

CVC ASSOCIATED VECTORS IN VALENCIA ORANGE OF CORRIENTES, ARGENTINA

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Abstract. Citrus Variegated Chlorosis (CVC), a disease affecting sweet oranges, was found in Brazil in 1987 and the symptoms were associated with the bacterium *Xylella fastidiosa*. In Argentina, it was first detected in the Province of Misiones (1984) and later (1990) in Corrientes. CVC became a serious problem of citrus in Brazil, where sharpshooter leafhoppers (Hemiptera: Cicadellidae: Cicadellinae) were identified as vectors of the pathogen. This study was conducted to identify leafhopper species possibly associated with CVC spread in Corrientes. Three homogeneous citrus groves of Valencia Late (Site 1 and Site 3) and Valencia Seedless (Site 2) were selected at different areas of Corrientes Province: 1) INTA Experiment Station in Bella Vista, 2) Ambrosio and 3) Monte Caseros. Twenty plants without CVC symptoms were selected per site; a yellow sticky trap was placed in each selected plant at 1,50 m from the ground, on the Northern side of the tree. The traps were replaced every 30 days, from December 2002 to December 2003. Trapped leafhopper species were counted and identified. Three species were always trapped: *Dilobopterus costalimai* Young (Cicadellinae: Cicadellini), *Molomea lineiceps* Young (Cicadellinae: Proconinii) and *Frequenamia spiniventris* Linnavuori & DeLong (Deltocephalinae: Euscelinii). The frequency of each species trapped was different for each site. In Site 1, *D. costalimai* was the most abundant. In Site 2, *F. spiniventris* was the most trapped and in Site 3, *M. lineiceps* reached 3.25 specimens per trap in September, the highest quantity registered in this first year of study. Other species potentially important (all in the Cicadellini tribe) were trapped **in lower numbers**: *Sonesimia grossa* (Signoret) in all sites, *Bucephalagonia xanthophis* (Berg) (Cicadellini) in Bella Vista and Monte Caseros and *Hortensia similis* (Walker) and *Diedrocephala variegata* (Fabricius) only in Bella Vista. At least three of the Cicadellini mentioned are considered important CVC vectors in Brazil.

Citrus Variegated Chlorosis (CVC), a new disease affecting sweet oranges, was found in Brazil in 1987 and the symptoms were associated with the bacterium *Xylella fastidiosa*. In Argentina, it was first detected in Misiones in 1984 (Contreras J., 1992), where the name “pecosita” was used; later it was also observed in Corrientes (Agostini, 1993). Now the disease is expanding through the South of Corrientes. CVC became the most serious pest problem of citrus in Brazil, where many studies are being carried out. The constant presence of *X. fastidiosa* in the xylem of affected plants from Brazil and from Argentina was observed (Beretta et al., 1992) and confirmed in France (Chang et al., 1993) and USA (Beretta et al., 1993).

CVC symptoms are observed in leaves of young and adult plants as inter-vein chlorosis with small gum spots that look brown in the lower side; these symptoms are visible in the spring. Fruits show a strong size reduction that causes important losses (Diamante et al., 1997, Haeltelman et al., 1999). There are no effective methods to control the disease and the most susceptible species is orange.

Xylem-feeding leafhoppers known as sharpshooters (Hemiptera, Cicadellidae, subfamily Cicadellinae) were identified as vectors of the pathogen in Brazil (Lopes et al., 1996). In Argentina some vector surveys were conducted in Misiones (De Coll et al., 2000). In Corrientes, there is no information on vector species present in citrus groves; thus, a survey was conducted to identify leafhopper species possibly involved with the disease in this province of Argentina.

Materials and Methods

Three homogeneous citrus groves of Valencia Late (Site 1 and 3) and Valencia Seedless (Site 2) were selected at different sites in the Province of Corrientes:

Site 1: Bella Vista. A grove of 296 plants in 8.024 m², grown in sandy soil at INTA Experiment Station in Bella Vista was used. The coordinates are: L1a: 28°26.916`S - 58°59.539` W; L1b: 28°26.755`S - 58°59.614` W; L1c: 28°26.745`S - 58°59.619`W; and L1d: 28°26.923`S - 58°59.523W.

Site 2: Ambrosio. Grove of 441 plants in 12.415 m², grown in a dark and heavy soil at Ambrosio, with the coordinates: L2a: 28°19.407`S - 58°55.293`W; L2b: 28°19.536`S - 58°55.353`W; L2c: 28°19.526`S - 58°55.380`W; and L2d: 28°19.397`S - 58°55.319`W.

Site 3: Monte Caseros. Grove of 612 plants (17.100 m²) grown in a free clayed soil at Southeast of Corrientes; the coordinates are: L3a: 30°16.488`S – 57°47.884`W; L3b: 30°16.484`S – 57°47.864`W; L3c: 30°16.588`S – 57°47.818`W; and L3d: 30°16.594`S – 57°47.840`W.

Twenty plants without symptoms were selected per site. A yellow sticky trap (card of 12 x 7 cm) was placed in each selected plant at 1.5 m from the ground, on the North side of the tree. The cards were replaced every 30 days, from December 2002 to December 2003, except in Monte Caseros, where the study started in July/2003. Used cards were taken to the laboratory for identification and counting of leafhoppers caught. New sprouts of each selected tree and CVC symptoms were registered.

The insects were removed from the cards, washed, and a preliminary classification was attempted according to a field guide (Fundecitrus, 1997). Some of the specimens were identified by A. M. de Remes Lenicov and S. Paradell (Museo de la Plata, Argentina) and others by Rodney Cavichioli (Universidade Federal do Paraná, Curitiba, Brazil).

Results and Discussion

Three species were always trapped: *Dilobopterus costalimai* Young (Cicadellinae: Cicadellini), *Molomea lineiceps* Young (Cicadellinae: Proconinii) and *Frequenamia spiniventris* Linnavuori & DeLong (Deltocephalinae: Euscelinii). *D. costalimai* is vector of *X. fastidiosa* in Brasil (Roberto et al., 1996; Lopes et al., 1996). No study was made with *M. lineiceps*; other species in that genus, *M. cincta* is considered potential CVC vector in Brasil (Fundecitrus, 1997) and *M. consolidata* seems to be common in Misiones (De Coll, 2000). The frequency of each species trapped was different for each site.

Site 1: Bella Vista

D. costalimai was the most abundant species in this first year of study at Site 1. This species showed a peak in April, 2003 and was absent only in July (Figure 1). It is found

in Brazil and Paraguay (Fundecitrus, 1997); in Argentina it was already collected in Corrientes and Misiones (Young, 1977). This species is vector of *X. fastidiosa* and is considered a citrus key pest in Brazil.

M. lineiceps was collected in low numbers throughout the sampling period (Figure 1). Found in Argentina and Brazil (Fundecitrus, 1997); species in this genus are considered potential vectors.

F. spiniventris was trapped only in March and April (Figure 1). This species was found in Brazil, Paraguay and Argentina: Misiones (Linnavuori, 1959). In Argentina it was collected again at Montecarlo, Misiones during 1994 and 1995 by De Coll (Paradell et al., 2000).

Other species trapped in lower numbers were also recorded considering the possibility of future increments or importance as vectors. The ones determined were:

Bucephalagonia xanthophis (Berg) (Cicadellidae, Cicadellinae, Cicadellini), which was trapped in May, August and September, 2003. This species was found in Brazil and Argentina (Jujuy, Córdoba, Santa Fe and Misiones) (Remes Lenicov et al., 1999) (Fundecitrus, 1997); it is vector of *X. fastidiosa* and considered a citrus key pest in Brazil.

Sonesimia grossa (Signoret) (Cicadellidae, Cicadellinae, Cicadellini), which was trapped in June, July and September, 2003. The species was found in Brazil, Paraguay and Bolivia (Fundecitrus, 1997); in Argentina it was collected in Misiones (Remes Lenicov et al., 1999) and is considered a potential CVC vector.

Hortensia similis (Walker) (Cicadellidae, Cicadellinae, Cicadellini) was trapped in January, March and June, 2003. The species was found in USA, México, Puerto Rico, Nicaragua, Panamá, Antillas, Cuba, Colombia, Venezuela, Guayana, Guyana Francesa, Surinam, Perú, Ecuador, Bolivia, Brazil, Paraguay, and Argentina (Young, 1977; Maes & Godoy, 1993). In Argentina it is present in Misiones, Corrientes, Entre Ríos, Santa Fe and Buenos Aires (Remes Lenicov et al., 1999) and is considered a potential vector.

Diedrocephala variegata (Fabricius) (Cicadellidae, Cicadellinae, Cicadellini) was trapped in January, February, March and May, 2003. The species was found in México, Honduras, El Salvador, Nicaragua (Maes & Godoy, 1993), Costa Rica, Panamá, Colombia, Venezuela, Guayana Francesa, Surinam, Perú, Bolivia, Brazil, Paraguay, and Argentina (Young, 1977). In Argentina it was collected in Tucumán, Chaco, Santa Fé and Misiones (Young, 1977).

Curtara concava (De Long & Freytag) was the only leafhopper species of the subfamily Gyponinae collected during this year of study in Corrientes, Argentina.

Site 2: Ambrosio

In this site the sharpshooters *D. costalimai* and *M. lineiceps* were trapped in low numbers (Figure 2). *F. spiniventris* was registered all year except for September and November (2003). Other species trapped at Site 2 were: *S. grossa* and *C. concava*.

Site 3: Monte Caseros

D. costalimai was present only in September, 2003 in low number (Figure 3).

M. lineiceps was captured every month, with peaks of specimens per trap in August (2.2), September (3.25) and December (2.2 specimens per trap) (Figure 3). *F. spiniventris* was trapped every month, with a peak in December (3.4 specimens per trap) (Figure 3).

Other species trapped in **lower numbers** at Site 3 were: *B. xanthophis* and *S. grossa*.

Conclusions

In one year of survey, three Cicadellini sharpshooters considered important CVC vectors in Brazil, *D. costalimai*, *B. xanthophis* and *S. grossa*, were found in citrus groves of Corrientes. In addition, this survey indicated the occurrence of three other sharpshooter species that are potential vectors, *D. variegata*, *H. similis* and *M. lineiceps*. Although most of the species were collected at the three sites surveyed, their frequencies at each place were highly variable and not related with the month considered.

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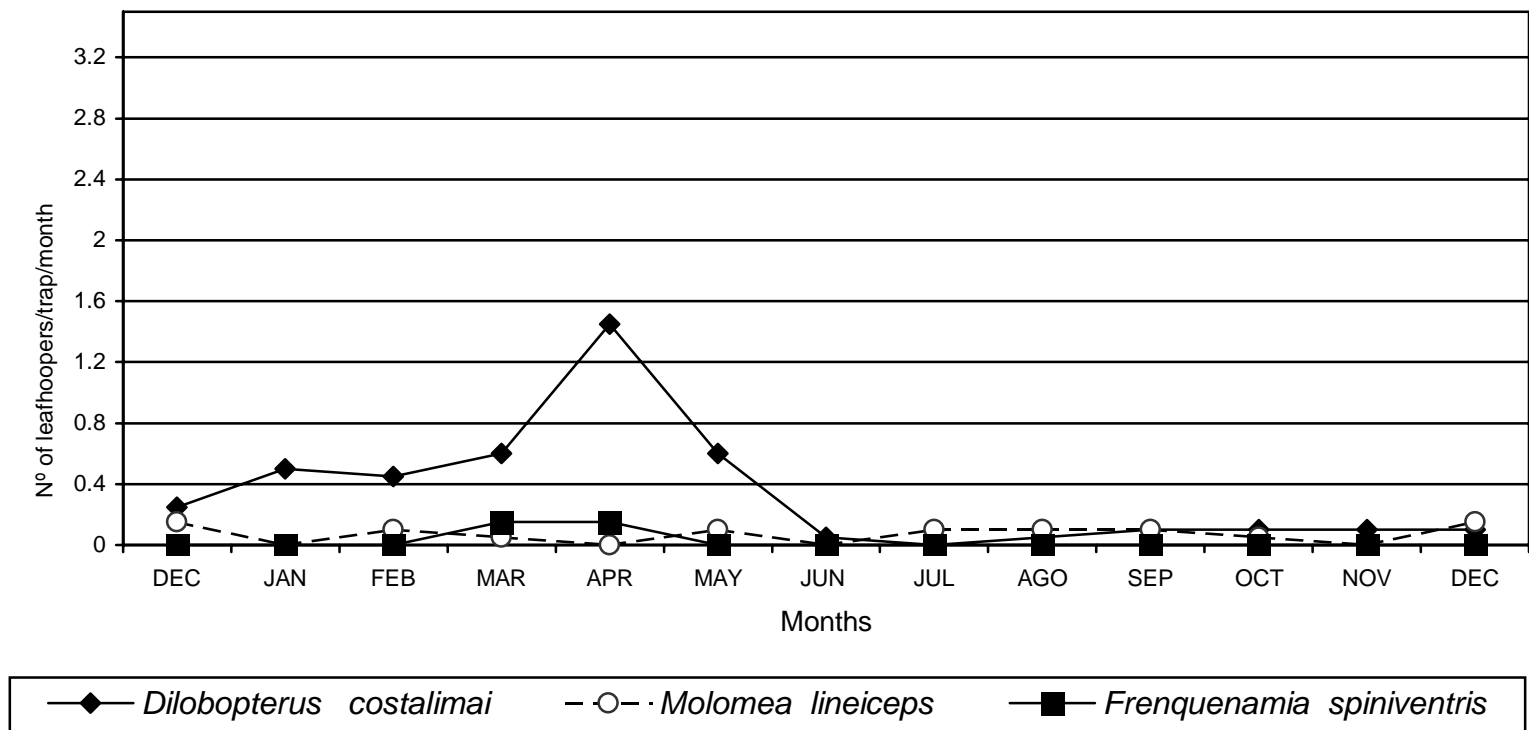


Figure 1. Mean numbers of leafhoppers trapped monthly per card at Site 1 (INTA Bella Vista Experiment Station), from December 2002 to December 2003.

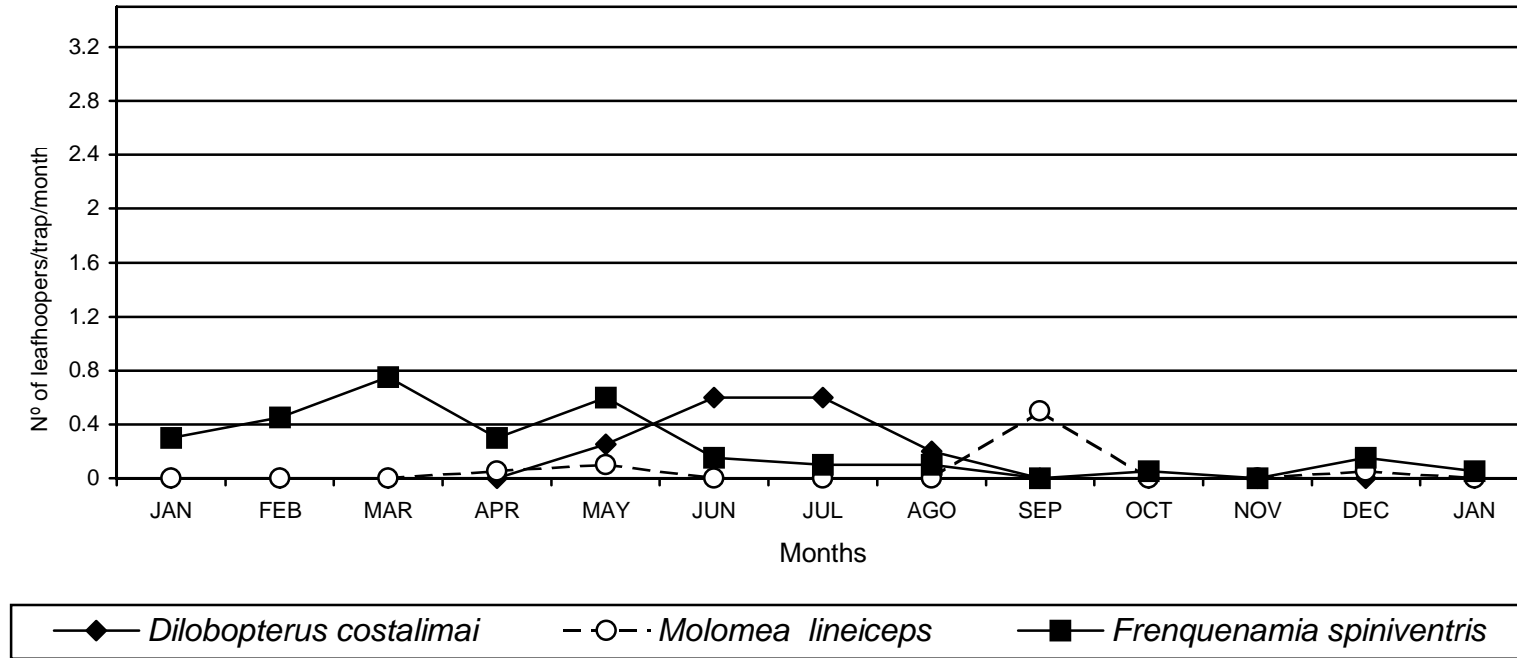


Figure 2. Mean number of leafhoppers trapped monthly per card at Site 2 (Ambrosio), from January to December 2003.

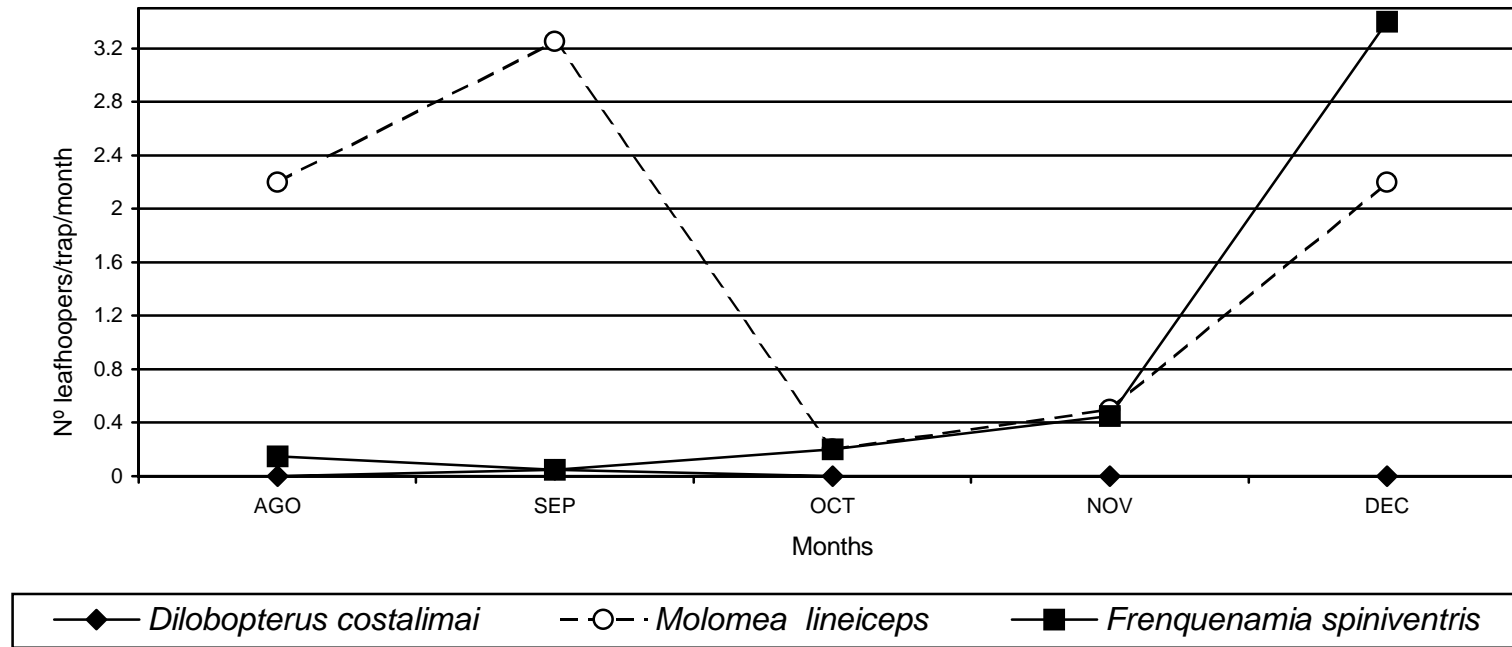


Figure 3. Mean numbers of leafhoppers trapped monthly per card at Site 3 (Monte Caseros), from August to December 2003.