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AGRICULTURAL PRODUCTION UNITS (APUs) AT AMAZON REGION OF ECUADOR, PASTAZA PROVINCE AND DIVERSIFIED FARM AS EFFICIENT PRODUCTION SYSTEM

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ABSTRACT

The paper makes an analysis of the Agricultural Production Units (APUs) in Pastaza province, the largest of Ecuador (12% of the country) and of the Amazon Region (66%), where 56% of its population live in rural areas. The 88% of APUs in Ecuador are constituted by family farming (FF), defining this term as a farmer group that employs basically family workforce for their activity. In fact, 41% of total productive land in the country is grown as "family farms", which corresponds to a total of 618,685 APUs. However, an important part of agricultural production takes place in the "Chakras (farm)" which is the traditional way of Kichwa people grown their crops, combining the goal of family feeding opportunities for income generation. The chakra's management is natural and is based on the ancient practice of Amazonian Kichwa, this is a family space for knowledge and to maintains a high biodiversity, which sometimes is affected by the increase of the commercial crop areas. At the Center of Research, Post-degree and Conservation of the Amazonian Biodiversity (CIPCA), belonging to the Universidad Estatal Amazónica a "diversified chakra" is developing in an area of 5000 m², with a high species diversity and managing agroecological principles, proposed as a productive model for the Amazonian region.

Keywords: Agricultural Production Units, Farm, Amazon.

1. Introduction

Pastaza is the largest province of Ecuador and from Amazon region, but meanwhile

one of the greatest contrasts in the whole country. It has an area of approximately 29,773 km², equivalent to 66 % of the Amazon Region and 12% of the national

territory. However, the extension of the territory is not concomitant with the richness of the zone and the income of their people.

Agricultural production in the region focuses on two forms of production: Agricultural Production Units (APUs), which can be framed in different sizes and farming activities and *chakra*, which is usually a small area and dedicated to agricultural crops. This work aimed to characterize both agricultural systems and to describe the species diversity and the agroecological principles carried out under diversified *chakra* at Center of Research, Post-degree and Conservation of the Amazonian Biodiversity (CIPCA), belonging to the Universidad Estatal Amazónica.

2. Results and Discussions

Characterization of Agricultural Production Units (APUs) in Ecuador

The 88% of agricultural production units in Ecuador are of family farming (FF), defining this term as a farmer group that employs basically family workforce for their activity, but not exclusively (Wong 2006). The 41% of total productive land in the country is grown as "family farms" with 618,685 UPAs.

Family farming, according to the temporary employment contract and type of labor for agricultural activities, can be classified as subsistence FF, transition FF and consolidated FF, being the consolidated agriculture that which employ contracted workforce permanently. By contrast, the transition FF is that does not hire permanent workers, although it may have temporary workers. The family subsistence agriculture is the activity that does not hire labor, or permanent or temporary, only use workforce from family members.

From the total FF of Ecuador, 456,108 (62%) belong to subsistence agriculture,

274,064 (37%) for transition agriculture and 9,780 (1%) to consolidated agriculture. Most of APUs are classified as "subsistence" FF. The average size of each classified APU in Ecuador (including all types of APUs) is approximately 14.66 ha, according to the Third National Agricultural Census, while APUs classified as "subsistence" reach 5.5 ha, and so called transition APUs have an average size of up to 7 ha. Finally, it is assumed as consolidated APUs those whose reaches up to 65.5 ha in average (Wong 2006).

The production system in the *chakras*

The *chakra* is a shifting agricultural system, which includes in its production space several agroforestry systems, spatial or temporal, developed in a forest clearing or enhancement, which deliberately conditioning the families to combine marketing and subsistence strategies. Their attributes define it as a priority system of sustainable land use in the Amazon Region.

This shifting cultivation way is the most widespread traditional system in the Amazon region. It is based on slash and burn areas of mature or secondary forests (1-5 ha), the implementation of crops for a short period (2-5 years), followed by long periods of rest or fallow (over 15 years). It is characterized by the exclusive use of human labor and the use of simple tools (Clarke, 1971).

In Kichwa production systems, which is the *chakra*, soil rotation is done every so often, allowing to grow for a few years and then is abandoned, and a new *chakra* is set to a new lot. The soil rotation period according to some authors is diverse, two to three years (Gonzales and Ortiz de Villalba, 1998) or three to five years (FEPP, 2002). The aim of rotation is addressed to soil fertility regaining.

Nowadays to establish a *chakra* by Kichwa, the first activity is to define an

area or a lot in the natural forest, where they perform the slash and burn and then grow mainly cassava and plantain. In the chakra, the same crop is grown twice, and then a different crop the previous one, due to that three cycles of crops are done on a lot set, then this chakra is abandoned for a few years until the soil recover its fertility, which means that a new area of natural forest is deforested, beginning a new cycle. Each year one family open from 1.5 to 2.3 ha of natural forest to perform the chakras and leave trace of 0.8 to 1 ha, what means that in a year a family opens about one additional hectare in the forest.

Kichwa produce in their chakras banana and cassava as staple food, which permanently planted at any time. The proteins source are from hunting and fishing. Part of their tradition is also the collection of non-timber forest resources as lianas, fibers, vines, seeds, leaves, bark, herbs, oils and resins, among others, which are used for food, medicine and crafts (FEPP, 2002).

Kichwa from the Amazon Region takes into account summer and winter times and the lunar cycle to the planting and harvesting of agricultural products. Usually in the summer months (less precipitation) perform clearing (slash and burn) and prepare the ground until the first rains, which are exploited for growing crops. No work or activity are performed until harvest (Gonzales and Ortiz de Villalba, 1998).

The chakra is set up in many ways, beginning with annual or seasonal crops and then planting cocoa. Other way is the planting of cocoa and after annual or temporary crops, or turn both at the same time. The size usually ranges between 0.50 and 1.25 ha.

It is expected that the cocoa cultivation will implanted for over 10 years and in intercrop annual species are rotated temporal or spatial in small areas by way

of mosaics and permanently associated with woody species such as: timber, fruit, medicinal and craft, among other species. This chakra structure is typical of the Kichwa communities, while settlers use simultaneously the whole area planted with cocoa to plant annual crops, practicing greater the intensification than in the Kichwa chakra.

Currently, the Kichwa communities and settlers have made progress in the knowledge and application of good production practices and postharvest of national fine and flavor cocoa, which is the main revenue of income generation, allowing them to produce and sell in domestic and international markets. However, production is still insufficient to meet a growing demand for this product, reason why it is required to improve the supply and distribution of appropriate technology to their condition.

Today in the chakra low diversity of agricultural and forest products is observed. Forest products are at the limit of agricultural crops or roads to the chakra. Agricultural products for home consumption (cassava, plantain, maize and rice) are grown on averaged 1.56 ha surfaces and agricultural products intended for sale (cocoa, coffee) are grown in larger areas of 3.44 ha average.

3. Materials and methods

Before the experimental research, we characterize the APUs from Ecuador and from the Amazon region. We also made a comparison from the several agricultural systems implemented in the region, focusing in the chakra, as the center of species diversification and to propose it as a productive model Ecuadorian Amazon Region.

To perform the investigation, we visited an important number of APUs and chakras at the 4 cantons of Pastaza province, where the diversity of cultivated species and conditions thereof were assessed. We

also obtained information from the Ministry of Agriculture, Aquaculture and Fisheries (MAGAP) of the province, from the Agricultural Group of Decentralized Self-Government of Pastaza (GADPPz) and publications of the National Autonomous Institute for Agricultural Research (INIAP). Finally, we participate as advisor in the Workshop of Analysis and Definition of the Productive Plan of the province for the period 2014-2025. With these activities, we obtained important information that allowed us to characterize the production systems of the

province. At the same time, we begin to "rescue" an area of 5000 m² from CIPCA to develop a diversified chakra and to design, organize and establish spatial and chronologically the crops to ensure a high species diversity. An analysis of the species diversity, production levels, income and health status of the crops was done, for which pests of different crops every seven days were evaluated, measuring six plants of each point having a total of 30 plants. All pests present in each crop were scored and counted.

4. Conclusions

Characterization of APUs in Ecuador and in Ecuadorian Amazon Region clarify the importance of the studies of several agricultural systems that can be implemented in the region. Our results highlight the chakra as a model for harmonic production in the forest and focus that the diversified chakra is an efficient alternative system for indigenous and settlers families at Ecuadorian Amazon Region.

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