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Incidence of Hypsipyla Grandella Zeller in Cedrela Odorata and Swietenia Humilis in an Agro Forestry System Taungya

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Summary: Hypsipyla grandella Z incidence was determined. in Cedrela odorata and Swietenia humilis in an agroforestry system. The design was blocks incompletosen that "evaluation of growth potential for carbon sequestration and kidnapping of six forest species in association with Mussa balbisiana ABB. El investigala area consists of 5 buildings and 28 plots in sampled every 8 díasel cualesse 100% plants between August 2013 and November 2014. The plant height, height of the damage, number of larvae in the ground and made precipitaciones.Se mean test Fisher LSD was recorded enInfostat yse found that the damage was higher in species associates in non-associates ($p < 0.05$) .In this sense C.odorata with banana (CR-G) had the highest involvement (21.3%). However when comparing the result with Newton et al (1998), the proportion of affected plants is low. In the most affected áreasin partnership recorded in S.humilis although less so than in the area asociada.En the months of highest rainfall is where the greater involvement of Hgrandella therefore must be increased management efforts during this period was recorded to minimize damage.

Abstract: It was determined the incidence of *HypsipylagrandellaZ.* in *Cedrelaodorata andSwieteniahumilis* in an agroforestry system. The design was incomplete blocksin which investigates the"Evaluation of growth, potential for kidnapping and carbon fixation of six forest species associated with *MussabalbisianaABB*. The area consists of 5 blocks and 28 plots where sampled every 8 days 100% of the plants between August 2013 and November 2014. Registration is the height of the plant, height of the damage, number of larvae present in the plant and the rainfall. Test was conducted of averages of LSD and Infostat Fisher sand found that the damage was greater in associated species, that in the not associated ($p < 0.05$) in this sense *C. odorata* with guineo (CR-G) presented the greatest affectation (21.3 %).But when we compare these results with those of Newton et al (1998), the proportion of affected plants is low.In the area without associated with a higher impact was recorded in *S. humilis*although in smaller proportion than in the associated area in the months of highest precipitation is where you record the greater involvement of *H grandella* must therefore be increase the management efforts during this time to minimize the damage.

Keywords: Taungyasystem, *Hypsipylagrandella*, *Cedrelaodorata, Swieteniahumilis,* Nicaragua.

Introduction

Nicaragua has a genetic potential in forest terms to be located in the center of the Americas where there is a confluence of species from North and South of the continent. However, deforestation and the rapid degradation of ecosystems have generated a series of problems such as soil degradation, irregular rainfall and environmental modification (INAFOR 2008). To counter these negative effects of deforestation, agroforestry systems as an alternative to maximize the use of resources, to increase or at least maintain the productivity of the land without causing degradation arise; likewise the regulation and control of invertebrate pests such as the Meliaceae borers, which stands HypsipylagrandellaZeller (Briceño 1997).

Granadella H. Z. (Lep. Pyralidae) is an aggressive forest pest that causes, in their larval state, destruction of the terminal bud tunnels leaving in its path. Product of repeated attacks the plant develops many side branches distorting the normal growth of the plant and consequently trees with low timber yield (Briceño 1997; Howard and Mérida 2014) are obtained. Several authors agree that the use of biological and natural products reduce insect populations, also managing the plantation silviculturalque provide deincidencia influences the level of pests, so the combination of forest species is recommended and culture agroforestry (Briceño 1997; Howard and Merida 2014. Howard et al 2002) .In this

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study the incidence of H. grandellaZeller real cedar (Cedrelaodorata) and mahogany Pacific (Swieteniahumilis) in a Taungya system was determined.

Materials and Methods

Location of the Study Area

The research takes place in a taungya in Santa Maria estate, owned by the International University of Agriculture, located in the community The Chocolata, municipality of Rivas, located between the 11 ° 41 'North Latitude and 85 ° 83' West longitude. The ecological conditions of the area are: annual average temperature of 27 ° C, precipitation of 1614 mm yr^{-1}, heatwave period 15 July to 15 August, 70 m altitude, relative humidity between 72-86% speed wind from November to April is 3.7 m s^{-1} and from May to October of 2.4 m s-1 topography 3-5% slope, loam to clay loam (INETER sf). It's a warm, dry area (Salas 1993).

Study Area

The research was established under the incomplete block design, in an area of 1.0 ha, Taungya defined for a system in which research on "Evaluation of the growth potential for carbon sequestration and kidnapping of six species develops forest in association with MussabalbisianaABB. " Forest species were established in July 2012 with planting distance of 6 x 1.5 m (1100 plants ha-1) and the banana was established in July 2013, between the streets of forest species with the same frame Drill (1100 plants ha-1). Forest species in the study were established, Teak (Tectonagrandis), Pochote (Bombacopsisquinata), Oak (Tabebuia rosea), Melina (Gmelina arborea), Royal cedar (Cedrelaodorata) and mahogany (Swieteniahumilis) each were established without associate of Banana (Musa balbisiana ABB) .Considering lasmeliaceaes Hypsipylagrandellapor preference in this study will emphasize the attack of this insect in the last two tree species described above.

Location Treatments in the Area of Taungya

Figura 1: Experimental area Taungya.

The area consists of five blocks and 28 plots, in the area of the plots associated the amount of banana plants and tree species is 40 and in plots without association of 24 plants. The description of the plots as follows:

1. Cedro Real associated with Banana (CR-G)
2. Mahogany associated with Banana (Cb-G)
3. Real Cedro no association (CR-SG)
4. Mahogany without association (CB SG)

Methodology

Data Collection Period

In each of the tratamientosse he sampled 100% of the plants in each experimental plot corresponding to 40 and 24 in the associated plants in the area without association area. DeH sampling. grandellaZeller took place every week, between 8:00 and 11:00 h during the period August 2013 to November 2014. At baseline only the number of plants affected by the bug was recorded subsequently included height plant (cm), height of damage (cm) and the number of larvae present in the plant. At the time of sampling, the larvae are mechanically removed in order to reduce the impact of misma.Con delaincidencia data obtained every eight days, the percentage mensualde involvement using the following equation was estimated.

$$\%\ affectation = \frac{N°\ affected\ plants}{Total\ plant}\ x\ 100$$

Plantation Management

The management of weeds was carried out by "Chapias", performing one in the summer and three in winter. For pest control terminal buds sprinkled with 2 - 3 applications of systemic insecticides in the months most

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affected alternating every 8 days Chlorpyriphos at 0.8 l ha-1 and 0.7-0.9 l has Cypermetrinaa -1.

Data Analysis

For data analysis means tests using Fisher LSD statistical software Infostat (Balzariniet al. 2008), with which averages were determined performed.

Results and Discussion

On average, during the evaluation period August 2013 to May 2014, it was found that the percentage of involvement of H. grandella varied by type of arrangement and species, in both species associated with M. balbisiana ABB damage caused in meristems of plants was higher than in the area of forest species no association ($p < 0.05$) (Figure 2), particularly CR-G showed the highest involvement. However the proportion of affected plants was low, even in the most affected month (April 2014 to 21.3%) compared with what was stated by Newton et al (1998), who claims that insect damage may be greater than 90% in the first three years.The larvae found direct suppression and applications of systemic insecticides terminal buds had an impact on this result.

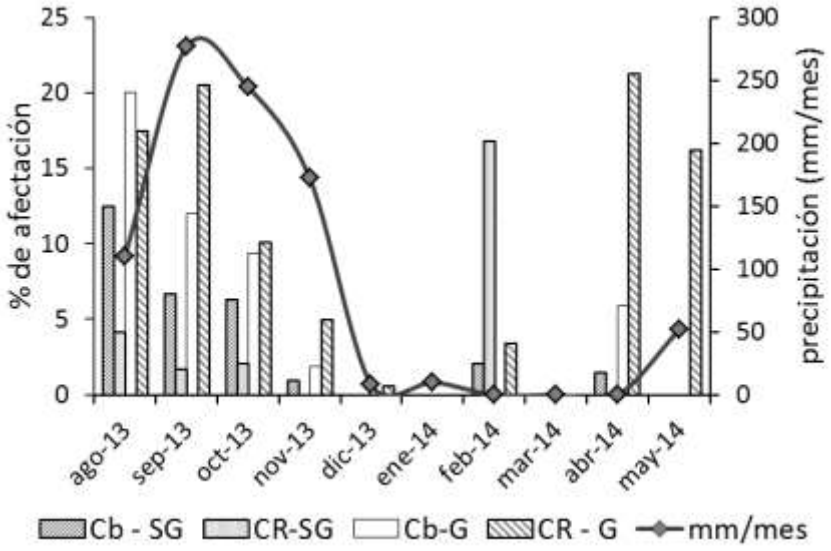

Figure 2. Incidence of H. grandella in relation to precipitation.

Comparing H. grandella damage in both species, the insect showed greater preference for Cedar Mahogany Pacific Real that the associated conm area. balbisianaABB recording a difference in the damage by more than 106%, while in the area without associate this trend is not as clara.Deacuerdo statistical analysis no difference in damage between H. grandella especies.Macías-Sámano (2001), considered C. odorata and S. humiles contain essential oils that act as attractants why insects prefer these species.

In August and September 2013, which correspond to two of the four months of highest precipitation was recorded as afectación.En August, was the most affected in the two arrays mahogany and cedar in September was the most affected, although there significativa.Howard difference and Merida (2014) and Macias-Samano (2001) suggest that in the rainy season is when it happens the proliferation of young shoots in the host plants and coincide with the reproductive stage of adults.

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Figure 3. *Damage caused by larvae of H. grandella in C. odorata*.

Conclusions and Recommendations

The findings of the incidence of H. grandella were influenced by the phenomenon of rain, however the presence of mother plants scattered C. odorata in the study area were also factors that influenced the incidence of attacks. Because H. grandella increased his attacks during the rainy season, it is important to increase management and control efforts at this time to minimize damage and subsequent consequences. Forest plants in association were the most attacked than those who were not in partnership, but this can not be considered a pattern for these types of systems since other studies have found different results. It is necessary to continue registering data to identify possible causes of why this pattern.

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