

The farm systems in two indigenous territories of Putumayo (Colombia), a technical economic comparative assessment

Caracterización técnica y económica de los agrosistemas de producción en dos resguardos indígenas del Putumayo (Colombia)

Vandreé Julián Palacios Bucheli y Juan Carlos Barrientos Fuentes***

Universidad Nacional de Colombia, sede Bogotá. Facultad de Ciencias Agrarias, Departamento de Desarrollo Rural.
*Corresponding author: vandreep@gmail.com; **jcbarrientosf@unal.edu.co

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Abstract

The intended outcome of this research is to comparatively assess the farm systems in two indigenous territories of Putumayo (Colombia): San Félix (1° 10' 34.67" N and 76° 55' 04.33" W), and Tamabioy (1° 10' 24.36" N and 76° 56' 55.54" W). Both of these territories are located at an altitude of between 2.000 and 2.150 meters above sea level, and have an average temperature of 15°C. The methods we used to obtain our primary information were a census and interviews. In both the census and interviews, it was necessary for participants to answer a survey that contained open and closed questions. Through these surveys, we found that 33 out of the 55 families in the Tamabioy indigenous territory, and 54 out of the 70 families in the San Félix indigenous territory, have agrarian activity as their main economic activity for income. For the Tamabioy territory, 33 families represents 49.5% of the total population, and in San Félix, 54 families represents 49% of the total population. In both territories, there are three types of agrarian systems: traditional, market, and mix. The traditional system has the home garden as main agrarian system; the market system has the corn/bean relay and dairy as the main systems; finally, the mix is a combination between traditional and market systems. Other economic activities in the territories are farm and home services, handicrafts, and agro-businesses. The market of agrarian outputs in the Tamabioy territory is more efficient than the San Félix territory because it's located close to the head municipalities of San Francisco and Sibundoy. Thus, this research will show that the market and mix systems have easily entered the territory and consequently the home gardens have lost importance.

Key words: Camëntsá, peasant economics, traditional agriculture, tropical agroforestry homegardens

Resumen

En el estudio se caracterizaron y analizaron de manera comparativa los sistemas de producción agraria en los resguardos San Félix (1° 10' 34.67" N y 76° 55' 04.33" O) y Tamabioy (1° 10' 24.36" N y 76° 56' 55.54" O) del departamento del Putumayo, Colombia, localizados entre los 2.000 y 2.150 m.s.n.m., con una temperatura promedio de 15 °C. La información de fuente primaria preliminar se recopiló directamente en las zonas de estudio mediante la realización de censos en ambos resguardos, seguidos de entrevistas con algunas familias de las fincas-hogar. En ambos casos se utilizó un cuestionario estructurado con preguntas cerradas y abiertas. En el resguardo Tamabioy se encontraron 55 familias y en San Félix 70, de las cuales 33 (49.5 %) y 54 (49 %), respectivamente, derivan sus ingresos de la actividad agropecuaria. En ambos resguardos se

hallaron los sistemas agrarios: tradicional, comercial y de transición. El primero es el huerto casero; el segundo lo constituyen el cultivo de maíz en rotación con frijol, la ganadería y la producción de pasturas; y el tercero la combinación de sistema tradicional más comercial. Otras actividades económicas presentes son los servicios, la artesanía y la agroindustria. La comercialización de los productos agrarios en Tamabioy es más eficiente que en San Félix, debido a la cercanía con las cabeceras municipales, en consecuencia los sistemas comerciales y de transición han entrado con mayor facilidad a la dinámica económica y, por ende, los huertos caseros han perdido importancia.

Palabras clave: Agricultura tradicional, Camëntsá, economía campesina, huerto casero.

Introduction

The Tamabioy and San Felix reservations belong to the area of the Lower Sibundoy reservation in Putumayo, Colombia, where indigenous families members of the Camëntsá community reside. According to the population census of Camëntsá Cabildo in 2010, there are 330 inhabitants in the Tamabioy reservation and 420 in the San Felix reservation (Camëntsá Inga Indigenous Cabildo, 2010). Indigenous cultural expressions of the Camëntsá community are broad and diverse, some of which are the language, dress, music, crafts, agriculture in home gardening, medicine, philosophy, among others. The reservations are collective and inalienable property; In addition, resident families are exempt from property taxes (Cabildo Indígena Camëntsá, 1994).

Agriculture is the main economic activity in both reservations in which the home garden predominates, which is known in the Camëntsá tongue as Jajañ, livestock production, bean, fruits, grasses and maize in rotation with beans (Palacios, 2012). Other present economic activities are services, crafts and industry. Within the services sector stands out mainly traditional medicine, with the use of plants, and the provision of labor through wage. Woodcarving, fabrics in yarn and beads are the crafts of biggest production in this sector. On the industrial side are highlighted as productive activities: dairy processing, corn and sugarcane; the latter two have a minor tech process, whose products are only locally sold (Palacios, 2012).

In the study reservations the subsistence system known as 'peasant' or 'family' is present, being those who take greater advantage of their production, the aim being to meet basic needs (Márquez, 2000) such as food and clothing; also it is present in their reservations the home garden, with similar characteristics to the former, where its primary function is, coinciding with the definition of Ospina (2006) and CATIE (1994), the diversified production of plants, destined in a greater percentage to consumption and marketing of the production surplus.

Until recently, reservations developed agriculture in accordance with their customs, characterized by what is known as home gardening (Jajañ), which fifty years ago comprised an approximate area of 5 ha, enough space to manage a migratory agriculture such as the system 'hack and rot' from the tribes of Chocó, and 'hack and burn' from the Amazon (Palacios, 2012). These systems allow rest cycles with sufficient time for ground recovery after maize (*Zea mays*) as the main crop and others like tumaqueño (*Xanthosoma sagittifolium*), jomush (*Colocasia xanthosoma*). The system, adapted to Andean conditions of the Sibundoy Valley, was continued until reaching one cycle of 8-10 years (Palacios, 2012) and allowed self-regeneration and self-subsidization of the necessary inputs to start a new production cycle, as described Krishnamurthy (1999) when referring to the recycling of nutrients as the ecological process in which migratory agriculture is based.

The change from the previous system started with population growth and

succession of land to heirs, which has meant a reduction of agro-productive space, and as manifested by indigenous people, "the migrant Jajañ may not work in smallholding conditions" (Palacios, 2012). Krishnamurthy (1999) argues that the growth of both the local population and migrants, without any traditional experience, reduce the crop cycle and therefore the fallow period with the consequent non-sustainable production. Therefore, in the reservations, the expansion of colonization of land by non-indigenous families present in the Sibundoy valley has caused an influential culture shock, because the farmer is not used to plant in home gardens, on the contrary, prefers monoculture and has eating habits based on rice and other products, which are gradually integrating to the Camëntsá diet (Palacios, 2012). As expressed Preciado (2003), the perception of the settler, its history and interests are diametrically opposed to those of the indigenous people.

In this process of cultural transformation of the indigenous people and the Jajañ system, socioeconomic factors come to play a decisive role. The demand for new food products; new ways of dressing; technological development, especially communications; and demand for basic and professional education, determine a context where the home garden alone is no longer able to meet the needs of the Camëntsá family and begin then to emerge changes as the introduction and spread of animal husbandry, beans and fruit production. However, it is unknown what and how is the participation and tendency of the new systems of agricultural production in each of the reserves. Commercial systems obey market trends but cannot be supported without proof that are the most recommended for reservations, taking into account that these can be detrimental to the Camentsá culture and the home garden. The benefits of home gardening, as it is known today are: to provide a wide variety of food for the family, create jobs, maintain high biodiversity and help to preserve the indigenous language.

The facts described a priori allow to visualize the need for a comparative technical and economic analysis of agricultural production systems in the indigenous reservations Tamabioy and San Felix in Putumayo (Colombia). In this sense, it is essential to determine the economic activities of the reservations, with emphasis on agriculture; identify and classify production systems; analyze production systems based on the quantity, diversity and quality of its production; and make an approach on the trends of production systems in the study areas.

Materials and methods

Study zone

The low Sibundoy reservation covers an area of 3,500 hectares and is located between 2,000 and 2,200 m.a.s.l. with a temperature between 10.3 °C and 21.7 °C, precipitation between 1,443 and 1,496 mm and annual relative humidity of 78% and 83% (IGAC, 1990). According to the classification of Holdridge (1967) the region belongs to the life zone very humid lower montane forest (VH-lmf). The Tamabioy communities located between 1° 10' 24.36" N and 76° 56' 55.54" W, and San Felix, between 1° 10' 34.67" N and 76° 55' 04.33" O belong to this great reserve and are specifically located in the Sibundoy municipality; both communities are adjacent and border south by the Cabrera village and Espinayaco creek, north by the Putumayo River, east by the municipal head of San Francisco and west by the reservation Las Cochas (IGAC, 2001).

Collection and analysis of information

The methodological design used in the analysis is non-experimental, descriptive and transversal. Primary sources were turned to with use of independent variables, to this end a survey among owners of productive units was performed and visits to farm-household were conducted in order to obtain reports on the systems through questionnaires previously developed. The

comparative analysis unit was the farm-household of all Camëntsá indigenous families in both reservations, and the agricultural systems found more frequently.

Due to the low population in the study area (125 families), to determine the size of the farm-household, the economic activities and identify the farming systems, a census was conducted through a structured questionnaire with open and closed questions. In field direct observation was also resorted to, to corroborate information of the existing agricultural systems in each farm-household. For the detailed description of the identified production systems five interviews were made. The formula of Zuñiga *et al.* (2004) was used in the technical analysis in order to specify the total number of surveys to conduct. The results indicated the need for 35 interviews, which were distributed between the Tamabioy reservation (15) and

the San Felix reservation (20). The collected data were analyzed using the Excel program.

Results and discussion

Economic activities

In both communities, agriculture is the main source of economic support in the Camëntsá family (Figures 1 and 2), however, as a source of income it represents less than 50%. Other activities have emerged and are gaining ground in the indigenous economy, a fact that Forero (2001) explains with the advent of the new rurality. The second activity in importance are services where the wage is the most relevant activity. In this regard, Forero (2001) states that the proportion of hired labor that the agricultural activity demands is high, even when it comes from rural economy. Crafts are the third predominant

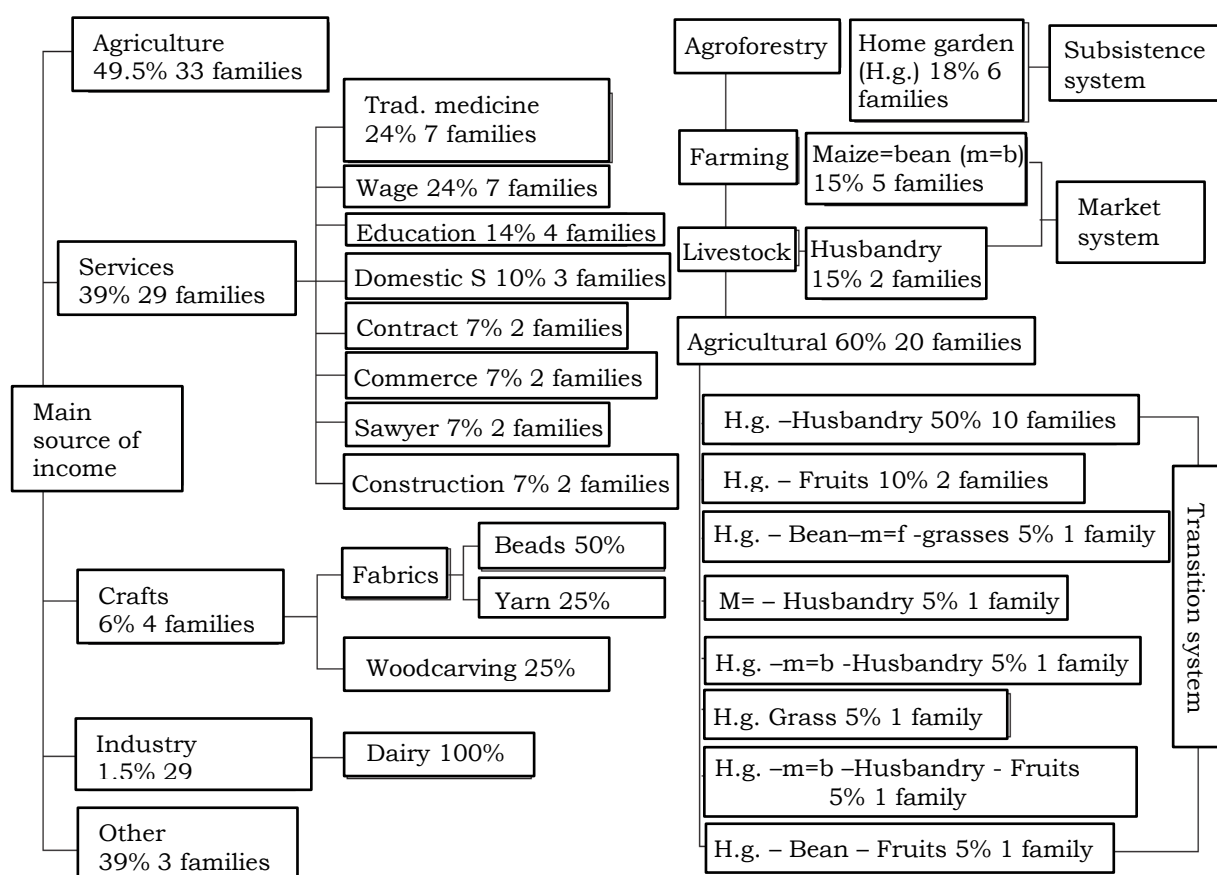


Figure 1. Economic and agricultural activities in Tamabioy reserve, Sibundoy valley, Colombia.

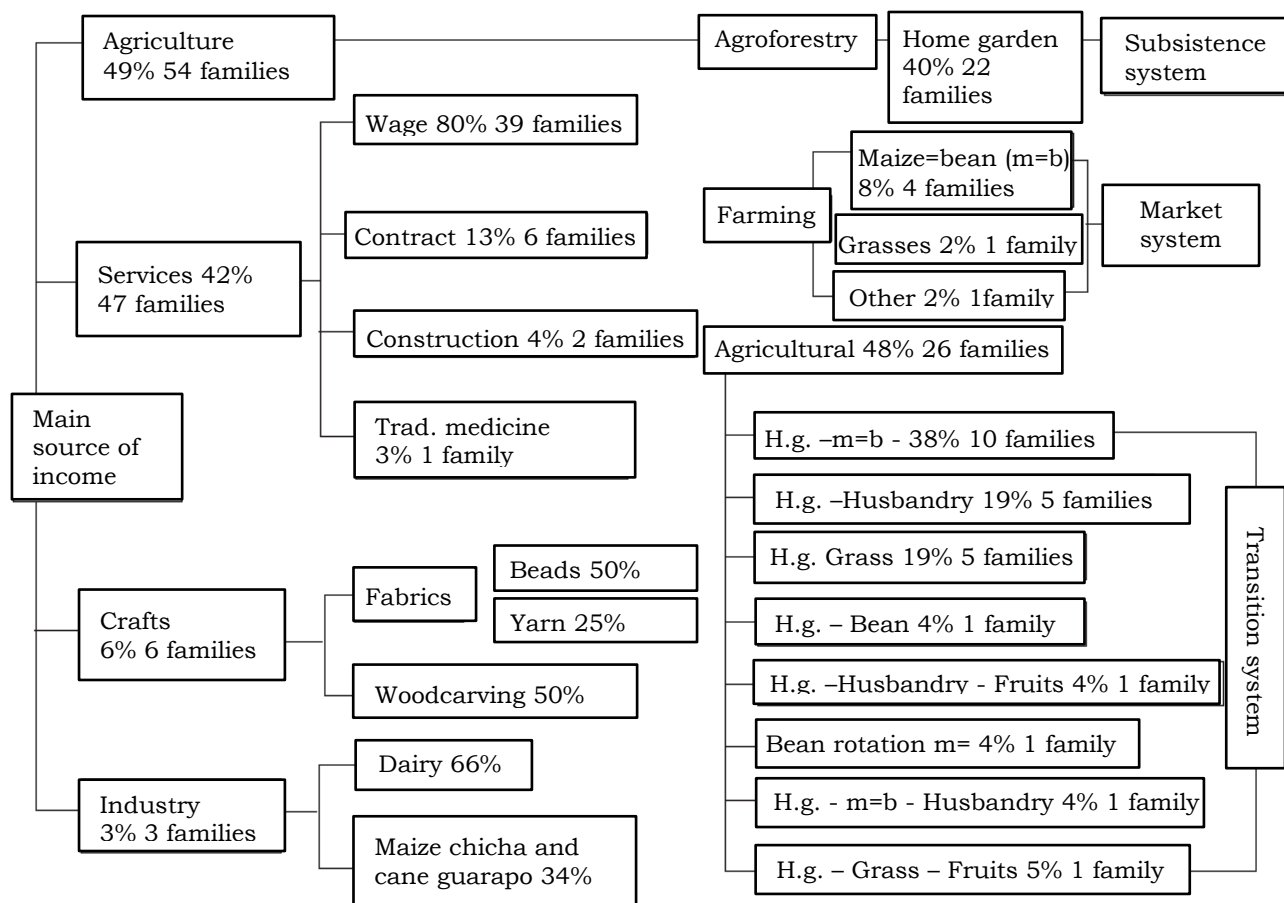


Figure 2. Economic and agricultural activities in San Félix reserve, Sibundoy valley, Colombia.

economic activity and prevail as part of the Camēntsá tradition on one hand fabrics both beads and thread and secondly, woodcarving.

Importance of the agricultural activity

The current context of the Camēntsá community falls within a globalized economy. The demand for different goods and services embedded in a capitalist model implies that agriculture moves into the background or is necessarily accompanied by other economic activities to meet the pressing needs of the current indigenous family. Mora (2008) emphasizes the different nuances that gain peasant production systems under the influence of a society pressured by information and market dynamics.

The modernization of the indigenous people has progressed along with a

technological change, in order to increase agricultural productivity and market integration (Tomich *et al.*, 1995), thus some existing services such as traditional medicine and wages have turned towards finding additional monetary income. This dynamic is a response to the need of mobilizing monetary income from the outside to the indigenous farm-household (Ellis, 2000).

Identification and classification of production systems

Existing farming systems, present in the study reservations are the result of the indigenous knowledge of the local environment and of the systems, given that, according to Farrington and Martin (1988) and Mora (2008), different strategies developed in the farm-household are

focused to ensure income under the indigenous knowledge, beliefs and customs.

The proximity of the Tamabioy reservation with the municipalities of San Francisco and Sibundoy and with the main road that connects them has facilitated the marketing of agricultural products more efficiently than in the San Felix reservation; consequently, the introduction of other agricultural systems, such as commercial production that has been done faster, impact in the reduction of home gardens.

The traditional system aims primarily to own consumption whereas the market is directed to marketing of products, and the transition is more suited to the strategies of agricultural multifunctionality by the presence of more than one production system (Table 1).

Technical and economic aspects of farming systems identified

The use of agrochemicals to fertilize and spray is widespread in all systems (Table 1), except those home gardens where the production of commercial crops is not contemplated (clean beans, m = f) because these systems do not tend to be marketed, so the inputs used are produced in the farm-household or simply not used.

Both the planting and harvest of different crops coincide with the rainy season and drought, respectively, which is why no irrigation is used. The management of woody perennials involves thinning pruning in order to promote the entry of light to crops and cattle, in the case of fruits, training pruning are made and consequently shoot stimulating pruning for production.

Table 1. General characteristics of the agrosystems in Tamabioy and San Felix communities, Sibundoy Valley, Colombia.

Variable	System				
	Traditional	Market		Transition	
Agricultural systems	Home garden	Maize = bean	husbandry	H.g. + M=b*	H.g. + Livestock
Production management	Consumption	Market	Market	Consumption and marketing	Consumption and marketing
Soil management	Manual machining	Manual machining	Manual machining	Manual machining	Manual machining
Use of chemical supplies	Generalized	Generalized	Generalized	Generalized	Generalized
Inputs generated within the system	Seeds, organic fertilizer, food for animal husbandry	Seeds, organic fertilizer, food for animal husbandry	Seeds, organic fertilizer, food for animal husbandry	Seeds, organic fertilizer, food for animal husbandry	Seeds, organic fertilizer, food for animal husbandry
Average area in Hectares	0,7 in Tamabioy 0,6 in San Félix	0,33 Tamabioy 0,68 San Félix	5 Tamabioy	0,85 San Félix	2 Tamabioy 2,85 San Félix
Plant species	4 grains, 4 tubers, 6 vegetables, 1 spice, 1 grass, 12 fruits, 5 pastures, 18 medicinal, 7 aromatic, 2 spices, 12 arboreal, 3 bushes	3 grains, 4 tubers, 5 vegetables, 1 spice, 1 grass, 11 fruits, 4 medicinal, 2 aromatic, 10 arboreal, 1 bushes	1 grain, 1 medicinal, 7 arboreal	3 grains, 4 tubers, 3 vegetables, 1 grass, 6 fruits, 8 medicinal, 4 aromatic, 1 spice, 12 arboreal, 1 bush	3 grains, 5 tubers, 4 vegetables, 1 grass, 10 fruits, 17 medicinal, 6 aromatic, 1 spice, 14 arboreal, 2 bushes
Animal species	Cuy, chicken, pigs, ducks, rabbits	Cuy, chicken	Beef cattle	Cuy, chicken, pigs, ducks	Cuy, chicken, pigs, ducks, rabbits

Table 2. Producción anual y porcentajes de autoconsumo y venta en los huertos caseros de los resguardos Tamabioy y San Félix, valle de Sibundoy, Colombia.

Production	Tamabioy			San Félix		
	Total Prod. (ha)	consumption (%)	Sales (%)	Total Prod. (ha)	consumption (%)	Sales (%)
Home garden (area)		0.7 ha ^a			0.6 ha ^a	
Maize: (1) seco	18	50	50	18	78	22
50 K (2) choclo package	0	0	0	4	62.5	37.5
Bean: (3) 1era	14	7	93	7	7	93
50 K (4) 3era package	1	100	0	1	100	0
(5) Tumaqueño: 50 K package	8	87.5	12.5	6	67	33
(6) Barbacoano: 50 K package	8	75	25	3	67	33
(7) Cider: 50 K package	19	53	47	12	67	33
(8) Tamarillo: dozen	514	0	100	30	47	53
(9) Potato: 50 K package	18	17	83	0	0	0
(10) Tranca bean: 50 K package	3	83	17	4	78	22
(11) forage(s) cut: guango (11,5 kg)	22	59	41	17	100	0
(12) Cane: hundred (100 canes)	6	58	42	4	45	55
(13) Strawberry: kg	2	100	0	18	50	50
(14) Juco: hundred (100 stalks)	0	0	0	2	94	6
(15) eggs: unit	1138	72	28	1303	47	53
(16) Cuy: unit	187	48	52	158	44	56
(17) Chicken: unit	64	47	53	49	61	39
(18) Pigs: unit	3	10	90	1	0	100
(19) Tree spp.: tree	8.5	93	7	2	33	67
(20) Compost: 50 K package	32	100	0	12	100	0
(21) Yagé: 11,5 Kg rattan	0	0	0	0.5	0	100
(22) Árnica: fresca 11,5 Kg	0	0	0	0.5	0	100
(23) Chontaduro: kg	0	0	0	0.3	0	100
(24) Pumpkin: package	0	0	0	0.3	0	100
Average		59	41		50	50

* Average surface area of the system.

Home garden as subsistence system

The high percentage of consumption of home garden production (Table 2) shows their importance in generating food security for indigenous families.

In home gardens where bean production is contemplated, the technology

used is aimed at obtaining premium beans, due to its high price in the market and to a lesser extent second grade beans; the third grade are incorporated into consumption. Overall, crops for market demand higher supplies for high quality yields. In the case of provision crops, the technology used does not require higher inputs and the market

for these products is local with low prices; however, the quality is excellent, as is the case of corn whose little surplus is sold at a stable price and in a safe market.

The agricultural system of home gardening in the study reservations reflects the characteristics of the system: they are used to meet family or community basic needs, with occasional sale of surplus production (Nair, 1993) and production is maintained throughout the year (Geilfus 1989, Krishnamurthy, 1999). The high species diversity (Nair, 1993) includes fruits, tubers, vegetables, grains, fibers, timber/fuel, flowers, forage, medicinal and other uses (Ospina, 2006). A feature the system is its reduced size with high output per unit area (Nair, 1993).

Home garden and commercial system as a system of transition

Among these systems are the following.

Home garden and bean/corn relay ($m = b$). This type of system presents most often in San Felix, so it was analyzed only in this reservation. Both components are distributed in different and distant areas in the reservation: the home garden is the residential area of the family and the $m = b$ is a distant area from the home garden, either owned (40%) or leased (60%).

Home gardens of this system exclude the production of commercial beans, given that there is an area of the farm-household to make this productive practice aimed purely to market.

Home gardening and livestock. This system has the greatest diversity of production; because they are two different components (agroforestry and livestock), the total product of the farm-household increases (29 in total). In this system, unlike the previous one, both components are distributed adjacently and generally livestock is distributed around the home garden. Livestock products that are added to the list are milk and calves.

Market system. The marketing of the products is related to the systems and agricultural production objectives.

Corn bean rotation ($m = b$). Among the systems analyzed this one occupies the least surface area (Table 1) as it is a remnant system of the home garden, both in size and diversity. The production cycle of this system begins with the planting of corn between December and February; ridging of the crop is done 45 days after planting with three weedings in the cycle. The harvests of sweet, maturing and dry corn are carried out after 6 months and in this work the terminal part of cornstalks is eliminated, which is deposited as a green manure, to enter the beans cycle that takes advantage if the stalk for support. At this point the preparation of the soil is done for planting beans, between June and August, mainly from the variety Cargamanto. When the seeds germinate and the seedlings have their two first true leaves, a chemical to control *Fusarium oxysporum* is applied once, practice that is usually done once in the crop cycle. To control the 'bean tentiform leaf miner' a synthesis insecticide is applied. Throughout the cycle three weedings, two foliar applications of fertilizer at 30 and 45 days after planting and two pesticide sprayings are made. Drying the beans is done in the plant and takes 15 days when the weather is dry. The harvest of beans occurs after 6 months, when the plant is yellowing (Table 3).

Table 3. Average annual production of beans in maize-bean system ($m = b$) in San Felix and Tamabioy reservations, Sibundoy Valley, Colombia.

Classification (grain quality)	Tamabioy	San Félix
	T/ha per year	
First	2.1	1.3
Second	0.0	0.3
Third	0.1	0.1

Livestock. Milk production is the main purpose of cattle ranching in the valley of Sibundoy, which explains, in some way, why this system occupies the largest surface area in the reserves (Table 1). The system of livestock present in the Tamabioy reserve generates fewer products per hectare per year, since it is limited to the production of milk, to a greater extent, and rearing calves; these products are intended

for sale in a high percentage (99.5%), which demonstrates the strong market trend of this system. At the time of the study, the selling price per liter of milk was 580 COP, a value that had been stable over the past seven years. Production was variable, according to the management system of animals; in good management conditions, the daily milk production reached 15 l/cow.

Trends in production systems

A progressive transformation of the Jajañ is perceived towards market and transition systems. Commercial crops such as blackberry (*Rubus mollis*), tamarillo (*Cyphomandra betacea*), lulo (*Solanum quitoense*), granadilla (*Passiflora ligularis*), among others, are competing with the cultivation of beans (*Phaseolus vulgaris*). This trend is explained by the new prevailing needs in the current context of Camëntsá community, with a greater demand for money to meet them.

It is relevant to note that both access and the existence of a stable and secure market for certain agricultural products influence the transformation of the home garden because it creates an opportunity to monetary income for indigenous families. Other influential factors are the supply of credit, which allows the establishment of commercial crops; supply of other non-Jajañ foods that have gradually changed Camëntsá diet and ease of access to conventional medicine.

In 2010, Colombia ranked fourth in milk production in Latin America with 6,500 million liters per year (Proexport, 2011). This market position affects indigenous families who have this system in their farm-household. The retail price of milk has not changed in years, but still generates some economic stability.

With the increasing abandonment of the field by the new generations (Forero, 2001), either because of armed conflict or seeking new opportunities, including basic and professional education, it is clear that agriculture loses importance in young population and new economic activities

emerge, as services, crafts and industry. This phenomenon is also due to insufficient income generation by the agricultural activity alone.

Given the agro-ecological potential of agroforestry systems for improving the quality and fertility of soils, water conservation, pest and disease control, carbon sequestration, biodiversity conservation, pollination (Altieri and Nicholls, 2011) the conversion of the home garden to certified organic agriculture is one of the roads ahead.

Conclusions

- Less than 50% of the families of the indigenous reservations San Felix and Tamabioy generate their income from farming, the rest of the population does, among others, from the supply of services, crafts and agriculture. Contact with the urban population, trade and industry is manifested in a gradual shift towards the market-oriented production and supply. The financial resources are becoming increasingly important as the means by which new needs are met such as education, transportation, medical care and conventional clothing.
- Multifunctionality is one of the strategies that indigenous families use to meet the needs of their current economic scenario, in some cases three agricultural systems within the farm-household are presented, demonstrating the need for diversification of production. This fact is confirmed by the large number of transition systems, as this results of combining home garden and mono-production; the first provides food, fuel and some medicines and the second financial resources. The latter system, while not allowing a considerable accumulation of capital, it does provide an acceptable amount, as well as food security for indigenous families.

- Delving in future research on the precise moment when agrosystems alien to the home-garden were introduced in the valley of Sibundoy is important to understand the historical process of social and economic change that the Camëntsá community has experienced, as well as the influence that the intrusion of colonization has exercised on such changes.

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