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Affectation of *thrips palmi* in the quality and production of the naranjilla in the Ecuadorian Amazon.

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Abstract:

Many amazon producers used to apply various agrochemicals on crops of naranjilla (*Solanum quitoense* Lam.) with the objective of controlling different pests, and also increasing the size of the fruit. This kind of crop has a very high acceptance among the producers of Pastaza province. The low level of identification of *Trips Palmi* leads us to believe that the symptomatology and damages are associated with the phytotoxicity of the plant caused by the various pesticides, masking the high incidence of this pest and generating a decline in yields. This has an impact on economy of producers and for this reason, it was necessary to carry out this research in order to determine the impact of *T. Palmi* on crops of naranjilla. This experiment took place in two different productive farms located in the community of San Cristoball, canton of Santa Clara in Pastaza province. A sample of 35 plants was taken to identify the pest first. It was indispensable to know the specific location for which quantity and quality variables were proposed. It was demonstrated that, in the quantity variable (plant height), there were highly significant differences, in comparison with the average values between farms at all times (days: 1, 8, 16 and 24). It became apparent that there is a 100% impact of *Thrips Palmi* in both farms. This pest is located on the upper side of young leaves causing chlorotic and rosulate yellowing in upper, middle and lower leaves as well.

Keywords: affectation, naranjilla cultivation, *Solanum quitoense* Lam.

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1. Introduction

In 2008, the world production of tropical fruits was estimated at 87.2 million tons, so much so, in the last decade the average growth rates of fruit production reached 5%. Latin America contributes to the world production of fruits with 21% (Muñoz, 2010).

Among the species of fruit trees, the naranjilla (*Solanum quitoense* Lam.) Is a crop of great importance for Ecuador, since it is a fruit tree with important markets, in turn of interest for international markets, the naranjilla has been cataloged as an essential factor in the peasant family economy due to the fact that it constitutes one of the main sources of income for 19,000 families in Ecuador (Muñoz, 2010) This Solanaceae is a short cycle crop, due to its constant production generates weekly income, main factor that stabilizes the family economy.

The cultivation of this fruit has been affected by high populations of the *Thrips palmi* insect that causes economic damages in the crop, since they produce lesions that do not allow the correct development of the plants and the quality of the fruit to be harvested (Murguido *et al.*, 2002).

Due to the above, in most of the countries where the fight against this insect has been launched, it has been difficult to eradicate it, due to the little or no quality of the applications of the chemical products, the ability of the insect to adapt to conditions unfavorable as it is the case of prolonged droughts, added to this, the reduced number of natural enemies that this has (Vázquez, 2003).

The Farmers in their effort to stop the development of this pest have used different insecticides, which in many cases failed to meet their expectation of eradicating the insect from their crops, caused by the lack of information on their effectiveness in controlling the plague. For these reasons, it has been suggested that *T. palmi* has a natural resistance to insecticides, which hurts and makes it a difficult pest to control and eradicate (Murguido *et al.*, 2002).

2. Materials and Methods

For the experiment, two agro-productive farms were chosen from Santa Clara - Pastaza Province, each one was named as replicas 1 and 2 respectively, these were divided into three levels. Medium and low, for the sampling of data, 35 Plants for each level during days 1, 8, 16 and 24 per plant were evaluated a high branch, a middle branch and a low branch, based on an exploratory investigation (Bermeo, 2011), since *Thrips palmi* is a pest with a wide range of hosts, especially plants of the Solanaceae family, an experimental design with dependent and independent variables was applied in order to obtain the relations of the incidence of *T. palmi* in the culture of the naranjilla each farm, the determination of the presence of the plague was made by direct observation to the plant with appropriate magnifying glasses, and the data were saved in database and then developed with the formul

The incidence was calculated using the following formula :

$$\% \text{ of incidence: } \frac{\# \text{ affected plants}}{\# \text{ total plants}} \times 100$$

Author: Barea, G. 2008

The severity was determined based on four levels of attack; each level corresponds to a percentage of damage of the foliar area attacked from the fourth leaf (counting from the apex of the branch) selected.

The severity was calculated using the following formula:

$$\% \text{ of Severity: } \frac{\text{Affected area}}{\text{Total area sheet}} \times 100$$

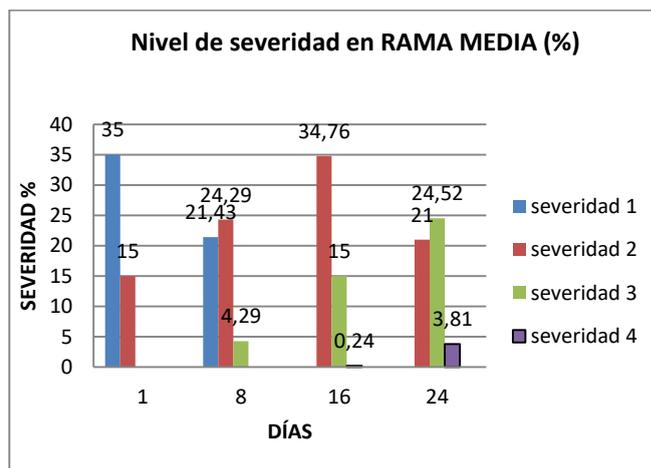
Author: Reis, 1994

In the end the presence of the characteristic symptoms caused by *T. palmi* in the organs of the plant was confirmed.

3. Results and Discussion

The research allowed to verify the existence and direct incidence of *T. palmi* with the lowering of the quality of the fruit and mechanical damage leaves and new shoots in the agroproductive farms under study.

Highly significant differences with respect to the values obtained from height of the plants on days 1, 8, 16 and 24 in relation to the comparison of farms.



Author: (Chicaiza, 2017)

Fig. 1. Treatment To levels of attack severity *Trips palmi* in the high branch.

Treatment A Regarding the location where sampling was considered, (Suris and Plana 2001) indicate that the ideal place is the middle stratum of the plants since the individuals (larvae) have better living conditions because they are less exposed to the action of natural enemies and solar radiation, in addition to being at this level leaves, which due to their age, could be more appropriate to guarantee food to this state. The sequential sampling plan (1, 8, 16, and 24) with fixed levels that indicate the presence and affectations of *T. palmi.*, based on the results obtained in Fig. 1., related to the spatial distribution of the pest in the plant, the representative state of

its populations and the selection of the sample unit, it is proposed to modify the sampling procedures indicated in the phytosanitary management program for the cultivation of naranjilla in the following aspects: The apical leaflet will be

selected as the sample unit, which will be chosen in the middle stratum of the plants and the state to be quantified will be the larva. These elements will be common in any monitoring procedure.

4. Conclusions

Treatment A allows us to take into account the initial behavior of the pest, once it has confirmed its presence in silver and its location in the high branch.

The research proved that by applying the treatments on the farms in the established days, they indicate that the pest is present with greater rigor in the high and low branches, which was verified through the monitoring on days 1, 8, 16, 24 also indicated the direct impact of *Trips palmi* as a cause of damage to leaves and rolling of young leaves and the direct impact on the quality of the fruit, prior to this investigation the producer associated the symptoms of the pest with intoxications manifested by overdoses of agrochemicals not specialized and even to *trips palmi*

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Author Contributions

All authors have the same contribution.

Conflicts of Interest

There is no conflict of interest of the authors.

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