Potential of *Crotalaria* spp. in the Agreocological Restoration of Fruit Orchards in the Soconusco,Chiapas, Mexico

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A).- INTRODUCTION

The Chiplin (*Crotalaria* spp.), it is considered as a important vegetable for its vitamin and protein content, used for human consumption and medicinal (Martinez, 1984).

Fruit growing is an important source of income in the Soconusco region of Chiapas, where total orchard acreage exceeds 40,000 hectares. Rambutan (Nephelium lappaceum L.), a tropical fruit tree native to the Malaysian and Indonesian archipelagos (Tindall, 1994) is largely unknown in Mexico, and acreage is small. The main production area for local and export markets is the Soconusco region in Chiapas. Rambutan orchards are being established and acreage is increasing with little regard for proper technology.

B).-METHODOLOGY

Research was initiated in august 2006, in a one-hectare rambutan lot in the Soconusco region of Chiapas, Mexico; the experimental plot is located as follows: 15° 21’ N, 92º 33’ W, over 335 m.a.s.l. Climate is defined as warm humid tropical with daily medium temperatures ranging from 26.5°C to 28.7°C, and an average yearly precipitation of between 2500 and 3200 mm. The Nephelium orchard was established in 2000, using an 8 x 8 m spacing. Selected buds were grafted on scions obtained from a local nursery.

Table 1. Characteristics of the integrated treatments in the rambutan orchard

Factors	Description of the treatments
Associated	**Compact sown between trees and rows**
A_1	1. Rambutan + *Crotalaria spectabilis* (Forrage ‘Chipilin’)
A_2	1. Rambután + *Crotalaria longirostrata* (Edible ‘Chipilín’)
A_3	1. Rambután + *Vigna unguiculata* (Caupi)
A_4	1. Rambutan without legumes (mechanical weeding)

An experimental area of 1,536 m² was selected for this investigation, in four 24 x 16m plots using a completely randomized experimental design with 6 repetitions.

Table 2. Parameters of weed and insect population dynamics

Variables	Methods
• Weed Diversity	Number of species per m²
• Weed Abundance	Number of individuals / species per m²
• Weed Biomass	Dry Biomass (gm-²) per specie and m²)
• Insect Abundance	Number of individuals / species and per sample (40 x 40 cm traps)
• Insect Diversity	Number of species per trap

C).- RESULTS AND DISCUSSION

1. *Influence of intercropped legume on the Weed biomass in Rambutan orchard*

Legumes intergrown within the rambutan plantation initiated an notable change in the structure of weed coenosis. Upon rotation with *C. spectabilis* we obtained a total biomass production of 1,918 kg ha^{-1} (Figure 1). *C Spectabilis* contributed with 82% of total biomass and weeds only 18%. This legume produced satisfactory weed control during its growth and development period inside the rambutan agrosystem

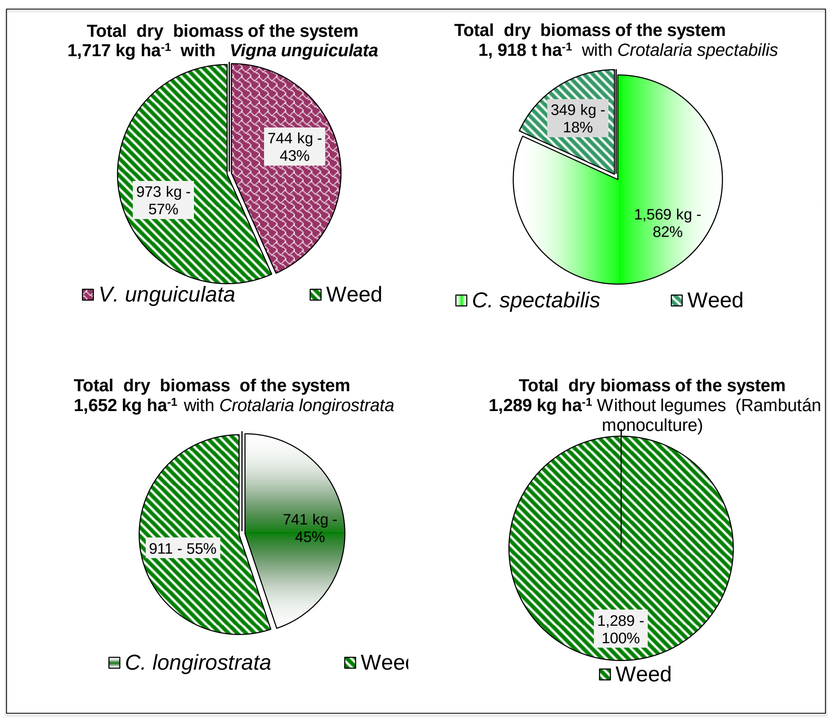

Figure 1. Total dry biomass production of rambutan agro systems intercropped with different legumes

2. *Effects of legume crops on the entomology dynamics in the Rambutan orchard*

The fast growth habits of C. spectabilis, is evident in “Chipilin” (C. spectabilis) by its height, which averages 2.25 m. The abundant blooming of this legume played a very important role in the rehabilitation of the insect population during the period from November 2006 to February 2007. Blooms attracted insects of the Lepidoptera, Hemiptera (Aphididae) and Hymenoptera (Meliponidae) species. Their activities resulted in enhanced pollination and established communities with low pest risk to the Rambutan crop.

Figure 2. Insect Diversity in different Rambutan/Legume associations

3. *Importance of the intercropped legume on the soil properties inside the Rambutan orchards*

Soil organic carbon in the 0 – 10 cm layer in the rambutan orchards interplanted with legumes was clearly superior to that registered in the rambutan system without legumes. Organic carbon percentage for the sites with legumes fluctuated between 2.67 and 2.83%, whereas rambutan systems without legumes reached 2.16% (Figure 3).

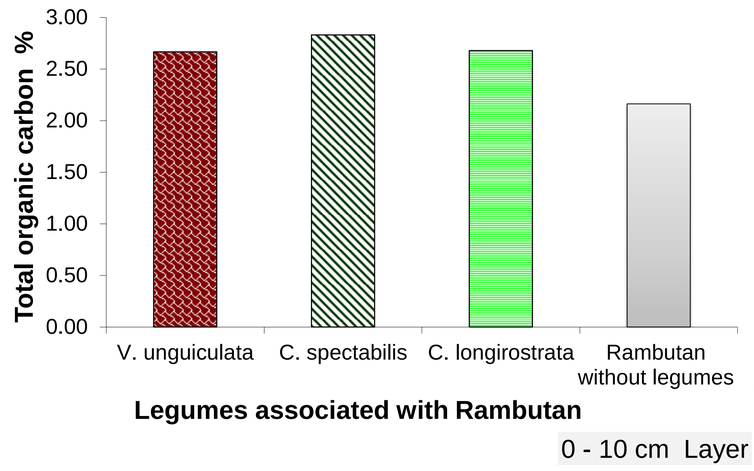

Figure 3. Soil organic carbon content in rambutan orchards interplanted with different legumes

4. *Effects of intercropped legume on the Rambutan yield*

Rambutan performance in the plot interplanted with ‘Chipilin` was significantly better than the other treatments. Rambutan fresh fruit production was 5,194 kg ha^{-1} at this site. The plot intercropped with eatable Chipilin yielded 2,447 kg ha^{-1} and the no legumes system produced 3,187 kg ha^{-1}. The highest performance shown in the C. *spectabilis* site is the result of a higher number of panicles per tree, and fruit per panicle. The best fruiting and performance in the treatment with *C spectabilis* is the product of the frequent visits of the stingless bees (Meliponidae), which are considered the most important pollinators in the Rambutan orchards in the Soconusco region.

D). CONCLUSION

Results of this work in the Rambutan agrosystem demonstrate in a meaningful way that the evaluated Fabaceae species change the composition of the vegetal biomass, cover the soil, improve the fertility of the soil and increase the diversity and abundance of the insect fauna. These agro ecological changes enhance rambutan performance and provide an additional income source for producers.

E).- References

MARTINEZ, V. 1984. Germplasm collection and characterization of chipilin (*Crotalaria* spp.) of the Pacific slope of the Guatemala, University of San Carlos of Guatemala, Faculty of Agronomy. 223 p.

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