Proceedings VI World Avocado Congress (Actas VI Congreso Mundial del Aguacate) 2007.
Viña Del Mar, Chile. 12 – 16 Nov. 2007. ISBN No 978-956-17-0413-8.

## CONTROL OF HARMFUL THYSANOPTERA ON HASS AVOCADO CROP (*Persea americana* Mill.), IN JUJUY PROVINCE, ARGENTINA

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Since thysanoptera affect commercial quality of Hass avocado, the search for appropriate alternatives to control them was initiated. Main objectives were: 1. Prove efficiency of different concentrations of mineral oil to control thrips. 2. Determine opportunity of treatment based upon abundance curve of these insects. Tests were performed during 2006/07 at La Ollada, Palma Sola, Jujuy, on 4-year-old plants, established on 6 x 8 m spacing and contour rows. Treatments were mineral oil at 1, 1.5 and 2 % (T1, T2 and T3), Endosulfan 50 at 1.75 % (T4) and one control. A Jacto 2000 sprayer with high volume and nozzle was used, with a completely randomized block design with 4 replicates of each treatment: Number of live thrips and percentage of healthy fruits were evaluated, along with light, medium and severe damages from a total of 50/treatments. The data were subjected to ANOVA, while the efficiency was determined through Abbott formula. Periodical monitoring was based upon random sampling of 2 fruits/plant and 8 per each treatment. Two spray applications were performed, being T4 the most effective (41 %) at first, followed by T3 (17%). During the second spray application, no treatment was different from the control. The highest percentage of healthy fruits with light injury was due to T4 (76 %), followed by T3 and T1 (58 % for both). Regarding severe injuries T4 and T3 had the lowest levels (1 and 2 %, respectively), whilst maximum damage corresponded to the control (46%).

Key words: Populations - Thrips – Mineral oil –- Efficacy - Damage

## CONTROL DE TISANÓPTEROS PERJUDICIALES EN EL CULTIVO DEL PALTO (*Persea americana* Mill.), VARIEDAD HASS, EN LA PROVINCIA DE JUJUY, ARGENTINA

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Dado que los tisanópteros afectan la calidad comercial de las paltas Hass, se inició la búsqueda de alternativas apropiadas para su control. Los objetivos fueron: 1- Probar la eficacia de diferentes concentraciones del aceite mineral para el control de trips y 2- Determinar la oportunidad de aplicación, basada en la curva de abundancia de estos insectos. El trabajo se realizó en la campaña 2006/07, en la localidad de La Ollada, Palma Sola, en un lote de plantas de 4 años, establecidas en marcos de 6x8 y curvas de nivel. Los tratamientos fueron: Aceite mineral al 1; 1,5 y 2% (T1, T2 y T3), Endosulfán 50 1,75 % (T4) y un testigo. Se empleó una pulverizadora Jacto 2000 de alto volumen con lanza, un diseño en bloques completos al azar con 4 repeticiones por tratamiento y se

evaluaron: Nº de trips vivos y % de frutos sanos y con daños leves, medios y severos, de un total de 50 por tratamiento. Los datos se sometieron a un ANAVA y la eficacia se determinó con la fórmula de Abbot. Los monitoreos periódicos consistieron en tomar al azar 2 órganos fructíferos/planta y 8 por tratamiento. Se efectuaron 2 aplicaciones, en la primera, T4, fue el más eficaz (41%) y le siguió T3 (17%). En la segunda, ningún tratamiento se diferenció del testigo. El mayor porcentaje de frutos sanos y con daños leves correspondió a: T4 (76%), le siguió T3 y T1 (58%, para ambos). En cuanto a los daños severos, T4 y T3 tuvieron los niveles más bajos (1 y 2 %, respectivamente), mientras que el máximo fue para el testigo (46%).

Palabras clave: Poblaciones - Trips - Aceites minerales –- eficacia – daños

## Introduction

In the year 2002 avocado (*Persea americana* Mill.) orchards occupied roughly 1700 ha in northwest Argentina (provinces of Salta, Jujuy and Tucumán), with 87.2 % belonging to Hass variety (Aguirre et al., 2003). In Jujuy there are 520 ha (Aguirre, 2007, personal comm.) being the main area in the subtropical Yungas which offers optimum agroecological features for the development of this production (Aguirre y Fernández Vera, 1997).
Palma Sola, Department of Santa Bárbara, province of Jujuy, represents 16 % of the total crop, among 15 big and small orchards (Aguirre, 2007, personal comm.). Fruit from this area presents high commercial standards with pulp of excelent flavor, firmness and color (Aguirre, 2005). This quality is in much demand by the local and foreign markets. The main target for this production are the european markets which require high quality. (Aranda González, 2004).
Among features affecting commercial value of fruits, phytophagous thysanoptera are harmful since they produce superficial injuries when feeding during flowering and early set on of fruits from july until september. The direct effect on the full grown fruit are deformations like crest or lips which diminishes commercial value and even complete discard.
There are surveys of thrips in relation to Hass cultivar (Tapia et al., 2004; Aguirre et al., 2004) without identification of species and their damage in packings in Jujuy province. Agostini et al., 2005; Muruaga de L'Argentier, et al, 2003; identified diversity of species ocurring in Ledesma, Calilegua and Palma Sola.
In relation to different management alternatives in Chile and Mexico, several chemicals and doses are recommended due to significant incidence of these insects (Gonzáles Hernández et al, 2000; Aranda González, 2004). Since in Jujuy experience of management and pest control are scarce, appropriate alternativas based upon population monitoring were sought after.
Main objectives of this survey were: 1. Prove efficiency of different concentrations of mineral oil to control thrips, and 2. Determine opportunity of treatment based upon abundance curve of these insects from beginning of flowering until harvest.

## Materials and methods

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Work was carried on at La Ollada near Palma Sola, Jujuy, between june 2005 and april 2007, on an 4 year old Hass plot established on 6 x 8 frame and contour lines. Treatments were mineral oil at 1, 1.5 and 2 % (T1, T2 and T3), Endolsulfan 50 at 1.75 % (T4) and no treatment. Along with all treatments Carbendazin at 0.1 % was used.
A high volume Jacto 2000 sprayer of 2000 liter capacity was employed, with a design of complete random blocks with 4 replicates of each treatment. Number of live thrips and percentage of light, medium and severe damage on fruits at harvest time on a total of 50 treatments were evaluated. Data were analized by means of ANAVA and efficiency was determined by Abbot formula.
Periodical monitoring were based upon random sampling of 2 fruits/plant (infloescence, young and adult fruits) out of 8 for each treatment.

**Results**

Two sprays were performef, one in august (first population peak with more than 120 trips/sample) and another in september (second and highest population peak with 180 thrips/sample) (Fig. 1).In the first spray T4 (Endosulfan) was the most effective (41 %), followed by T3 (17 %) (Fig. 2). During the second spray none treatment was different from the non treated. No decrease of number of individuals was detected in any case.

The highest percentage of healthy fruits with light injury was due to T4 (76 %), followed by T3 and T1 (58 % for both). Regarding severe injuries T4 and T3 had the lowest levels (1 and 2 %, respectively), whilst maximum damage happened to non treatment.

Regarding damage in fruits the highest percentage without any and light damage was T4 (76 %), followed by T3 (58 %) and T1 (56 %). T4 and T3 had the less highest damage and the maximum was T2 (46 % and 14 %, respectively). (Table 1)

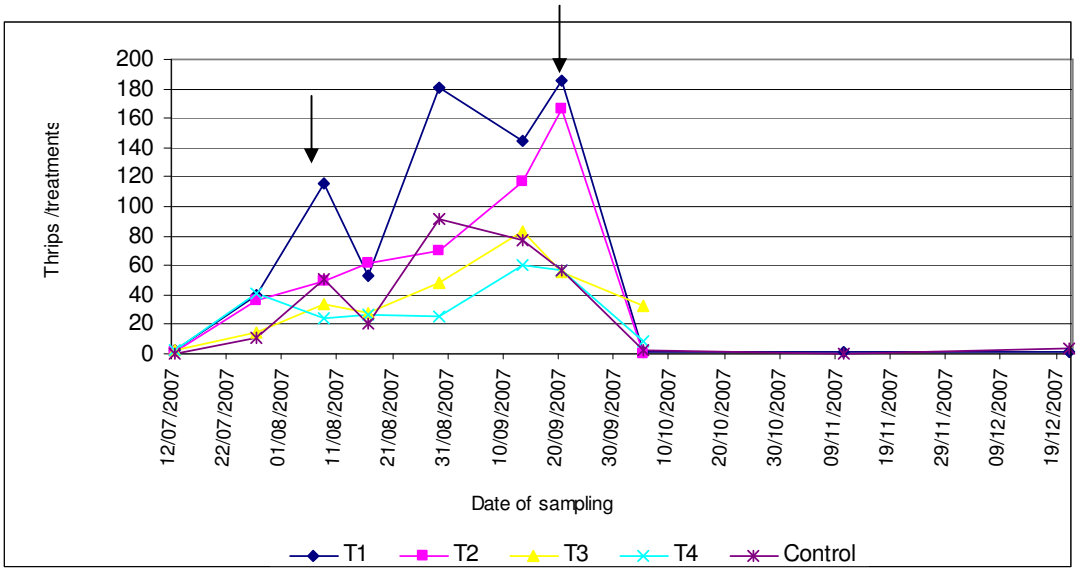

Fig. Nº 1: Population dynamic of harmful thysanoptera on Hass avocado. Both arrows show spraying time. Palma Sola, Jujuy. Period 2006/07.

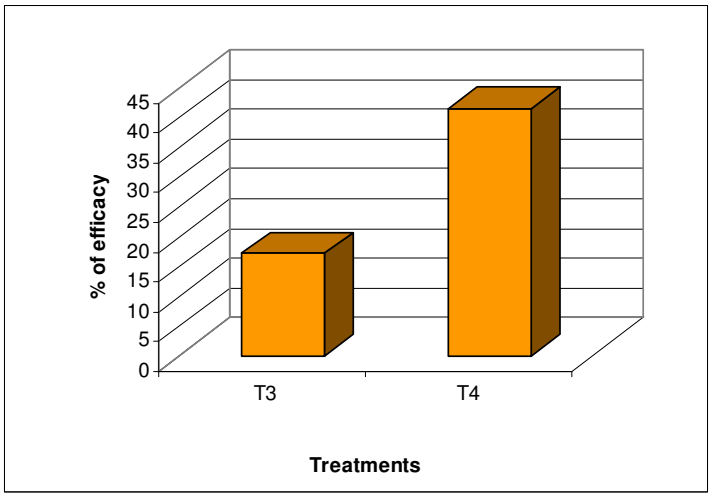


Fig. Nº2: Efficacy of first mineral oil spray to control thrips on Hass avocado. Palma Sola, Jujuy. Period 2006/07.

Table Nº 1: Fruit percentage without any damage and with crests. April, 2007. Palma. Sola, Jujuy Period 2006/07

| Treatments | % of Fruits with damage | | | |
|---|---|---|---|---|
| | Without any damage | Light damage | Medium damage | Strong damage |
| T1 | 26 | 32 | 34 | 8 |
| T2 | 30 | 6 | 50 | 14 |
| T3 | 24 | 34 | 36 | 6 |
| T4 | 48 | 28 | 22 | 2 |
| None | 18 | 20 | 16 | 46 |

## Conclusion

- Fruits sprayed with mineral oil at 1 % and those of the non treated were strong affected.
- T4 (Endosulfan) had the highest percentage of fruits without any damage.
- Packing standards accept undamaged fruits and with light and medium damage. Therefore the ranking with efficient treatment is: T4 (76 %) and T1, T3 (56 %).

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