



USDA, APHIS Safeguarding Operations for Anastrepha ludens (Loew) On the Mexico / United States Border

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Introduction:

The fruit fly detection, exclusion and suppression operations safeguard against the establishment and spread of economically damaging fruit flies in the border region of Mexico and the United States of America. Agricultural crops are vulnerable to Anastrepha ludens and the establishment of other exotic fruit flies, which can result in millions of dollars lost in commercial trade. Mexico is an especially high-risk pathway due to the natural populations of Anastrepha species endemic in the region and the large numbers of people migrating through Mexico to the United States from other fruit fly infested countries. Through a cooperative agreement USDA APHIS and Mexico's Minister of Agriculture (SAGARPA – Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación) and the Mexican Service of Animal, Plant and Food Safety (SENASICA – Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria) conduct surveillance, regulatory, insecticide treatments, public outreach and Sterile Insect Technique (SIT) in high risk areas of northern Mexico in Tijuana, Baja California and Reynosa, Tamaulipas. Figure 1 show locations where the operations are conducted.

The trapping array is organized by the following distribution: 5 Multilure and 5 Jackson Trimedlure with one Jackson Cuelure and one Methyl Eugenol per square mile. A total of 1,956 traps are deployed in Tijuana and 700 traps in Reynosa. Table 1 summarizes the trapping numbers.

Table 1. Trapping numbers

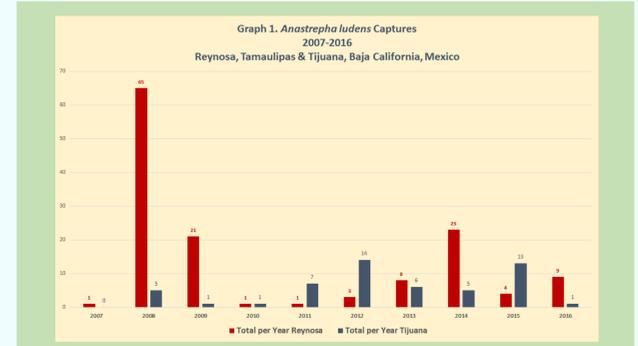
Trap Type	Density per square mile	Total Tijuana	Total Reynosa	Genus
Multilure	5	764	285	Anastrepha
Jackson Trimedlure	5	764	285	Ceratitis
Jackson Cuelure	1	214	65	Bactrocera
Jackson Methyl Eugenol	1	214	65	Bactrocera
Total		1,956	700	

The detection is complemented by fruit sampling in the markets of each region.

The primary control for suppression of Anastrepha ludens consists of SIT. Weekly releases of sterile insects are made over urban settings along the Mexican side of the northern border cities of Matamoros, Rio Bravo and Reynosa in Tamaulipas state, and the city of Tijuana in Baja California. The release densities ranging from ~ 106 to ~ 180 Anastrepha ludens per acre. In 2014, the Black Pupae Strain (BPS) was introduced in Tijuana for the SIT operation. The BPS males are separated by the female pupa by color that allow only sterile male adults to be released rather than the Standard Strain (STD) whereby both male and female adults are released together. In Tijuana the amount of sterile BPS released are 8 million sterile males, half the rate to 16 million sterile male and female STD. In Reynosa there are no BPS released because of limited BPS production in Guatemala where the BPS are produced. The production availability of STD pupae in Reynosa varies from 40 million to a maximum capacity of 75 million weekly.

Results:

The operations in Baja California and Tamaulipas help prevent and maintain a free or low prevalence status for work areas in border Mexican states and in California and Texas on the United States side. The graphs show the numbers of the captures from 2007 to 2015. With the exception of 2008 in Reynosa, the rest of the years there have been less than 23 captures per year, demonstrating the success of the operations safeguarding the border area against Anastrepha ludens. Graph 1 shows the total number of wild captures of Anastrepha ludens per year. Tijuana, less than 5 are expected.



Graph 2 shows the average captures per month for the same period, indicating the months with more captures each year. In the peak months, March for Reynosa and June for Tijuana, less than 5 captures are expected.

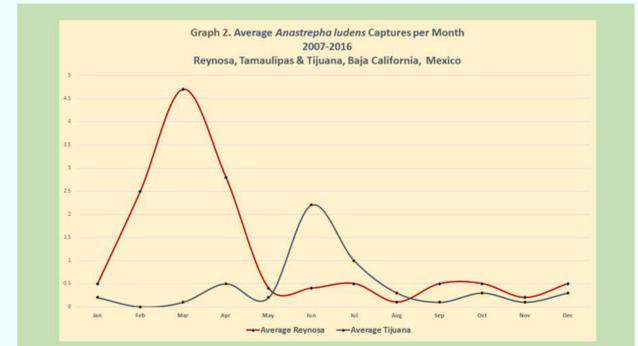


Table 2. Millions of pupae and release densities

	Millions of BPS	Millions of STD	Density (Sterile Flies / Acre)
Tijuana	8	0	~ 106
Reynosa	0	40 - 75	~ 180
Total	8	40 - 75	

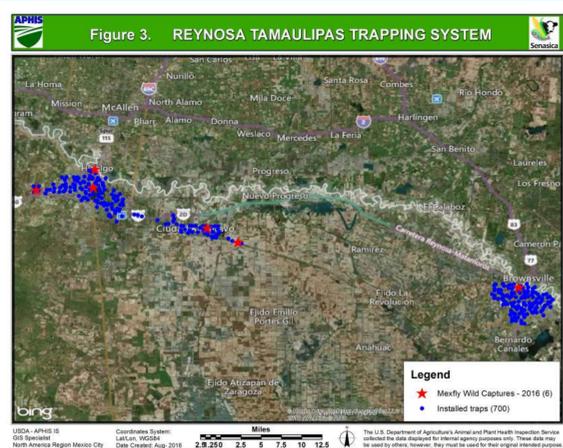
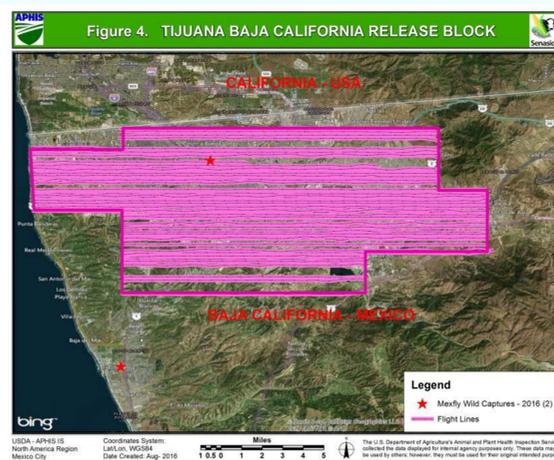
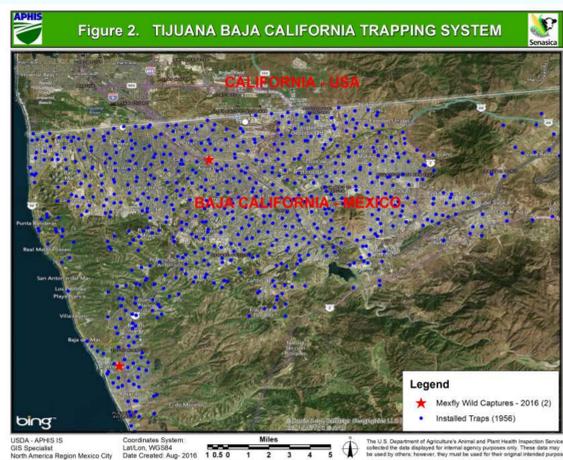


Picture 1. Emergence Facility at Reynosa, Tamaulipas, Mexico

Methods:

USDA APHIS IS in cooperation with SAGARPA SENASICA conduct a preventative release and suppression program in northern Mexico. The operations perform surveys of early detection of targeted fruit flies through an established trapping network. The primary trap used for Anastrepha species detection is the Multilure using a water/antifreeze mix and baited with a 2-component Biolure (Suterra LLC, Bend, OR). Jackson traps baited with Trimedlure, Cuelure and Methyl Eugenol are utilized to detect Ceratitis capitata and various Bactrocera species. Trapping is conducted on a bi-weekly schedule at a desired density of 5 trap locations per square mile, totaling 764 locations in Tijuana and 285 in Reynosa. Figures 2 and 3 show the trapping system for both places.

Figures 4 and 5 show the SIT release blocks and the flight lines for Tijuana and Reynosa.



Conclusions:

Fully integrated program operations with a well-defined management structure to coordinate activities among countries (USA-Mexico). An eradication strategy that includes tactical operations applied in a systematic manner to achieve eradication on the work area. Long-term strategy for declaration and maintenance of Mexican fruit fly free areas (USDA-APHIS 2009 LRGV_Final_Report).



Picture 2. Servicing of a Multilure Trap.



Picture 3. Emergence Facility at Tijuana, Baja California, Mexico

Keywords:

Anastrepha ludens, Black Pupae Strain (BPS), Standard Strain (STD), Sterile Insect Technique (SIT)