±0.003 |
| Length of thorax | 0.677±0.004 | 0.720±0.003 |
| Length of head | 0.257±0.003 | 0.280±0.002 |
| Length of fore leg | 0.676±0.004 | 0.795±0.004 |
| Length of middle leg | 0.944±0.005 | 1.058±0.007 |
| Length of hind leg | 1.213±0.005 | 1.367±0.005 |

is very short, strongly deflexed, bucculae wide, areolate, closed in front. Legs are fairly slender and yellowish brown. Pronotum is very strongly convex, tricarinate, with discal part on each side covered by the reflexed paranotum up to the lateral carina; backward projection of pronotum triangular, areolate; hood small, feebly produced anteriorly at the middle. Hemelytra are wider than width of pronotum across humeral angles, longer than abdomen. In published literature no incidence and morphometric details given on *D. cheriani* could be found; and the first incidence and morphometric study of *D. cheriani* is described herein. The mean body lengths of males and females were 2.17 mm and 2.74 mm, respectively (Table 2). In comparison to, *D. convergens* are pale yellow brown body with several darker areas on the forewings. The length of body is 3.5 to 4.0 mm [www.britishlacebugs.org.uk online]. To basis of review of literature, this is the first report of *D. cheriani* on *C. myxa*. This lace bug is damaging important parts of tree, such as leaves, flowers and stem. Therefore, management practices needs to be developed and implemented to minimize the losses caused by this pest.

SUMMARY

The infestation of *Dictyla cheriani* (Drake) (Hemiptera: Tingidae) on Indian cherry (*Cordia myxa* L.), was noticed in

2010 at the Experimental Farm of Central Institute for Arid Horticulture and other fields of Bikaner district, Rajasthan, India. The maximum incidence was observed in October (51.67% on bold and 76.67% on small seeded plants) and minimum was in January (11.67% on bold and 21.67% on small seeded plants). The number of this lace bug ranged between (0.5 to 8.8 on bold and 4.5 to 25.97 on small seeded plants) nymphs and adults per leaves. This species is characterised by body oblong, pale testaceous with brownish or fuscous markings, with collar and hood yellowish brown, body beneath reddish dark with thoracic sterna darker. Antenna is yellowish brown; 1/3 part of 4 segment blackish. Antenna is rather slender, segmental measurements: I, 0.12 mm; II, 0.09 mm; III, 0.80 mm; IV, 0.22 mm. The mean body lengths of the male and female adult vary and were recorded as 2.17 mm and 2.34 mm, respectively.

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