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Complex realities and transformations in work in a diversity of farming models

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Family farming work organization of agro-extractivist communities in the region of Mambaí, Goiás State, Brazil.

Stéphane Guéneau^a, Janaína Deane de Abreu Sá Diniz^b, Sabina Dessartre Mendonça^c, Igor Amaury Aveline^d, Eric Sabourin^e

^aCIRAD, UMR Moisa / University of Brasília, CDS (Center for Sustainable Development), Brasília, Brazil. - stephane.gueneau@cirad.fr ; ^bUniversity of Brasília, FUP, Planaltina, Brazil, janadiniz@unb.br ; ^cAgroParisTech, Nancy, France, dmsabina@hotmail.com ; ^dUniversity of Brasília, CDS, Brasília, Brazil, igoraveline@gmail.com ; ^eCIRAD, UMR ArtDev / University of Brasília, CDS, Brasília, Brazil, eric.sabourin@cirad.fr

Abstract: Located in the center of Brazil, the Cerrado biome is the most diverse savanna in the world and covers about a quarter of the country area. However, since the 1960s, an ongoing agricultural expansion has led to profound transformations of the natural landscape of this biome, notably through land conversion. The remaining areas of native vegetation is a living and working place for many traditional communities and more recent rural settlements, who undertake low-impact agricultural and extractivist activities. Extractivism in the Cerrado constitutes harvesting of many Non-Timber Forest Products, especially Pequi fruits (*Caryocar brasiliense*). This proposal aims to study the agro-extractivism systems in Mambaí district, Goiás State, central Brazil, by describing their work organization, by analysing participation in the market, and by discussing the challenges they face. Data was gathered in socio-anthropological fieldwork through semi-structured interviews with over 40 agro-extractivists in rural settlements, visits to farms and observation of the town's weekly street market, followed by interviews with the main actors along the value chain. Results show that farmers have different strategies of production and combine different activities within their household. Regarding Pequi, there are many products obtained from the fruit, the commercial ones (mainly Pulp Preserves) being different from those for household consumption. Harvesting and processing the fruits is a family activity, almost always led by the women. Different products are sold through different commercial channels, including: direct sales to consumers (on orders or at the street market) or directly to local and distant industries, but mostly through intermediaries. The complexity of the relationship between the latter and the agro-extractivists is discussed. Although the income generated by these sales is important and complementary, access to markets appears as a main issue. Therefore, projects and public policy should address basic market access needs, by focusing on marketing, legislation requirements, transportation and especially entrepreneurial management.

Keywords: agro-extractivism, NTFP, smallholder farmers, Pequi, Cerrado

Introduction

Located in the center of Brazil, the Cerrado biome is the most diverse savanna in the world (Klink and Machado, 2005) and covers about a quarter of the country area. However, since the 1960s, an ongoing agricultural expansion has led to profound transformations of the natural landscape of this biome (Eloy et al., 2015). So far, about half of the original 204 million hectares of the Cerrado native vegetation have been converted to monoculture, pastures and wood plantations (Ministério do Meio Ambiente, 2015).

The remaining areas of native vegetation is a living place and an agricultural workplace for many indigenous communities and maroon people (*quilombolas*), as well as by more recent dwellers, such as those from rural settlements (*assentamentos*) and several other traditional populations: *geraizeiros* (traditional inhabitants from the Sertão), *vazanteiros* (traditional farmers that cultivate during the ebbs) and *vaqueiros*, (traditional cowboys) (Melo, 2013).

Cerrado's biodiversity is directly consumed by human beings as food through the traditional use of over 80 plant species, as fruits, seeds and hearts of palm, according to Assad & Assad (1999 apud Abramovay, 1999). The same authors also indicate the existence of more than 100 plants bearing medicinal properties. Ribeiro (2008) goes further in his study, claiming 65 species with edible fruits, 29 plants from which to extract oils and 170 used for medicinal purposes, not to mention others employed for crafts, dying, cork, etc. Several studies indicate, thus, the diversity also found in Cerrado's non-timber forest products.

Most of this potential is collectively known by the traditional communities who inhabit the landscape. These populations have learned from a historical interaction with the natural resources in the Cerrado. Until today, this knowledge leads them to use these resources for food consumption, traditional handicraft and medicinal purposes.

The traditional use of biodiversity in the Cerrado is generally conducted by means of "extractivism", a concept originally applied to certain activities developed in the Amazon region. The term extractivism can be defined as activities of extraction of natural products directly from their natural area, in order to use or sell goods for human needs (Drummond, 2013). However, in the Cerrado, rural practices show some specificities in relation to extractive activities that exist in the Amazon region. Indeed, in Cerrado, traditional food production systems are generally characterized by pluriactivity, combining family farming, small-sized cattle farms and extractivism of a wide variety of native species, in a production system called "agroextractivism" (Nogueira and Fleischer, 2013). The Cerrado pluriactivity systems can also include the agroextractivism activities and other employments, not necessarily related to rural activities, although these may be the most frequent (Bispo & Diniz 2014). This phenomena has been observed worldwide within rural populations as a strategy to increase and diversify income entries, as discussed by van der Ploeg (2008) and Schneider (2009).

Today, the traditional agroextractivism systems are under threat in the Cerrado, considering the rapid expansion of agro-industrial activities in the Brazilian center-west region. Yet, several scholars consider that these small scale and highly diversified agricultural systems create small perturbations in the ecosystem dynamics (Sawyer, 2011; Mazzeto Silva, 2009; Ribeiro et al., 2008). The relatively small cultivated areas and woody pasturelands are embedded in a more natural landscape, integrating different activities and uses of local biodiversity. Thus, promoting the sustainable harvesting and selling of Cerrado's native plants by family farming is a major opportunity for the conservation of this biome (Ribeiro et al., 2008; Abramovay 1999). This strategy of sustainable use is indeed much more relevant than less than 9% of the Cerrado biome which is protected under a conservation unit status.

In this context, this proposal aims to study the agroextractivism systems in a determined area of the Cerrado biome. These systems are indeed poorly documented, both in the way that the different activities combine, and as regarding their place in the capitalist economy. Based on a value-chain analysis (Gereffi et al. 2005, Temple, Lançon et al. 2011), this paper aims first to describe the family farming work organization of agro-extractivist communities of the Mambai district, Goiás State, central Brazil; then to analyse the way they participate in the market, especially regarding products prepared with Pequi (*Caryocar brasiliense*), one of the most important plant species of the Cerrado; and finally to discuss the challenges they have to face in order to develop their extractive activity, with a focus on work and sales.

Theoretical framework

Among the multitude of recent work on food systems, a body of research has developed, in recent years, a series of approaches to study the interrelated systems of stakeholders fulfilling complementary functions for the production of a certain product or a homogeneous group of goods. If there is a relative proximity between these approaches, each one can be distinguished by a specific angle taken to analyse these interdependencies (Temple, Lançon et al. 2011).

Amid these, the French *filière* approach's main objective is to map out specific product flows and to identify agents and activities within a chain that links initial producers and final consumers. The *filière* approach is mainly used to analyse outputs and inputs, prices and added-values, and their share among actors or production sites. Although it is generally seen as a “neutral, practical tool of analysis for use in ‘down-to-earth’ applied research”, it includes several different schools of thought, borrowing from different theories and methodologies (institutional economics, management science, etc.) (Raikes et al., 2000).

One interesting reference for our case study is the anthropological tradition within *filière* that focuses on markets and power, particularly in market construction for small-scale products and in the condition for the micro-chains to be successful (Raikes et al., 2000). It pays special attention to the type of relation between the agents (solidarity, domination, etc.) beyond purely market transactions.

This approach is similar to the “global commodity chain” (GCC) approach which was born in the 1990s, now called “global value chain” (GVC) approach. The main innovation of GVC approaches in relation to the “neutral” vision of *filière* research - is the introduction of the study of governance mechanisms inside the value chains (Raikes et al., 2000). The seminal work of Gereffi (1994) suggests an explanatory framework of value chains governance introducing the concepts of *producer-driven* and *buyer-driven* value chain. Based on this work, the GVC approach tries to answer the following questions (Gereffi et al., 2005): who drives the chain? And how are they structured by dominant agents or other agents arrangements? Thus, GVC approaches also deal with power relationships among economical agents in the production and marketing process of one product and its subproducts (Raikes et al., 2000).

Methodology

Based on an analytical framework of economic sociology, socio-anthropological fieldworks were first conducted in the Mambáí area through semi-structured interviews with over 40 agro-extractivists in rural settlements, visit to some farms, observation of the town's weekly street market as well as photographic records. This first step was followed by interviews with the main actors along the value chain (consumers, intermediaries, cooperatives, industries and local public stakeholders). This fieldwork was completed by a review of gray and scientific literature on agro-extractive practices.

The area of study, the municipality of Mambáí, is located inside the Environmental Protection Area (APA) Nascentes do Rio Vermelho, in the northeastern state of Goiás, Brazil. It host six rural settlements from the agrarian reform policy (*assentamentos*), housing 313 families.

Mapa de Localização da APA das Nascentes do Rio Vermelho

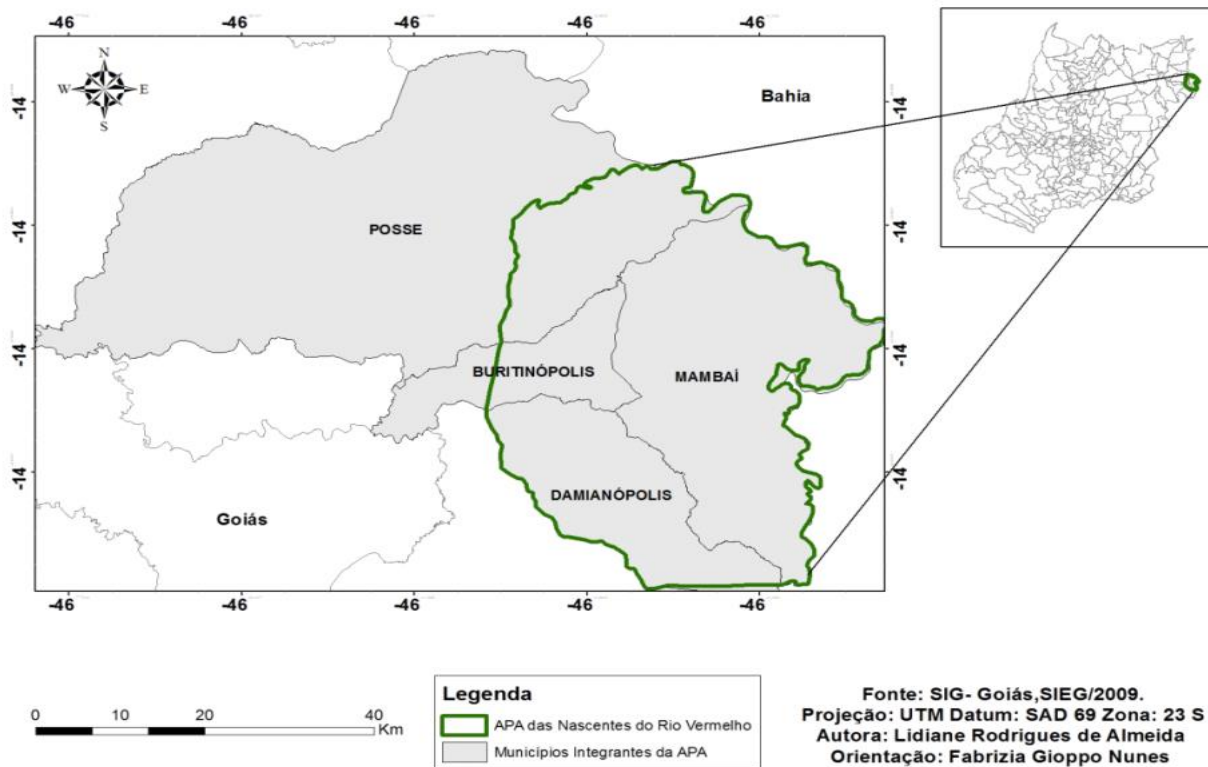


Figure 1. Location of the study area

Results

The results are organized in two sections. The first one describes the work organization in rural settlements. This part addresses the diversity of products, the type of organization of harvesting and production, the processing methods, the working time undertaken at each stage, and finally, the organization of work within the family structure. The second section deals with value chain analysis. It aims at describing the interaction between the agro-extractivists and the other stakeholders involved in the Pequi supply chain. It will address the supply chain structure mainly regarding the sale, the market transactions (direct, through resellers, etc) and the prices.

The work organization in rural settlements

Despite the context of poverty, lack of government support and the trend towards precariousness of life in these settlements, several family farmers have structured different strategies of production. Interviewed smallholder family farmers displayed great variety in their crop production, including products such as cassava, corn, rice, beans, watermelon, pumpkin, bur cucumber, okra and sweet potato, together with free-range chicken raising. In addition to farming and other income generating activities (e.g. temporary jobs in nearby bigger farms, working in local restaurants, at school, hired as housekeepers, etc), families may also engage in extractive activities of the Cerrado products. Some of the products observed in the weekly street market illustrate the diversity obtained from the natural vegetation: Pequi pulp (*Caryocar brasiliense*), Pequi nuts, Araticum fruits (*Annona coriacea*), Buriti pulp and ice cream (*Mauritia flexuosa*), and Coquinho-azedo fruits (*Butia capitata*).

Among all, the Pequi is by far the most exploited in this region, due to its abundance, popularity and culinary features specific to this region (i.e. thicker pulp). Freshly harvested, this green fruit is about the size of an

orange. It includes a 1-4 segments of internal yellow pulpy mesocarp of 3.5 cm of diameter on average (lumps). The pulp, about 3mm thick, is rich in oil, vitamins and proteins. Internally, it also contains an edible white seed (Picture 1). From the interviews with the agro-extractivists, it was possible to list many different products obtained from the fruit, which are discussed below.

The whole inner part of the fruit (lump) is frequently used within the households. In the rural areas, the entire fresh lump is the preferred form of consumption, particularly in the traditional recipe "Rice with Pequi" (even if only the outer pulp is edible). The lump can be also found as preserves in brine or frozen.

From the pulp, families prepare their flagship commercial product: Pulp Preserves in brine, the thin slices bottled in upcycled soda bottles (Picture 1). The choice for this particular method of packaging is interesting and deserves some attention. It is clear that another container, such as barrels for example, would reduce time needed in the bottling and would be easier to store and transport. Nevertheless, packaging the pulp in the soda bottles is, in fact, the simplest way for the productive families to lower costs, given the ease to get these bottles, a rather abundant material in these areas (however, some extractivists indicated that, during the peak in Pequi production, they may need to buy the soda bottles, which reach up to BRL 1.5 per unit). Moreover, this form of packaging adds some flexibility in the sale, since it allows to sell a quantity corresponding exactly to the demand. In addition, in a transparent bottle, it is easier for the buyer to control the quality, checking the colour and the quantity of pulp within. Ultimately, it is a form of commoditization that facilitates market transactions.

From the same part of the Pequi fruit, the farmers also extract oil, cut shavings, make sauces, flour, dried pulp, sweets and even soap. Lastly, the inner nuts are also extracted by some. More demanding products, such as oils and nuts, are much less frequently found, being extracted in small quantities for own consumption and on order.

Going to harvest the fruits in the Cerrado lands is mainly a family activity (also observed by Bispo & Diniz, 2014). In most of the households, the work is carried out by at least two members of the family, e.g. the husband, the wife and their children. The wife is almost always present and, quite frequently, goes unaccompanied. It is rare to find men that would go on their own. Through these results, it is possible to observe that picking the fruits is also a female-led enterprise.

Harvesting Pequi in this region is conducted mostly between December and February, with early harvests since October lasting up until the beginning of March. The results match phenology described by Oliveira and Scariot (2010) for northern Minas Gerais and Distrito Federal regions. Extractivists go various days to collect the fruits during the harvest period, usually going on consecutive days (up to over 100 days, when aiming for a bigger commercial production). It is chiefly an early morning activity, most families leaving the house around 6-7AM and working for up to 4 hours. By choosing this time, extractivists avoid being under the strong sun at the hottest hours of the day and, by taking the already cut-up, very perishable Pequi lumps home, they are able to process them the same day. However, a few families do spend the whole day out collecting the fruits.



Picture 1: Pequi products: pulp preserves, oil and nuts (photo credit: Igor Aveline)

In some cases, the pequi is collected in remote locations, generating high transport time. When it occurs on private property, the gathering of pequi needs the owner's authorization. Several agro-extractivists collect the fruits on their own plots because of the prohibitive costs of access required by some private owners. Others gather the fruits in private farmland owned by an acquaintance without any charge.

Preparing the Pequi Preserves is always done at the extractivists' home, lasting from 3 to 11 hours per day. Quite a few families admitted working until late at night on some days (till 01-03AM), in order to process all fruits. According to the extractivists, the length of the processing times varies according to the number of people involved and the amount of fruits collected that day. Families also mentioned that they may carry out other activities during this time. As to who participates, preparing the preserves seems to always involve women, usually including also the husband and sometimes also their children or grandchildren. It was observed that women carry their work on their own rather frequently as well. Extended family, neighbours and in-laws can also be present, although only occasionally. Interestingly, some extractivists described a very enthusiastic atmosphere that takes hold of the community during the Pequi harvest. A great number of households work afternoons and nights, peeling and bottling Pequis in their verandas for many days, the strong smell of the fruit very present around the houses.

Despite the collective nature of this activity, the agro-extractivists of the Mambaí area have little interest in the forms of institutionalized mutual organization, such as producer associations or cooperatives for example. The family remains as the production unit.

Processing methods to prepare the pulp preserves vary a little from household to household, but always involve: cutting the pulp into thin slices and washing it (although some families may invert the order or wash before and after), sometimes washing two or more times, then inserting the pulp into a previously cleaned bottle and finally filling it with brine (1 liter of water with usually 2 tablespoons of salt). Not all extractivists use hot water for washing the pulp. Some families reported leaving the fruits out to dry before cutting, which would make them less slippery and the cutting, easier. Thus, the processing and packaging processes are very rudimentary and the families run the risk of sanitary controls by the public health control services.

Curiously, very contrasting opinions were found related to the cutting process, with some of extractivists claiming it to be very difficult and hazardous to the hands, while others admitted having a remarkable ease with this task. Filling the Pequi pulp slices in the bottles is also mentioned by some agro-extractivists as the longest and the most tedious task. However, some of them are showing ingenuity using a funnel system that speeds up this process.

In terms of overall revenues, selling the raw or processed Pequi fruits provides a significant cash income in a very short period to the agro-extractivist families, often coming in times of need. It is complementary to the income obtained more evenly from the sale of products of family farming, enabling purchases to the household such as school supplies for the children, televisions, wardrobes and stoves, and by paying supermarket and energy bills. Farming activities or city jobs appear more profitable than agroextractivism but requires a constant work over the year. The income generated by the sale of Pequi goods appears, therefore, to work as a safety net from deeper poverty, in the same lines as detailed by Shackleton et al. (2011). However, the profitability of this small business is largely conditioned to market access constraints, a point that we will discuss in the next section.

Into the market: Pequi's supply chain

Generally, inhabitants of the Mambaí area collect themselves the Pequi on their own plots or on open access places for their own consumption. Therefore, except for some consumers living in small towns in the region, local markets are almost non-existent. Some families may sell a variety of derived Pequi products - the lump is the most appreciated - through direct sales, at the street market, on the roadside, or on orders, but the quantities are very low.

A limited number of regional and local industries buy the whole fresh fruit– and even the Pulp Preserves – in order to process it locally. Other products, such as the sweet, flour, sauces, extracted nuts and oils made by the extractivists are sold in the street market, on order or through direct sales. The supply chain for these products, therefore, constitute short circuits and, although unable to sell large volumes, families obtain better prices per sold product (a situation discussed by Bispo, 2014). Soap is today considered an old fashioned product and is no longer sold.

As the fresh Pequi lump is highly perishable, and also to reduce the volume transported, the fruits are generally processed immediately after harvest. However, some agro-extractivists propose to sell the fresh green fruit, without any transformation. We could observe that agro-extractivists located in the most distant settlement of the city offer unprocessed products, an observation that is partly explained by the lack of knowledge about processing technologies. The distance from the city is another parameter that limits the commercial opportunities for these family farmers. In the settlements closer to the city, where other employment activities are more profitable, some agro-extractivists have little time to devote to extractive activities, a situation that can lead them to sell the fruits *in natura*.

As described before, the Pulp Preserves are the main commercial product to all interviewed extractivists, although fruits *in natura* and fresh lumps are also subject to local demand from local industries that have processing units (through contracts or not). Most families sell the Pulp Preserves to middle men that play an intermediary role between local agro-extractivists and more distant markets concentrated in the large cities of the Central-West region. These intermediaries are generally known by some of the families, but there is usually a personal distance between them leading to a very noticeable lack of information: agro-extractivists are generally unaware of who the traders are, when they will come or how to contact them (Picture 2). This leaves them at the powerless position of price-takers, dealing with high uncertainties and risk. In spite of existing opportunistic resellers and the power imbalance, two of the main intermediaries in

the study area are locals and seem to be key actors in facilitating the access to the market, since other options are scarce, as discussed by Diniz (2008).



Picture 2. Agro-extractivists store the bottles in their houses until the hypothetical arrival of the intermediary. (photo credit: Igor Aveline)

Intermediaries are typically men, either locals or from a nearby city (e.g. Brasília, Goiânia), in possession of a pick-up car or small truck and some knowledge about the Pequi market, especially regarding prices, buyers and productive regions. There are three main types of intermediaries. The first one is a local farmer, a member of the community living in the *assentamento*, which has an informal agreement with a remote industry, paying him BRL 0.20 per litre of pulp preserves on average in order to collect a determined quantity at a fixed price. The second type works independently and negotiates directly with remote industries and cooperatives. Remote industries will then recondition the pulp or process it into canned food, sauces, pastes, liqueurs, etc. The last type of intermediary, less common, is also independent, but sells directly to final consumers; at fairs, on the street, from door to door and on the side-line of the main marketplaces of the big cities (Brasília, Goiânia). Regarding this last category of intermediaries, some of them buy the whole fruit *in natura* or just the lump in order to resell it on the big cities' marketplaces.

At some point after the harvest begins, the resellers will start passing by the extractivists' houses and will usually buy the entire production of each family, after some price negotiation. Although some families do

mention difficulties to deal with unknown intermediaries (i.e. not being paid, uncertainty in the sale, low payments, delays, etc), they prefer this kind of transaction because the traders will take large quantities.

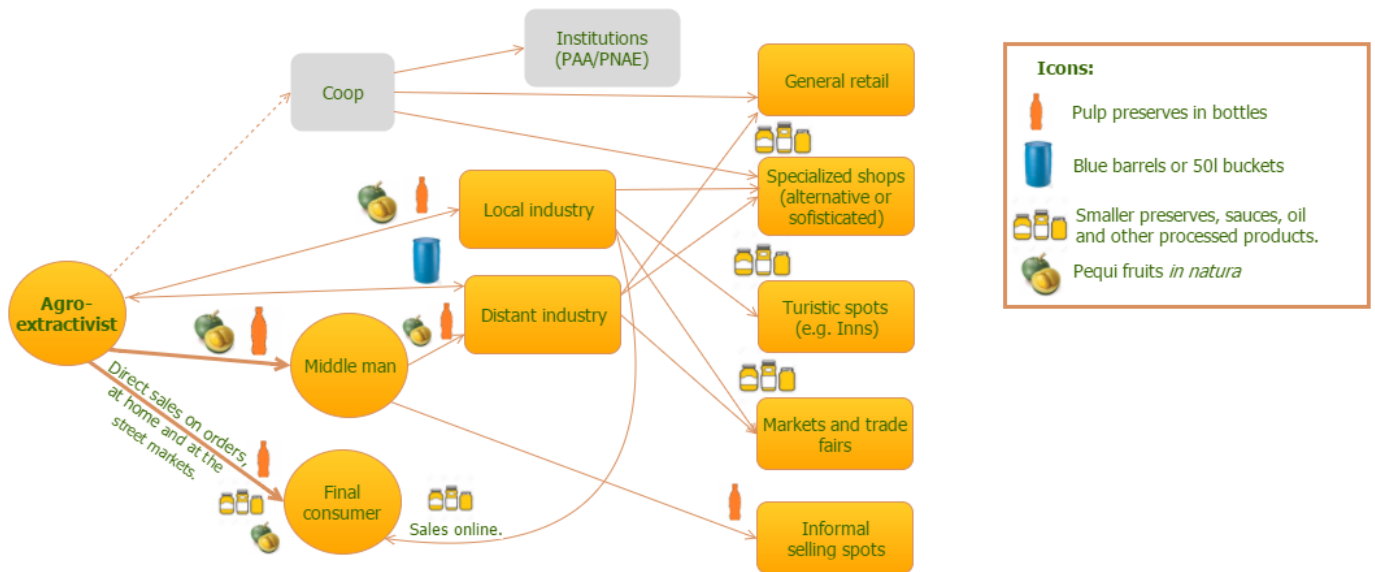


Figure 2. Pequi's supply chain

Prices of products vary a lot, especially in response to fluctuations in supply, according to distribution channels and also volumes purchased. For instance, each bottle of pulp preserves is sold in the market or through direct sales to individual buyers for BRL 7 to 12, whereas intermediaries will offer as low as BRL 3 up to BRL 8 for the same product. The same product can be found in informal point of sales of the regional bus station of the nearby city of Alvorada do Norte at a higher price of BRL 20. When the same product is sold in specialized retail stores, in the form of 100-350g labelled glass cans, the price varies between BRL 60 and 100 per kg. This price differential shows the significant profit made by intermediaries, industries and retail stores throughout the value chain, while the work remains being done mainly by the agro-extractivists.

The quantities sold annually by each family also vary greatly depending on their capacity to collect and process. We could observe some situations where families could offer up to more than 500 bottles, generating an income of around BRL 3 500. Nevertheless, we have also noticed that some families were unable to sell their whole production, or have sold it at a loss. Indeed, when supply is too abundant, some intermediaries do not hesitate to exert downward pressure on prices, offering around BRL 3 per bottle. Some agro-extractivists then explain that these non-remunerative prices lead them to thinking about abandoning the pequi activity in the future.

Selling the fresh (unprocessed) fruit seems to be a greater cost-effective operation for the agro-extractivist because it requires much less work and renders proportionately more profit per litre of pulp. A 20 litre bucket of fresh lumps provides between 6 and 9 bottles of pulp preserves, depending on the propensity of the agro-extractivists to compact more or less pieces of pulp slides inside. Thus, we evaluated at approximately 2.5 litres the quantity of fresh lumps necessary to produce a bottle of pulp preserves. Following our market transaction observations, we estimate that the selling price of 2.5 litres of fresh lump is about BRL 15, at least twice the value of a bottle. But selling the fresh fruit is also a risky business because this is a very perishable good and it has to be sold immediately after harvest. This is why, except for a few producers whose fresh fruit purchase is guaranteed through intermediaries or industries they know, most of them continue to process the Pequi in bottles of pulp preserves in order to ensure the conservation of the product.

Oil is sold in 250ml bottles for BRL 10-15, through direct sales, and nuts for BRL 10.00 per litre in the market. Industries do not buy oil from agro-extractivists because they prefer to undertake the transformation

themselves in order to control the production process and the quality of the product. Pequi oil is usually sold by retailers in bottles of 150 ml at a price of BRL 10-15.

Conclusion

Extractive activities of pequi fruits is, as described earlier, a very time-demanding enterprise. The revenues are uncertain and, although strongly rooted in the regional culture, harvesting and processing Pequi are considered very toilsome activities, all the more with the lack of available technology. It was not rare to hear families complaining of the hardships of the tasks, some even admitting they were willing to stop the activity altogether, not wishing to work with Pequi the following year. However, as one agro-extractivist interestingly observed: although families may give up right after the harvesting period (time at which part of the interviews was collected), when the fruit season arrives again, the enthusiasms rises in the community and influences the agro-extractivist families, who also think of the revenues they can obtain in a few months' time. Besides the income, another economic criteria that leads the agro-extractivists to persist in producing pequi products is the fact that extractivism does not require any input or investment. Agro-extractivists feel that the fruits are available for free in the nature and can therefore just make use of the resource.

The results also show that intermediaries occupy an important place in the value chain by exerting certain dominance over agro-extractivists, controlling the quantity purchased and setting up the market prices. Yet, agro-extractivists perform most of the work of harvesting and processing. But because of their inability to access to the formal market, the value-added of their flagship product, the pulp preserves, is paradoxically smaller than that of unprocessed fresh produce.

This situation calls for the implementation of projects and public policies designed to help the creation of small family businesses able to access the formal market. However, over recent years, technical assistance has focused mainly on the processing techniques, to the point that certain agro-extractivists admitting having enough knowledge on producing any kind of canned and other processed product. In addition, their buyers are mostly resellers that are not interested in other goods than commoditized ones, e.g. standardized bottles of pulp preserves and, to a lesser extent, fresh fruits.

Thus, it is not the lack of technical knowledge on the products processing that prevent the families from a greater valuation of their production, but the difficulty to access directly to differentiated markets. Therefore, in terms of projects, public policy and technical assistance, the focus should be on rethinking how to address basic market access needs: marketing, legislation requirements (regarding sanitary regulation, etc.), transportation and especially entrepreneurial management for the youth, integrating the basic concepts of accounting and management.

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