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## DIVERSITY OF THE GENUS ANASTREPHA SPP., AS PART OF THE NATURAL HERITAGE PRESENT IN THE SOUTH OF THE YUCATAN PENINSULA, MEXICO

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**Abstract:** Due to its geography, the state of Campeche in Mexico belonging to the Yucatan peninsula in the humid tropics and together with its proximity to the Gulf of Mexico and the Caribbean Sea, determines the ideal conditions for the proliferation of a great diversity of animal and plant species, constituting, as well as one more territory of the Mexican Republic that make the country one of the mega diverse in the world. In this diversity of flora and fauna of the State of Campeche, fruit flies of the genus *Anastrepha* were found, some considered as a phytosanitary problem with economic losses in global, national and local fruit growing in tropical regions, and other species that do not constitute Economic disadvantage, but ecological, impacting the populations of the pest species in the environmental balance, both carry out their biological cycle in both commercial and wild fruits of the place. The objective of this study is to make known the existing diversity of flies of the genus *Anastrepha* and their relationship with their hosts, which constitutes an important component in the natural heritage of the place. To date, the following flies of economic and non-economic importance have been found on various fruits sampled over 10 years: *A. ludens* (Loew), 1873; *A. obliqua* (Macquart), 1835; *A. striata* (Schiner), 1868; *A. serpentina* (Wiedemann), 1830; *A. fraterculus* (Wiedemann), 1830; *A. zuelaniae* (Stone), 1942; *A. distinta* (Greene), 1934; *A. ampliata* (Hernández), 1990 and *A. Hamata* (Loew), 1873.

**Keywords:** *Anastrepha* spp., Population ecology, Diversity

## INTRODUCTION

Natural Heritage is made up of constructions resulting from physical and biological formations that were created over time by nature, having exceptional universal

value from the aesthetic and scientific point of view as well as cultural and that is related to the diversity of the ecosystems. Biodiversity refers to the existing variability of life in ecosystems, including terrestrial and aquatic ecosystems, both the diversity of the ecological places where they are found, the diversity between and within species, it could be said that it reaches levels between ecosystems, and between species intra and inter specifically. In the world, 12 mega-diverse countries have been described that house up to 75% of the planet's total diversity, and Mexico is one of them (Mittermeier and Goettsch, 1992). The state of Campeche, according to official sources, is one of the entities with the largest area of forests with 3.3 million ha., It is located in the Yucatan Peninsula, located in the southeastern region of Mexico, bordering to the north and northeast with the Mexican state of Yucatán, to the east with the state of Quintana Roo, to the southeast with the country of Belize and to the south with Guatemala. Given the geographical location of the state of Campeche in Mexico and its proximity to the Gulf of Mexico and the Caribbean Sea, it has a great diversity of microclimates and native vegetation, which are favorable conditions for the proliferation of a great variety of species, it is considered together with the states of Chiapas, Veracruz and Oaxaca one of the states that make up the national mega diversity. In Campeche there are species of flora and fauna whose study and conservation is of great ecological relevance because there is great abundance and intra- and inter-specific diversity. Fauna species include mammals, birds, reptiles, insects, and aquatic species, among others. Many of them, such as insects, make up groups that have not yet been described and that have an important function in the ecosystem, constituting an important part of the natural heritage of the place (Villalobos and Mendoza, 2010).

Within the insects are the fruit flies of the family Tephritidae of the genus *Anastrepha* spp. Considered one of the main problems of fruit growing in the world; in Mexico the species: *A. ludens*, *A. obliqua*, *A. striata*, and *A. serpentina*, considered as a problem of phytosanitary interest and there are Mexican standards that regulate their control. However, there are also reports of different species of *Anastrepha* that do not cause alert points for the fruit economy. (Antonio and García, 2017; García et al. 2012). In Campeche until 2008 there were records of 10 species of *Anastrepha* but most of them collected with McPhail and Multilure traps (Hernández-Ortiz et al., 2002; Tucuch-Cauich et al., 2008); and given the fact that within ecosystems you can find species that interact with each other with their environment, creating an appropriate environment for their proliferation or for one species to be able to displace another, having positive or negative impacts within this collaboration of species. (García and Antonio, 2017) the objective of this work was to publicize the diversity of fruit flies and their relationship with their host fruits, the result of systematic sampling carried out for seven years, presenting the various species as part of the natural heritage. from the state of Campeche.

## METHODOLOGY

The present work is the result of systematic sampling of fruit collection in the southeast of the state of Campeche, where houses with backyard orchards were visited to collect fruit directly from the trees and the one that was lying on the ground, following the same methodology in undisturbed natural vegetation where the collection of fruits was also carried out. The samplings were carried out from June 2013 to June 2022 in the municipalities of Escárcega and Champotón, in the ejidos (División del Norte, Justicia Social,

Km 36, La Victoria, López Mateo, Revolución, Venustiano Carranza, and Xbacab (Table 1) The collected material was placed in 20 x 30 plastic trays with their respective collection data label, and transported to the laboratory of the Higher School of Agricultural Sciences, Campus IV of `` Universidad Autónoma de Campeche``.

In the laboratory, the fruits were weighed on a 5 kg capacity scale and on an analytical scale as the case may be. The fruits were dissected for the extraction of third stage tephritid larvae, which were put to pupate in plastic containers with sterilized soil in groups of fifty. After approximately eight days, they were checked daily to recover the pupae present to deposit them individually in 5x5 plastic cups until the emergence of the adults. The recovered flies were placed in glass vials with 70% alcohol for their conservation and identification, which was carried out with the keys of Korytkowski (2008), by Dr. María de Jesús García Ramírez (responsible for the Entomology laboratory of the Faculty of Agricultural Sciences of `` Universidad Autónoma de Campeche`` in Mexico), the criteria for identification were: thoracic pattern, wing pattern and female terminalia (length and shape of the aculeus apex). The identification of the plant material was carried out in the herbalist of the Center for Sustainable Development of `` Universidad Autónoma de Campeche`` in Mexico.

Location	Location
Xbacab	90° 43' 19"N, 18° 56' 29"O
Vicente Guerrero	90° 43' 56"N, 18° 54' 22"O
Revolución	90° 43' 54"N, 19° 13' 11"O
Km. 36	18° 37' 11"N, 90° 50' 48"O
División del Norte	18° 31' 40"N, 90° 45' 50"O
Justicia Social	90° 23' 15"N, 18° 37' 16"O
López Mateos	90° 17' 00"N, 18° 39' 03"O
La Victoria	18° 37' 35"N, 90° 50' 30"O

Table 1.- Geographic location coordinates of the different fruit collection sites from June 2013 to June 2022.

## CONCLUSIONS

In the present work it has been determined that in the state of Campeche there are potential hosts for fruits, both commercial and wild, suitable for flies of the genus *Anastrepha* to carry out their biological cycle, these hosts belong to the following plant families: Rutaceae, Myrtaceae, Sapindaceae, Flacourtiaceae, Sapotaceae, Fabaceae, Verbenaceae, Anacardiaceae and Rosaceae (Table 2). To date, the following flies of economic and non-economic importance have been found observing their cycle on the host: *A. ludens* (Loew), 1873; *A. obliqua* (Macquart), 1835; *A. striata* Schiner, 1868; *A. serpentina* (Wiedemann), 1830; *A. fraterculus* (Wiedemann), 1830; *A. zuelaniae* Stone, 1942; *A. distincta* Greene, 1934, *A. ampliata* Hernández, 1990. The continuity of the search for hosts and its relationship

with the development cycle of the various species of *Anastrepha* is suggested, as well as its biological function, which could be the regulation of species. plague for those that are not and its role within the biodiversity of the state of Campeche in Mexico as part of its Natural Heritage.

Species: <i>Anastrepha</i> spp	Host Plans
<i>A. ludens</i>	Rutaceae, Anacardiaceae
<i>A. obliqua</i>	Anacardiaceae, Rosaceae
<i>A. serpentina</i>	Sapotaceae
<i>A. striata</i>	Myrtaceae
<i>A. fraterculus</i>	Myrtaceae, Sapindaceae
<i>A. distincta</i>	Fabaceae
<i>A. ampliata</i>	Verbenaceae
<i>A. zuelaniae</i>	Flacourtiaceae
<i>A. Hamata</i>	Sapotaceae

Table 2. Hosts where the life cycle of flies of the genus *Anastrepha* spp. has been observed. in laboratory.

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