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Socioeconomic profile and agricultural practices of farmers in traditional communities of Jangada, Mato Grosso, Brazil

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Abstract: Agricultural diversity depends on natural conditions and the cultural and socioeconomic profiles of farmers. The present study aimed to assess the socioeconomic characteristics of four contiguous traditional rural communities (Mutum, Vaquejador, Ribeirão das Pedras Acima and Quilombo) located in the municipality of Jangada, Mato Grosso, Brazil, and their effects on the preservation of agrobiodiversity. Semi-structured interviews involving at least half of all family units confirmed that small-scale agriculture was practiced in all communities although Mutum presented the lowest proportion of farmers. Socioeconomic profiles of families were similar, with agricultural activities conducted mainly by males of median age 56 years. Mutum showed the largest proportion of young people who had left the community (63.9 %), while Ribeirão das Pedras Acima had the highest percentage of new family units located in the same community (64.3 %). The main reasons for the departure of young people were deficient infrastructure (limited educational and health services) and inferior job opportunities. Our results demonstrate that reassessment of public policies and educational strategies in rural communities is necessary to stimulate the appreciation of traditional agricultural knowledge and practices, and to persuade young people to remain by breaking the maxim that urban living is superior to country reality.

Perfil socioeconômico e práticas agrícolas de agricultores de comunidades tradicionais de Jangada, Mato Grosso, Brasil
Resumo: A diversidade agrícola depende das condições naturais e dos perfis culturais e socioeconômicos dos agricultores. O presente estudo teve como objetivo avaliar as características socioeconômicas de quatro comunidades rurais tradicionais contíguas (Mutum, Vaquejador, Ribeirão das Pedras Acima e Quilombo) localizadas no município de Jangada, Mato Grosso, Brasil, e seus efeitos na preservação da agrobiodiversidade. Entrevistas semiestruturadas envolvendo pelo menos metade de todas as unidades familiares confirmaram que a agricultura de pequena escala era realizada em todas as comunidades, embora Mutum apresentasse a menor proporção de agricultores. Os perfis socioeconômicos das famílias eram semelhantes, com atividades agrícolas realizadas principalmente por homens com idade média de 56 anos. Mutum apresentou a maior proporção de jovens que haviam deixado a comunidade (63,9%), enquanto Ribeirão das Pedras Acima teve o maior percentual de novas unidades familiares localizadas na mesma comunidade (64,3%). As principais razões para a saída dos jovens foram a infraestrutura deficiente (serviços educacionais e de saúde limitados) e as oportunidades de trabalho inferiores. Nossos resultados demonstram que a reavaliação das políticas públicas e das estratégias educacionais nas comunidades rurais é necessária para estimular a valorização do conhecimento e das práticas agrícolas tradicionais e para persuadir os jovens a permanecerem, quebrando a máxima de que a vida urbana é superior à realidade rural.

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Introduction

Family farming is an important agricultural segment in Brazil because of its essential role in generating jobs and supplying a significant portion of the domestic food market (STRATE; COSTA, 2018). Given the various scenarios in which family farming flourishes, it is clear that this agricultural sector has the ability to reinvent itself (BARBOSA *et al.*, 2022). This viewpoint is amply demonstrated by the expansion of family farming in the Brazilian state of Mato Grosso in the 1980s following the arrival of migrants seeking new productive lands (ASCARI *et al.*, 2019).

In this context, the search for alternative forms of farming, conceptualized as agroecological agriculture, is a global phenomenon that aims at the sustainable management of natural resources, *harmony between the use of technologies and* ecosystems, and the reconstruction of interactions between environmental, social and economical aspects (ALTIERI, 2012; PLOEG *et al.*, 2019; SILVA, 2020).

Knowledge regarding the current socioeconomic system and how it affects farmers' choices is essential for a full understanding of agrobiodiversity. It is, therefore, necessary to evaluate how agricultural units are organized and to determine the extent to which social, economical and political issues influence and shape such organizations (BROOKFIELD; STOCKING, 1999). More specifically, an appreciation of the complex interactions between farmers, crops and the environment is fundamental to the comprehension of the dynamics of an agroecosystem.

Agricultural diversity depends not only on natural conditions, but also on the cultural and socioeconomic characteristics of farmers (SANTILLI, 2009; JOSEPH; ROSSETTO, 2021). Thus, studies focused on the characterization of farmers and the circumstances in which they live are relevant for establishing strategies towards the conservation of agricultural diversity and the rural way of life and identifying and understanding the different realities in which farmers are inserted.

Based on these considerations, the present study aimed to identify the socioeconomic characteristics of communities in the municipality of Jangada, Mato Grosso, Brazil, and to determine their influence on the preservation of the agrobiodiversity of cassava (*Manihot esculenta* Crantz.; Euphorbiaceae) and on the permanence of farmers in the rural area. Our hypothesis is that traditional rural communities are undergoing transformations that threaten their continuation.

Materials and methods

Ethical considerations

The study was approved by the Ethics Committee of the Biosciences Institute of Universidade Estadual Paulista (UNESP), Rio Claro, SP, Brazil (protocol 096/2013), as required by the National Health Council (Resolution 196/96). In order to comply with the Terms of Prior Consent (TPC) required to access ethnobotanical information, a free and informed consent form (FICF) was prepared to document the authorization of residents to participate in interviews.

Site of study

The study was practiced four traditional communities, namely Mutum (Mt), Vaquejador (Vq), Ribeirão das Pedras Acima (Ra) and Quilombo (Qb), in the municipality of Jangada located in the Baixada Cuiabana region of Mato Grosso, Brazil. This region comprises 14 municipalities and constitutes one of the many areas targeted by the Territories of Citizenship Program (*Programa Territórios da Cidadania*), a governmental policy aimed at improving living conditions, access to public goods/services and opportunities for social/economic inclusion of populations living in the interior of the country (SOUZA; AMARAL, 2015).

Baixada Cuiabana is recognized as a region in which the traditional methods of agriculture, cuisine and vocabulary associated with Mato Grosso are preserved. Despite the predominance of large-scale modern agriculture throughout the state, some communities of this region not only retain a peasantry style of life in which agriculture is practiced using classical methods, mainly for subsistence, but also strive to maintain significant agricultural diversity, particularly with regard to local varieties of cassava (AMOROZO, 2010).

Study design and data analysis

A prospecting visit to Baixada Cuiabana was carried out in April 2012 to target potential working areas, and this resulted in the selection of the four contiguous traditional communities. During this visit, information about the organization and articulation of these communities was collected with the aim of planning the best way to expedite TPC agreement with the residents.

With the support and collaboration of Empresa Matogrossense de Pesquisa, Assistência e Extensão Rural (EMPAER), all family units in the four communities were visited between May and June 2013 to establish close contact with the residents and to obtain TPC authorizations where applicable. At the same time, georeferencing was practiced in order to incorporate the information collected into a map displaying the coordinates of the family units.

After obtaining signed FICFs, the numbers of residents per community were estimated and the family units were assigned unique codes. Family units, encompassing at least 50% of the population, were selected using a simple random sampling method to participate in the socioeconomic characterization. The selected family units were revisited in 2014 and heads of families (male or female) were interviewed in order to collect information about the socioeconomic conditions of the communities and to identify the family units that cultivated cassava. The semi-structured interviews of family heads or their spouses included a pre-determined set of open questions and application of the participant observation technique in order to deepen the understanding of the sociocultural context (VIERTLER, 2002). The areas of inquiry were developed with the help of researchers from the Economy Department of Embrapa Agrossilvipastoril and addressed a range of issues including: (i) characterization of the farmer, the living space, and the infrastructure present in the community; (ii) the extent to which these factors influenced the farmer's choices; and (iii) the number and description of children who had left the rural community to live in an urban area. Data were analyzed qualitatively using recognized methods (HUBERMAN; MILES, 1994; GODOY, 1995) and through descriptive statistics.

Results and discussion

General characteristics and structure of the traditional communities

As shown in Table 1, the family units sampled incorporated at least 50% of those residing in the traditional rural communities of Jangada. The total number of residents distributed among the 89 sampled family units was 320 (excluding children that had moved out of the rural area), giving an average of 3.6 residents per household. The highest mean number of residents per household (4.2) was recorded in the Ra community.

Table 1 - Composition of the traditional communities of Baixada Cuiabana (Jangada, Mato Grosso, Brazil).

Communities	Total number of family units	Number of sampled family units
Mutum (Mt)	55	31
Vaquejador (Vq)	58	29
Ribeirão das Pedras Acima (Ra)	33	17
Quilombo (Qb)	22	12
Total	**168**	**89**

The main socioeconomic characteristics of the heads and other members of the sampled family units are shown in Table 2. The sex ratios in the family units of Mt and Vq were 1.28 and 1.08, respectively, indicating somewhat higher proportions of men to women, (the Mt sex ratio calculated from Table 2 [1.2] cannot be said to represent "similarity in the prevalence of men and women") whilst the family units of Ra and Qb presented slightly higher prevalences of women as demonstrated by

sex ratios of 0.84 and 0.87, respectively. The overall median age of all members of the family units varied from 25 years in Ra to 32 years in Mt, indicating that the general population was of mature age.

Table 2 - Socioeconomic characteristics of sampled family units in four traditional communities in Baixada Cuiabana (Jangada, Mato Grosso, Brazil).

Variables		Communities[1]			
Mt		Vq	Ra	Qb	
Sex					
All members of sampled family units	Males (n)	59	51	33	21
	Females (n)	46	47	39	24
Family heads	Males (%)	80.7	86.2	94.1	83.3
	Females (%)	19.3	13.8	5.9	16.7
Age					
All members of sampled family units	Median (years)	32	31.5	25	28
	Amplitude (years)	1-73	1-83	2-72	1-78
Family heads	Median (years)	51	56	49	57
	Amplitude (years)	21-73	17-83	27-72	33-78
General education	Elementary - incomplete (%)	45.2	65.5	64.7	100.00
	Intermediate - incomplete (%)	3.2	6.9	5.9	0.0
	Intermediate – complete (%)	29,0	13.8	23.5	0.0
	University - complete (%)	19.4	3.4	0.0	0.0
	Illiterate (%)	3.2	10.3	5.9	0.0
General occupation	Farming (%)	48.4	82.8	88.2	83.3
	Domestic service (%)	9.7	6.9	5.9	16.7
	Public service (%)	25.8	6.9	0.0	0.0
	Other (%)	16.6	3.4	5.9	0.0
Farmers	Males (%)	80	87.5	100	80
	Females (%)	20	12.5	0	20
	Median age (years)	60	57	49	58

[1] Mt= Mutum; Vq= Vaquejador; Ra= Ribeirão das Pedras Acima; Qb= Quilombo.

The vast majority of family heads were males with median ages varying between 49 years in Ra (range 27 to 72 years) and 57 years in Qb (range 33 to 78 years). However, the largest amplitude in age of family heads was observed in Vq (range 17 to 83 years) with a median age of 56 years.

These figures show that half of the family heads in each of the studied communities were aged around 50 years or more, a profile that is typical of the Brazilian rural environment and characterized by increasing median age and rising masculinity index (BRUMER, 2007; MORAIS *et al.*, 2008). As is the case for many other traditional rural communities, the majority of the family heads were born and raised locally, indicating a protracted period of occupation of the land that is emblematic of these groups (DIEGUES; ARRUDA, 2001).

Regarding the level of education, Mt presented the highest number of residents with complete

intermediate schooling (29.0%) or with a university degree (19.4 %) while, in the other three communities, a substantial majority of residents had received only incomplete elementary schooling. Of the four communities studied, Mt is the least reliant on agricultural activities whereas Ra is the most dependent.

Socioeconomic characteristics of the farmers

The socioeconomic characteristics of the family heads who declared farming as their main activity were similar in all four communities (Table 2). The great majority (87.5%) of farmers were male, with median age of 56 years, and in most cases (75.8%) their spouses were also farmers. The finding that agriculture in the traditional rural communities of Jangada is currently practiced primarily by men over 40 years of age, corroborates our original hypothesis that such communities are undergoing transformation.

Previous studies relating to traditional communities of Baixada Cuiabana dedicated to the cultivation of cassava revealed that men over 50 years of age were essentially responsible for working the fields while their spouses helped with weeding, yard maintenance and flour production (AMOROZO, 2010; MARCHETTI *et al.*, 2013). Other authors have also emphasized the increasing age and masculinization of the rural population (CAMARANO; ABRAMOVAY, 1998).

Most of the farmers (75.8 %) were born within their respective communities and the majority (87.5 %) worked land belonging to their own family. Among the farmers who were born outside the community, 75 % hailed from another rural community within the municipality of Jangada. The permanence of farmers in their communities and their identification with living areas may represent important brakes on the advancement of agricultural frontiers and the implementation of novel production methods. This situation may engender a high negative environmental and social impact, as exemplified by some municipalities in Baixada Cuiabana (AMOROZO, 2010; MARCHETTI, 2012).

The sampled family units showed strong community engagement having reportedly organized themselves against the implementation of industrialized cassava flour production facilities in the region while supporting small-scale artisanal factories, known locally as *farinheiras*. In a book entitled "Etnoconservação: Novos rumos para a conservação da natureza", Diegues (2000) states that environmental conservation is successful only when the characteristics and knowledge of traditional populations are preserved. This idea can certainly be extrapolated to the conservation of agricultural diversity and traditional agroecosystems.

Permanence of young adults in the communities

Table 3 shows the proportions and characteristics of young adults (≥ 18 years) who had left the family units. The number of young males who no longer lived with their parents ranged from 19 (Qb) to 36 (Mt), while the equivalent number of young females varied between 21 (Ra and Qb) and 32 (Vq). The departure of young women from the Ra and Qb communities followed the pattern previously mentioned by other researchers, marking the transformative process of masculinization of the rural environment (CAMARANO; ABRAMOVAY, 1998; SCHNEIDER, 2003).

However, in the present study, the numbers of young men and women who had left their family units were somewhat similar and indicated only a tendency. Further in depth studies are required to confirm the process of masculinization in these four communities.

The mean ages of young adults living away from their family units were similar for men and women and from community to community and varied between 27 years (for males from Qb) and 34.9 (for males from Vq). The most cited reason for daughters to leave the family home was marriage (72.7%) followed by work (16.9%) and study (10.4%). These young women either remained within their own community or moved to another community in the municipality of Jangada.

Table 3 - Characteristics of young adults (≥ 18 years old) who had left the original sampled family units in four traditional communities in Baixada Cuiabana (Jangada, Mato Grosso, Brazil).

Variables		Communities[1]			
		Mt	Vq	Ra	Qb
Sex	Males (*n*)	36	33	20	19
	Females (*n*)	29	32	21	21
Mean age ± SD	Males (years)	31.4 ± 9.2	34.9 ± 9.5	28.2 ± 7.6	27 ± 5.6
	Females (years)	29.8 ± 9.2	30.9 ± 8.6	33.9 ± 8.7	30.5 ± 6.8
Latest place of residence	Within the community (%)	27.8	32.5	64.3	20
	Another rural community in Jangada (%)	8.3	30	14.3	25
	Jangada town (%)	2.8	2.5	14.3	0.0
	Other municipalities in Mato Grosso (%)	61.1	35	7.1	40
	Another Brazilian state (%)	0.0	0.0	0.0	15
Reasons for leaving	Marriage (%)	50	55	85.7	61.1
	Work (%)	30.6	42.5	14.3	33.3
	Study (%)	19.4	2.5	0.0	5.6
Ratio between young adults who still lived with their parents and those who had moved away		0.19	0.22	0.32	0.20

[1] Mt= Mutum; Vq= Vaquejador; Ra= Ribeirão das Pedras Acima; Qb= Quilombo.

The main motivation for young men to leave the family unit was employment (47.4%) followed by marriage (44.7%) and study (7.9%). The predominant destination of males who relocated for work purposes was Várzea Grande, a municipality close to the state capital Cuiabá, while those who moved by reason of marriage generally resettled in a different domicile within their own community or in another community in Jangada.

The Mt community exhibited the lowest ratio (0.19) between young adults who still lived with their parents and those who had moved away. This community also presented the highest number of young adults who had moved to other municipalities in Mato Grosso (61.1%) and who had left the community for educational purposes (19.4%). As mentioned earlier, Mt had the lowest proportion of farmers and the highest number of residents with high levels of education among the studied communities. This situation may represent a risk to the maintenance of agricultural activities in the community.

According to some authors, the permanence of young people in rural areas, particularly those involved in agricultural activities, is indispensable for the preservation of agrobiodiversity (BROOKFIELD; STOCKING, 1999; SANTILLI, 2009, AMOROZO, 2013). However, the task of motivating the younger population to remain in rural areas is particularly challenging, given the impossibility of providing access to health and educational services of the requisite quality.

Moreover, the increased *ease of travel and the development of communication technologies have*

brought rural and urban areas together, thereby stimulating younger generations to search for better living standards in urban areas (CARNEIRO, 1998). It is, therefore, necessary to explore alternatives to the formal education offered in urban areas by, for example, providing a more practical and functional type of tutelage that recognizes the value of knowledge of the land and its management as opposed to perpetuating the vision that rural work is somewhat inferior.

This line of thought has been adopted by the Escola Estadual Damião Mamedes do Nascimento located in the Mt community, which, in addition to regular elementary and intermediate classes, also offers a technical course in agroecology that aims to connect young people with agricultural work involving the application of traditional knowledge in farm management. Many young people from Mt and nearby communities showed interested in the course and began to value working in rural areas, even to the point of seeking higher education to improve their knowledge. It is worth noting that agroecology is an important tool in the process of valuing traditional knowledge and in advancing alternatives to modern means of production that respect and manage the sociocultural aspects of each farmer (AMOROZO, 2013).

However, the permanence of young people in rural areas does not necessarily guarantee the replacement of labor and the maintenance of traditional agriculture. Even if young people continue to carry out agricultural activities on a full or part time basis, it is still necessary for them to learn the trade of traditional farmers, with all of their refined knowledge about the natural resources and the ecological processes that take place in the local environment, as well as their farming practices and their system of classification and identification of crop plants. Ultimately, it is imperative to invest in strategies that motivate new generations to take up agricultural occupations (AMOROZO, 2013).

Among the residents of Mt, there was a prevalence of individuals commuting to work on neighboring farms (for which they received daily or weekly remuneration) or in nearby urban centers, and returning to the community to carry out part-time agricultural activities. Such a trend could result in the loss of knowledge or even the abandonment of the activity. Thus, efforts should be made to incentivize young people to remain in the communities by strengthening the links between the communities and the consumer market and by valuing products grown and manufactured in traditional ways. On the other hand, part-time agriculture carried out within the family unit is frequently the only way in which this activity can be maintained, and in such cases it is essential that the traditional knowledge and practices are transmitted and fully applied.

The highest proportion of young people resettling in their own community was found in Ra (64.3%), with marriage being the most cited reason for leaving the original family unit (85.7%). Moreover, in this community there was greater coordination among family members with respect to the cultivation of cassava and the production of flour in the community *farinheira*. Thus, the permanence of young couples in Ra can be considered important for maintaining cassava cultivation and the manufacture of artisanal flour. All four of the studied communities were mentioned by young people as possible destinations for the start of new family units. The flow of residents and the resulting kinship bonds between communities play an important role in the social network. Connectivity between these groups is crucial for the existence and maintenance of knowledge circulation and cassava propagule networks that are fundamental for small-scale agriculture (THOMAS *et al.*, 2011).

Infrastructure of communities and residences

The best overall infrastructure was found in Mt, although Vq also has a municipal school offering kindergarten and elementary level classes. Moreover, there are several rural schools in the municipality of Jangada so that commuting to the town of Jangada to attend classes at elementary or intermediate level is generally unnecessary. However, since no institutions in the municipality provide education at a higher level, individuals seeking degree courses must move to Várzea Grande, Cuiabá or other cities.

There is a basic health unit in Mt that also serves other neighboring communities, and families can even receive monthly primary care visits by general practitioners. In all of the communities studied, residents use medicinal plants and apply indigenous traditional knowledge to treat minor

diseases, while patients with serious illnesses are sent to the Municipal Hospital in Jangada. At the time of the original survey, there was a municipal dental care facility in Ra, but this unit has since been deactivated and no longer functions.

Contacts between residents of the studied communities and neighboring urban centers were strong, thereby suppressing the characteristics of isolation that are often found in traditional communities. Access to urban centers was generally by personal car or motorcycle, or by private collective transport.

Regarding the infrastructure of the domestic units, more than half of the properties had access to at least one source of water, which was generally adequate for the needs of the residents throughout the year but not always sufficient for irrigation (Table 4). The Vq community was most affected by drought problems with 42.9% of the residents experiencing difficulties with water supply at certain periods during the year (May to October). All of the current dwellings were of masonry construction and all but one had an internal bathroom. All domiciles had an electricity supply, some had a telephone connected to the rural landline network, and a few had an internet connection.

Table 4 - Characteristics of the traditional communities and residences in Baixada Cuiabana (Jangada, Mato Grosso, Brazil).

Variables		Communities[1]			
Mt		Vq	Ra	Qb	
Presence of water source	Yes (%)	56.7	67.9	53.3	58.3
	No (%)	43.3	32.1	46.7	41.7
Water throughout the year	Yes (%)	90.0	57.1	80.0	66.7
	No (%)	10.0	42.9	20.0	33.3
Electricity in the residence	Yes (%)	100.0	100.0	100.0	100.0
	No (%)	0.0	0.0	0.0	0.0
Bathroom in the residence	Yes (%)	96.7	100.0	100.0	100.0
	No (%)	3.3	0.0	0.0	0.0

[1] Mt= Mutum; Vq= Vaquejador; Ra= Ribeirão das Pedras Acima; Qb= Quilombo.

Interestingly, the more elderly residents in the communities recalled the old types of houses made of clay and palm leaves that were eventually replaced by modern dwellings. Examples of these clay and leaf structures can still be found in the form of detached "outdoor kitchens" in which wood burning stoves have been installed. This use of traditional building materials is justified by the microclimate created in the interior of the kitchen, since clay and leaf rooms are considered more airy and appropriate for handling wood stoves. Similar building structures were also found by our research group in a traditional community located in the municipality of Porto Estrela, Mato Grosso (OLER, 2012).

Conclusions

The discontinuity of agricultural activities and transmission of knowledge from generation to generation seem to be the main threats to the maintenance of small-scale agricultural systems. Despite the nutritional importance of cassava for all four communities, and the economic significance for Vq, Ra and Qb in particular, alternative sources of income and the continuous devaluation of the rural way of life are leading to profound changes in traditional practices and, therefore, in the strategies adopted to maintain the agroecosystems.

The communities studied herein followed the general trend observed in different agricultural areas across the country, namely masculinization and aging of the farming population. Even though

the communities enjoyed relatively good infrastructure, and did not display the characteristics of isolation, considerable numbers of young adults are leaving the rural areas in search of better jobs and education, a trend that was particularly perceptible in the Mt community.

Our results demonstrate the need for public policies focusing on novel educational strategies for rural communities aimed at valuing traditional agricultural knowledge and practices in order to persuade young people to remain in the countryside and enjoy the benefits of a better quality of life.

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