Efecto de atrayentes para prevención de mosca de la fruta en guayaba en Temascaltepec, México

Effect of attractants to prevent fruit flies in guava Temascaltepec, Mexico

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Resumen

El objetivo de la presente investigación fue evaluar el efecto de atrayentes para la prevención de mosca de la fruta en guayaba en la comunidad El Salitre, perteneciente al municipio de Temascaltepec, Estado de México, durante el periodo de diciembre 2013 a abril de 2014.

Se utilizaron cuatro atrayentes alimenticios ceratrap, proteína hidrolizada, pastillas de torula y flyral, distribuidos en cinco hectáreas de árboles de guayaba en producción, así como tres trampas multilure y 20 trampas artesanales por tratamiento (atrayente); asimismo, se aplicaron chisguetazos de proteína hidrolizada, malathion 1000 y agua cada diez días a cada árbol. Las variables estudiadas fueron moscas por trampa al día y el número de larvas por kg de guayaba infectada. La toma de datos se realizó cada siete días.

El diseño utilizado fue completamente al azar, con cuatro tratamientos y cinco repeticiones. A la información se le aplicó el análisis de varianza y donde se detectó diferencia significativa se aplicó la prueba de tukey al 5 o 1 %, según correspondía.

El mejor atrayente estadísticamente ($P<0.01$) fue el ceratrap, seguido por la proteína hidrolizada y este a su vez por las pastillas torula. Finalmente, el que mostró la menor efectividad fue el Flyral.

Por lo tanto, se recomienda la aplicación del ceratrap para la prevención de la mosca de la fruta en guayaba en esta comunidad.

Palabras clave: guayaba, mosca de la fruta, atrayentes.

Abstract

The aim of this investigation was to evaluate the effect of attractants to prevent fruit flies in guava El Salitre community in the municipality of Temascaltepec during the period December 2013 to April 2014.

Ceratrap four food attractants, hydrolyzed protein, disc and torula flyral, spread over five acres of guava trees in production, for which three Multilure made traps and 20 traps per treatment (attractive), were used likewise applied chisguetazos hydrolyzed protein, malathion and 1000 water every ten days each tree. The variables studied were flies per trap per day and the number of larvae per kg of infected guava, data collection was performed every seven days.

The design that was used was completely randomized with four and five repetitions treatment, information was applied to the analysis of variance and where significant difference was detected Tukey test 5 or 1 % is applied according corresponded. The best attractant statistically ($P< 0.01$) was the Ceratrap, followed by the hydrolyzed protein and this in turn by the torula and finally the tablets that showed lower effectiveness was Flyral.

As the implementation of Prevention Ceratrap fly in guava fruit in this community is recommended.

Key words: guava fruit fly attractants.

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Introduction

In Mexico, fruit growing is one of the most important economic activities. However, fruit flies represent a constraint to the development of this industry factor, causing economic losses are estimated at USD $ 2,350 million (Claridades, 2008).

In the State of Mexico it has an established 887 Guava (Psidium guajava), ranking fourth nationally in 2009. The average yield surface was of 12.936 ton / ha (SIAP-SAGARPA, 2009) was recorded. The areas of greatest production of guava in the state are: Coatepec Flour and Temascaltepec (SIAP-SAGARPA, 2009).

At present the fruit of the guava is severely attacked by pests and diseases that directly affect the quality of the fruit. Among the economically important phytosanitary problems highlighted Anastrepha striata (Schiner), which is associated with percentages of damage to the fruit of 73.23%, with rates up to 70 larvae infestation / kg (SIAP-SAGARPA, 2009).

Producers who do not carry an integrated controlling fruit flies have to sell their fruit at local markets or walk to orchard at a cost of $ 2.00 to $ 2.50 a kilogram of fruit; however, not all commercial fruit is because contains larvae. This causes farmers not recoup production costs and choose to abandon their orchards; On the contrary, when handled holistically flies guava fruit in orchards by the correct application of methods of chemical, organic, mechanical or cultural control help to produce and / or reduce free fruit fly larvae Fruit and thus, they can sell the fruit to other states, to supermarkets or the juice industry at a price of $ 8.00 to $ 10.00 kg (SIAP-SAGARPA, 2009; CESAVEM, 2010).

The presence of larvae of these insect pests has been significantly affecting the quality of the fruit and, consequently, of products derived from processing such as canned food, snacks and jellies.

The producing area of Coatepec Flours participates in the Guava Export to the United States, where he sent 185.606.80 kg in 2010 (CESAVEM, 2010), at a price of US $ 10.00 per kg, which means that there potential market outside of Mexico.

The fruit fly Anastrepha has quarantine significance for Mexico. There are some producing areas of guava (Psidium guajava) in the State of Mexico where it has not worked in monitoring the fruit fly and the correct application of control methods, either chemical, cultural or mechanical, directly affecting production Guava quality and, therefore, the

economics of producing and living standards of the families involved in this agricultural activity.

We know that the fruit fly control is difficult due to their biology and habits, so you need to use efficient and comprehensive manner the different techniques and methods of control. However, the use of these means having knowledge of the biological and behavioral aspects of fly guava; for example, to know whether the fruit fly is playing in the same area or guayabera has a host alternating or is introduced in infested fruit elsewhere.

This paper seeks to broaden the knowledge of the producers on the behavior of the fruit fly in the guava plant or host plant, generating better monitoring techniques and chemical, organic, cultural or mechanical control of the pest, This and other crops. To that end, three food attractants were evaluated for monitoring and prevention of fruit fly in the cultivation of guava in the community El Salitre, municipality of Temascaltepec, Mexico, 2014.

Materials and methods

Note that this work was developed with funding from the Produce State of Mexico group was validated by Sifupro nationwide, with Folio project 2440 and entitled "Validation technology to control fruit fly in the cultivation of guava, Temascaltepec township, Mexico ". So this article was generated by a piece of information collected in the field, as one of the products involved was the preparation and delivery to producers of a manual guava production under agro-climatic conditions that prevailed during the experimental phase.

Experimental area

The pilot phase was held in El Salitre, municipality of Temascaltepec, Mexico, community during the months of December 2013, January, February, March and April 2014. The gardens are located at 19 ° 17'0.2 "north latitude and 100 ° 15 '1.1 "W and 1741 meters.

Material biológico

Five hectares of guava orchards in production were used with an average age of five years and a density of 150 trees / ha.

Applied treatments

They were used as food attractants to fly protein fruit hydrolyzed flyral, tablets torula and CeraTrap at doses of 200 ml of product in Multilure traps and 100 ml made traps (PET plastic with three holes to the neck and a hook wire).

Methodology

Multilure traps 12 and 80 made traps per hectare, placed in three rows per row randomly, facilitating data collection was every seven days at eight in the morning used. At the same time, the traps are recebaron with new product.

Treatments were prepared as follows: to 50 g borax hydrolyzed protein, 50 ml of malathion 1000, 200 ml of water and 750 ml of hydrolyzed protein were used; flyral attractant for malathion 1000 50 ml and 100 ml of water and 850 ml of flyral applied; tablets for the treatment of torula 200 ml water were used and three pellets were added Multilure traps; made traps for 1.5 tablets were used in 100 ml of water and finally in the food attractant CeraTrap 200 ml of pure product for Multilure traps and 100 ml of certarap artisanal traps were used.

The traps were placed at an average height above ground guava 90 cm.

To collect field data information, a colander plastic product where its content is poured into a beaker of 500 ml was used, then quantifying the number of flies was done by treatment and trap.

In the five hectares of guava chisguetazos hydrolyzed protein, malathion 1000 and water was applied in doses 600 ml, 150 ml and 14,250 liters respectively, all to prepare a backpack spray 20 liters. This was done every 10 days in all orchards by two rows of trees, with which it was possible to impregnate the whole tree.

The parameters evaluated were:

Flies per trap per day (FTD): this variable was assessed by quantifying the number of flies found in each trap, prior identification of the species and adding all the flies obtained by treatment. Then it was calculated by the equation MTD follows:

BAT = Total of flies found by treatment / number of traps per treatment * the number of days set traps.

Experimental design

To process the information collected in the field a completely randomized design, with four food attractants and five repetitions was applied. Where significant differences were detected Tukey to 5 or 1% was applied according corresponded, the above was processed with statistical package Statistical Analysis System Institute (SAS, 2012).

Results

After the experimental stage proceeded to the organization and information processing field, with the following results for fly per trap per day (FTD) in the months mentioned below:

December 2013

Performing the analysis of variance a highly significant difference ($P \leq 0.01$) was found between food attractants for flies per trap per day for the dates 07, 14, 21 and December 28, 2013, with variability coefficients indicate that there varying the number of flies per trap per day found in traps; it is noteworthy that only the relevant information (Table 1) is presented in summary form.

Table 1. Mean squares and significance level of the F values of MTD during the month of December 2013.

Fuente de variación	Gl	fecha 07	14	21	28
Atrayentes	3	0.00059**	0.00237**	0.01401**	0.02297**
Error	16	0.00002	0.00042	0.00253	0.00455
C.V. (%)		48.3	80.6	81.81	89.44

Gl = grados de libertad; ** = efecto significativo (P≤0.01); fecha = toma de datos en campo

Comparison of means of MTD during the month of December 2013.

The behavior of attractive evaluated for flies per trap per day CeraTrap highlighted throughout the month, followed by torula tablets and hydrolyzed protein that behaved statistically equal, but different flyral was registered the lowest number of flies during the first two weeks; then the latter behaved statistically equal to each other (Table 2).

Table 2. Averages MTD four food attractants for fruit flies during the month of December *2013.*

Atrayente	fecha 07	14	21	28
Ceratrap	0.0248a	0.0546a	0.1291a	0.1627a
P. torula	0.0037b	0.0186b	0.0447b	0.0397b
Proteína H.	0.0086b	0.0260b	0.0695b	0.0919b
Flyral	0.0000c	0.0024c	0.0024b	0.0074b

Las medias con la misma letra dentro de cada columna son iguales estadísticamente (Tukey, α = 0.01); fecha = toma de datos en campo

Enero de 2014

Performing the analysis of variance for flies per trap per day during the month of January 2014, a highly significant difference (p≤0.01) among food attractants for fruit flies in guava was found during the first, second and fourth week, and a significant difference (P ≤ 0.05) for the third week. Variability coefficients indicate that there is variation in the number of flies per trap found in each trap; also worth mentioning that only the relevant information (Table 3) is presented in summary form.

Table 3. Mean squares and significance level of the F values of MTD during the month of January 2014.

Fuente de variación	Gl	fecha 04	11	18	25
Atrayentes	3	0.01088**	0.02549**	0.01171*	0.006**
Error	16	0.00119	0.00306	0.00368	0.002
C.V. (%)		77.3	89.9	145.8	143.3

Gl = grados de libertad; ** = efecto significativo (P≤0.01); * = efecto significativo (P≤0.05); fecha = toma de datos en campo

Comparison of means of MTD during the month of January 2014.

In the behavior of attractive evaluated for flies per trap per day he highlighted the CeraTrap throughout the month, followed by hydrolyzed protein, torula and flyral pills in the first two weeks behaved statistically equal, being better hydrolyzed protein in the third and fourth week regarding torula and flyral pills (Table 4).

Table 4. Averages MTD four food attractants for fruit flies during the month of January *2014.*

Atrayente	fecha 04	11	18	25
Ceratrap	0.1068a	0.1577a	0.1018a	0.0745a
P. torula	0.0161b	0.0124b	0.0000d	0.0024c
Proteína H.	0.0534b	0.0732b	0.0596b	0.0372b
Flyral	0.0024b	0.0024b	0.0049c	0.0024c

Means with the same letter within each column are statistically equal (Tukey, α = 0.01 ó 0.05 según corresponda); fecha = toma de datos en campo

February 2014

Performing the analysis of variance for flies per trap per day during the month of February 2014, a highly significant difference (p≤0.01) was found between food attractants for flies

per trap per day during the first, second and fourth week, and a difference not significant ($P \leq 0.05$) for the third week (Table 5).

Table 5. Mean squares and significance level of the F values of MTD during the month of January 2014.

Fuente de variación	Gl	fecha 01	08	15	22
Tratamientos	3	0.00226**	0.00061**	0.00035^{ns}	0.0001**
Error	16	0.00045	0.00017	0.00016	0.00009
C.V. (%)		114.7	135.7	187.4	71.4

Gl = grados de libertad; ** = efecto significativo ($P \leq 0.01$); ns = efecto no significativo ($P \leq 0.05$); fecha = toma de datos en campo

Comparación de medias de MTD durante el mes de enero de 2014.

In the behavior of attractive evaluated for flies per trap per day they highlighted the CeraTrap and hydrolyzed protein during the first, second and third weeks. In the fourth week he highlighted the CeraTrap, followed by torula and flyral pills, behaved statistically equal to each other (Table 6).

Table 6. Averages MTD four food attractants for fruit flies during the month of February 2014.

Atrayente	fecha 01	08	15	22
Ceratrap	0.0422a	0.0186a	0.0099a	0.0099a
P. torula	0.0012b	0.0000b	0.0095a	0.0012c
Proteína H.	0.0310a	0.0198a	0.0098a	0.0062b
Flyral	0.0000c	0.0000b	0.0094a	0.0000d

Las medias con la misma letra dentro de cada columna son iguales estadísticamente (Tukey, $\alpha = 0.01$); fecha = toma de datos en campo

For the months of March and April, the parameter MTD was zero incidence of fruit flies in guava.

Discussion

The information generated in this research under warm weather conditions are better than those reported by Rodriguez (2010) in his research entitled "Evaluation of traps and attractants for the capture of Anastrepha species," held in Panama, with average reports from 0.4 to 0.9 MTD during the months of June to February.

Reported similar behavior in their research: Navarro (1996), Norrbom et al. (2000), Norrbom (2004), IAEA (2005) with average values of 0.62, 0.52, 0.61 and 0.60 respectively MTD.

Celedonio et al (1995) reported in their study Anastrepha fluctuations in Chiapas, Mexico, whose values range from 0 to 0.52 MTD.

Finally, Aluja et al (1996) studied the fluctuations of Anastrepha by season in southwestern Mexico, reporting average of 0.56 MTD values.

The heterogeneity of information reported these investigations may be due at first to the number of hectares that are grown from one place to another, for our research in El Salitre, municipality of Temascaltepec, State of Mexico community, it has 50 acres established. Here the population of fruit fly is lower with respect to those areas or places where the number of hectares is greater, as is the case of the research outlined above.

The above is confirmed by Navarro (1996), Norrbom (2004), IAEA (2005), IAEA (2007) and Rodriguez (2010), stating that if any guava producing area has a high number of hectares of fruit in production, it will have higher incidence of fruit flies if not carrying out a comprehensive management and control of this pest.

Another aspect that influences the differences in the results of the investigations is the phenology of guava, especially when we talk about the state of fruiting and ripening. When the fruit is green-yellow state, the fruit fly oviposition reaches their eggs to ensure their reproduction, which is needed to monitor traps (Multilure traps) and made traps for its prevention and control. Of course, the best attractant is added and thus the best strategies for prevention and control of this pest is established.

The foregoing is confirmed by Rodriguez (2010), Navarro (1996), IAEA (2005), IAEA (2007) and Norrbom (2004) when mention that the fruiting and ripening guava or other

fruit used to stimulation reproduction and thus the incidence of fruit flies in the orchards, so is recommended to have traps to monitor such impact and then apply a comprehensive management for the prevention and control of this pest.

On the other hand, the differences between investigations may be due to the shade of the tree and environmental conditions prevailing in the orchards. We note in this research that when the fruit had little foliage or branches with leaves, the incidence of fruit flies was less about those trees had a greater size and foliage; It was also observed that as the moisture in the soil and the environment was absent, dramatically decreased the incidence of fruit flies, coupled with this ambient temperature (29 ° C) increased, so identify the fly absent from the orchards and sought an environment that will provide the comfort required for playback, such as host trees, for example, mango and sapote natives of this area.

This agrees with the statements of Navarro (1996), Norrbom (2004), IAEA (2005), IAEA (2007) and Rodriguez (2010), who report that the incidence of fruit flies in the orchards of guava fruit is closely related to the ambient conditions prevailing at the site, the availability of ripe fruit, shade trees, soil moisture, ambient temperature, the presence of host trees and eventually integrated management that applies each producer his garden.

Regarding the use of food attractants for the prevention and control of fruit flies in guava, the best was CeraTrap, followed hydrolyzed protein and, finally, torula tablets, all supported by applying chisguetazos hydrolyzed protein, malathion and water every guava tree every ten days, when the fruit guava submitted a size of a marble and to finish the harvest, as well as placing traps or killer craft around and inside the gardens.

Conclusions

Once processed the information gathered in the field, we conclude the following:

It is recommended that producers of guava applying attractive CeraTrap because it was the one that registered the highest values of MTD, bringing the incidence of fruit flies in guava is decreased, all supported with chisguetazos hydrolyzed protein, malathion and water every guava tree.

Producers need to be organized to acquire CeraTrap at a lower price, because the dealer is located in Mexico City.

Producers who tracked the research show acceptance of the results, as witnessed in the management of the four attractive gardens, and the final result achieved in the production and sale of free larvae guava fruit fly .

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