

# SURVEY OF FRUIT FLY PARASITIDS AND PRETATORS IN CULTIVATED AND WILD HOST IN THE PROVINCE OF VÉLEZ (SANTANDER – COLOMBIA )

Juliana Cuadros Martínez<sup>1</sup>, Orlando Ildefonso Insuasty Burbano<sup>2</sup>



<sup>1</sup>Biology student UIS. e-mail: [jcuadrosmartinez@yahoo.es](mailto:jcuadrosmartinez@yahoo.es)

<sup>2</sup>CORPOICA –CIMPA .IPM Program. (Santander- Colombia). e-mail: [oribu6755@yahoo.com](mailto:oribu6755@yahoo.com)



## ABSTRACT

Fruits of cultivated and wild hosts were randomly sampled in municipalities Vélez-Santander and Boyacá departments of Colombia S.A. for Jul. 2004 to Aug. 2005. 547 samples were collected (47 plant species and 18 families). A total of 13.566 specimens of Diptera emerged of the families: Tephritidae, Richardiidae, Lonchaeidae, Otitidae, Syrphidae, Tabanidae and Muscidae. Eighty six percent – 11.664 – were tephritids of the genus *Anastrepha* (*A. fraterculus*, *A. striata*, *A. distincta*, *A. grandis*), *Blepharoneura* sp., *Toxotrypana curvicauda*. From the same samples emerged 565 specimens of Hymenopteran larval – pupal parasitoids, 498 of them (88.14%) emerged from tephritids and they were identified as *Aganaspis pelleranoi*, *Odotosema anastrephae*, *Dorytobracon crawfordi*, *Uletes anastrephae*, *Microcrasis* sp., *Asobara* sp., *Aceratoneuromyia indica*, *Pachycrepoides videmimiae*, *Tetrastichus giffardii* and *Trichopria* sp.; 64 specimens, identified as *Aganaspis pelleranoi*, *Uletes anastrephae* and *Lophoclella anastrephae* emerged from 1.637 *Neosilba* sp. The overall rate of parasitism was 4.75%. However, parasitism for each parasitoid species varied considerably according with the host plant. Predators of *Anastrepha* spp. and stage preyed were directly observed in field and laboratory. The most abundant were ants (Hymenoptera: Formicidae) *Pheidole* sp., *Solenopsis* sp. and *Crematogaster* sp.; the vespid *Polistes* sp.; one morphospecies of spider (Saltidae); two morphospecies of Coleoptera:Staphylinidae ;one morphospecies of Dermaptera:Forficulidae ; and one morphospecies of Hemiptera Reduviidae : Harpactorinae.

## INTRODUCTION

The fruit flies (Diptera:Tephritidae) constitute one of the main factors that restricts the fruits production, commercialization and export at international and national levels (Arévalo & Escobar, 2004).The fruit fly populations are commonly high in Colombia (Canal, 2004). The damage and the opportunity that these flies settle definitely in the country at a local level is worrying ; this situation could lead to a fitosanitary problem of high relevance (Portillar, 1994). Therefore, the bioscology appropriate knowledge of the fly species could set up handling conditions from their own habitat. Thus, the agents that can be used according to our environmental conditions and technological development could be identified, making a careful study of this knowledge about the tephritids natural enemies (parasitoids, predators and entomopathogens), including their recognition and bioecology as a choice of an initial population decrease of the fruit fly at national and local levels (Canal, 2004). Both parasitoids and predators were the main objective of this research, as a contribution for populations handling and control of the fruit fly in the influence area of Vélez, Santander-Colombia

## METHODS

The study was made in eight Vélez-Santander and three Boyacá municipalities in areas from 95 to 2760 masl. The fruits were processed and analysed in the laboratory at the Experimental Station CORPOICA-CIMPA located in Barbosa, Santander to 1950 masl. and 25°C, 80% RH. The methodology used was the one that follows:

### PARASITIDS

- Field Phase:** Fruits samples were collected at random in grown and wild plants and were carried to the laboratory.
- Instarium Phase:** The fruits were disinfected, weighed and counted. Each sample was placed in plastic containers. Later of 10-12 days, the fruits were dissected and the third instar larvae were counted and passed to glass vials with damp vermiculite to facilitate pupation.
- Laboratory phase:** The containers with pupae were kept in the laboratory at ambient temperature and humidity for 20-30 days. The flies and the parasitoids that emerged were counted, grouped and preserved in vials filled with 70% alcohol for their identification. Parasitism was calculated as the number of parasitoids divided by the summed number of parasitoids and host flies emerging from a particular sample. An exception was parasitism due to the gregarious eulophid *A. indica*; in this instance, the number of parasitized pupae was divided by the summed number of parasitized pupae and host flies (Sivinski *et al.*, 2000).

### PREDATORS

- Field phase:** Fruit fly predators were observed and collected both in the field and in the laboratory; furthermore, an exhibition of larvae, pupae and eggs (*A. fraterculus* laboratory flies) in trees and in the soil were made.
- Laboratory phase:** The collected predators were killed and preserved in vials filled with 70% alcohol for their identification.

## RESULTS AND DISCUSSION

From July 2004 to August 2005, 547 samples from 47 different plant species and 18 families were collected. A total of 13.566 flies and 565 parasitoids was recovered.

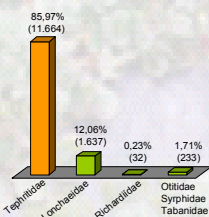


Figure 1. Percent and number total from flies recovered from 31 plant species.

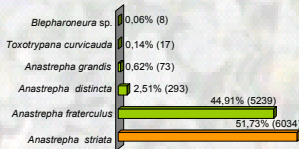


Figure 2. Percent and number total of the species family Tephritidae collected from 8 families and 15 plant species.

Species of Tephritidae	Host Plants
<i>A. fraterculus</i>	Myrtaceae, Solanaceae, Rosaceae, Rubiaceae
<i>A. striata</i>	Rubiaceae, Melastomataceae, Solanaceae, Myrtaceae
<i>A. grandis</i>	Cucurbitaceae
<i>A. distincta</i>	Mimosaceae
<i>T. curvicauda</i>	Caricaceae
<i>Blepharoneura</i> sp.	Cucurbitaceae

Table 1. Relationship between fruit flies (Diptera: Tephritidae) and hosts plants.

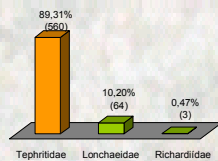


Figure 3. Percent and number total hymenopteran parasitoids collected on Tephritidae, Lonchaeidae and Richardiidae.

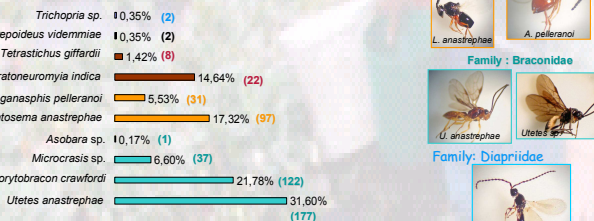


Figure 4. Percent and number of species hymenopteran parasitoids on Tephritidae.

Relatively, few researches have been made about parasitoids and fruits flies in Colombia compared with other countries studies, giving signs of its resources and diversity in the country. Among the studies done in Vélez, Santander, the highlighted ones were done by Oiaré (1980-1991), Guarín and León (2002). They collected and identified parasitoids from fruit flies *A. striata* y *A. fraterculus* in guava and coffee crops. Similar results were found in this study made from 2004 to 2005 in the same zone. There, other crops and wild plants were sampled recovering different flies of the Tephritidae family and other parasitoids species. These ones were similar to the ones recovered in other towns of the country (González R., 1952; Posada & García, 1979; Antioquia (Yepes & Vélez, 1989); Nariño (Portilla *et al.*, 1994); Valle del Cauca (Carrejo & González, 1999); Tolima (Gómez *et al.*, 2002). Also, some spiders and other insects predated different phases of the fruit fly were collected. All of this, could lead us to think that we have a lot to know about the Tephritidae family species and their natural enemies (parasitoids and predators) as a choice to the population initial decrease of flies at national and local levels.

## CONCLUSIONS

- A. striata* (Diptera Tephritidae) is the species most abundant in the area.
- From the family Tephritidae *A. fraterculus* is the species with greater number of hosts plants species.
- Neosilba* sp. (Diptera Lonchaeidae) it is the only species collected in different vegetable hosts, it shows special preference for the fruits of the Solanaceae family.
- From the parasitoids that belong to the family Tephritidae *Uletes anastrephae* (Hymenoptera: Braconidae) is the species with the highest number of individuals collected.
- The Braconidae family is the most representative in the sample.
- From the parasitoids that belong to the family Lonchaeidae *Lophoclella anastrephae* (Hymenoptera Figitidae) they represent the highest number of individuals.
- The parasitoid *Spilomicrus* sp. is the single representative of the Richardiidae family in the zone of research.
- Spiders, other insects are also responsible of the decrease in the population density of the Tephritidae family flies in the area.
- Uletes anastrephae* were the species with the highest percent of parasitism on the family Tephritidae.
- Uletes* sp. were the species with the highest percent of parasitism on the family Lonchaeidae.

## ACKNOWLEDGEMENTS.

To: Agreement COLCIENCIAS-CORPOICA (Cod. 7106-07-14943) and SENA for the financial support of the project; to proprietary estates zone of study; to personal Experimental Station CORPOICA-CIMPA; to Alicia Rojas (Jardín Botánico Eloy Valenzuela) for the identification of the plant species; Dr. Nelson Augusto Canal Daza (Grupo de Investigación en Moscas de las Frutas Universidad Del Tolima) or the collaboration in the determination and/or confirmation of the species of parasitoids and flies, a special gratefulness to: Dra. Ligia Nuñez, Ing. Orlando I. Insuasty Burbano (CIMPA-IPM Program), Rafael Monroy (CIMPA), Sr. Jorge Villamizar (Entomology Laboratory UIS)

## REFERENCES

- ARÉVALO, P. & ESCOBAR, F. 2004. Las Moscas de la fruta (Diptera: Tephritidae) en el departamento de Antioquia. Modelo espacial se su distribución y su impacto. En: Simposio XXXI Congreso Sociedad Colombiana de Entomología SOCOLEN. Bogotá D.C. p. 179.
- CANAL, N. A. 2004. El manejo de moscas de las frutas en Colombia: Realidades y necesidades. En: Simposio XXXI Congreso Sociedad Colombiana de Entomología SOCOLEN. Bogotá D.C. p.187-191.
- GUARÍN, E. & LEÓN G. 2002. Reconocimiento, Distribución temporal y espacial de moscas de la fruta (Diptera:Tephritidae) y sus parasitoides en guayaba (*Psidium guajava* L.) y café (*Coffea arabica* L.) en tres municipios de la provincia de Vélez – Santander. Tesis. Trabajo de Grado (Biólogo). Universidad Pedagógica y Tecnológica de Colombia. Facultad de Ciencias. p. 1 – 39.
- NUÑEZ, L. 1994. Las moscas de las frutas (Diptera: Tephritidae). Revista ICA. 29:121-132.
- PORTILLAR, M.; GONZÁLEZ G.; NUÑEZ B., L. 1994. Infestación, reconocimiento e identificación de moscas de las frutas y de sus controladores benéficos en el cultivo del café *Coffea arabica* L. Revista colombiana de entomología (Colombia). 20 (4):pp.161-266.
- SVINSKI, J.; PINERO, J.; ALLUIA, M. 2000. The distributions of parasitoids (Hymenoptera) of *Anastrepha* fruit flies (Diptera: Tephritidae) along an altitudinal Gradient in Veracruz, Mexico. Biological Control. 18, 258-269.

## PREDATORS

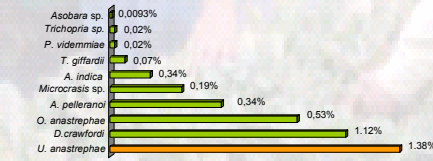


Figure 5. Parasitism (%) of Tephritidae by different species of parasitoids collected.

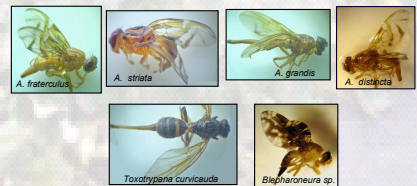


Figure 6. Species of the family Tephritidae collected.

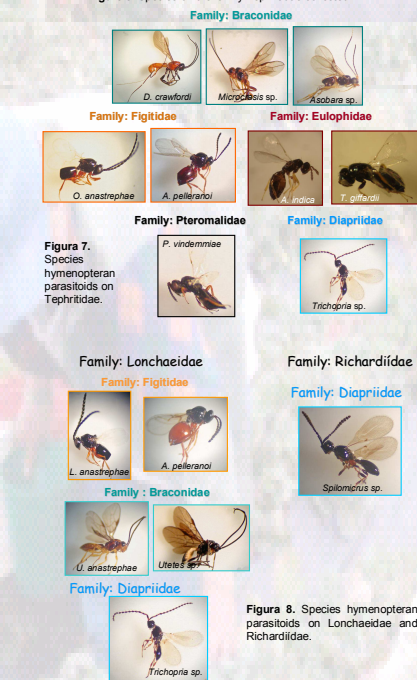


Figure 7. Species hymenopteran parasitoids on Tephritidae.

Figure 8. Species hymenopteran parasitoids on Lonchaeidae and Richardiidae.



Hemiptera:Reduviidae:Harpactorinae  
Predator of adults



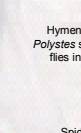
Hymenoptera: Formicidae  
*Pheidole* sp., *Solenopsis* sp. (on larvae, pupae and eggs)  
*Crematogaster* sp. (on pupae);



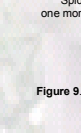
Dermaptera:Forficulidae  
one morphospecies (on larvae)



Coleoptera: Staphylinidae  
two morphospecies (on larvae);



Hymenoptera: Vespidae  
*Polistes* sp. (on larvae of fruit flies in guavas in field)



Spider: Saltidae  
one morpho (on adults)

Figure 9. Predators fruit fly