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Translated from the original in spanish **Original article**

Trees outside the forest at Finca Maripa, Cumanayagua, Cienfuegos, Cuba

Árboles fuera del bosque en Finca Maripa, Cumanayagua, Cienfuegos, Cuba

Árvores da floresta em Finca Maripa, Cumanayagua, Cienfuegos, Cuba

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ABSTRACT

The definition of trees outside the forest (TOF) contemplates non-timber forest products and constitutes a set of goods and services that contribute to the production of food in different agricultural forms. The study was carried out on the Maripa family farm, municipality of Cumanayagua, Cienfuegos province, Cuba, with the objective of analyzing the evolution over time of the TOF in the farm's location area. A diachronic analysis was approached through the method of synchronic cuts, with a cross-sectional research design and descriptive approach, where qualitative and quantitative aspects were measured without manipulating variables. The chosen temporal axis was specified in three successive sections, 1935-1965, 1966-1996 and 1997-2023, with an approximate reconstruction of the conditions of those most significant elements of the landscape. Ecological indicators were calculated, adjusted to the TOF present on the farm in the third cut. Over time, a dynamic change of the landscape towards an agroecosystem resulted, with 21.95% of species not present on the farm at the end of the first half of the year 2023 in relation to the period 1935-1965. Currently, 64 species belonging to 33 botanical families were quantified, with the greatest representation of: Fabaceae, Annonaceae, Anacardeaceae and Sapotaceae. The ecological indices showed a high diversity and richness of species, with low dominance.

Keywords: Trees, landscape, diversity, species, transformation.

RESUMEN

La definición de los árboles fuera del bosque (AFB) contempla a los productos forestales no madereros y constituyen un conjunto de bienes y servicios que tributan a la producción de alimentos en diferentes formas agrícolas. La investigación se realizó en la finca familiar Maripa, municipio de Cumanayagua, provincia Cienfuegos, Cuba, con el objetivo de analizar la evolución en el tiempo de los AFB en el área de ubicación de la finca. Se abordó un análisis diacrónico a través del método de los cortes sincrónicos, con un diseño de investigación transversal y enfoque descriptivo, donde se midieron aspectos cualitativos y cuantitativos sin manipular variables. El eje temporal elegido se concretó en tres cortes

sucesivos, 1935-1965, 1966-1996 y 1997-2023, con una reconstrucción aproximada de las condiciones de aquellos elementos más significativos del paisaje. Se calcularon indicadores ecológicos, ajustados a los AFB presentes en la finca en el tercer corte. Resultó en el tiempo una dinámica de cambio del paisaje hacia un agroecosistema, con un 21,95 % de especies no presentes en la finca al cierre del primer semestre del año 2023 en relación con el período 1935-1965. En la actualidad se cuantificaron 64 especies pertenecientes a 33 familias botánicas, con mayor representación de: Fabaceae, Annonaceae, Anacardeaceae y Sapotaceae. Los índices ecológicos mostraron una alta diversidad y riqueza de especies, con baja dominancia.

Palabras clave: Árboles, paisaje, diversidad, especies, transformación.

RESUMO

A definição de árvores fora da floresta (AFB) inclui produtos florestais não madeireiros e constitui um conjunto de bens e serviços que contribuem para a produção de alimentos em diferentes formas agrícolas. A pesquisa foi realizada na fazenda da família Maripa, no município de Cumanayagua, província de Cienfuegos, Cuba, com o objetivo de analisar a evolução ao longo do tempo da AFB na área onde a fazenda está localizada. Foi realizada uma análise diacrônica usando o método de cortes sincrônicos, com um desenho de pesquisa transversal e abordagem descritiva, em que foram medidos aspectos qualitativos e quantitativos sem manipulação de variáveis. O eixo temporal escolhido consistiu em três seções sucessivas, 1935-1965, 1966-1996 e 1997-2023, com uma reconstrução aproximada das condições dos elementos mais significativos da paisagem. Foram calculados indicadores ecológicos, ajustados à AFB presente na fazenda na terceira seção. O resultado foi uma mudança dinâmica da paisagem ao longo do tempo em direção a um agroecossistema, com 21,95% das espécies não presentes na fazenda no final da primeira metade do ano de 2023 em relação ao período de 1935-1965. Atualmente, foram quantificadas 64 espécies pertencentes a 33 famílias botânicas, com maior representação de: Fabaceae, Annonaceae, Anacardeaceae e Sapotaceae. Os índices ecológicos mostraram uma alta diversidade e riqueza de espécies, com baixa dominância.

Palavras-chave: Árvores, paisagem, diversidade, espécies, transformação.

INTRODUCTION

The definition of Trees Outside Forest (TOF) emerged in 1995. According to FAO (2002) include, among others, trees on agricultural land and grasslands, urban areas and peri-urban; trees along human infrastructure such as roads, canals, along rivers or streams ("gallery trees"); within the agricultural landscape, trees in parks and orchards; and also trees on natural lands where tree cover is less than 0.5 ha, or remnants of primary and secondary forests reduced to isolated trees. Within TOF, Agroforestry Systems (AFS) - defined as agricultural land with tree cover greater than 10% - cover 43 % of global agricultural land - more than 1 billion hectares and 80 % and represent a component growing landscape (Zomer *et al.*, 2014).

It is common to find TOF that coexist with humans in their different settlements, and contribute in many different ways to the well-being of the human population. On a global level, this resource plays a relevant role in ecological, economic and sociocultural terms for society. Despite this, it seems that TOF are not yet fully recognized as a renewable natural resource and there are few countries where legislation defines a legal framework for its development and management (FAO y UNEP, 2020).

It is estimated that, in the year 2050, the world population will have reached 9 billion people, which would entail a need to increase food production by 50% (FAO, 2017). In this panorama, Tree-Based Systems (TBS) and Agroforestry Systems (AFS) in particular, constitute key elements in the management policies of productive spaces, conservation and climate change management (Rosenstock *et al.*, 2018), which may represent a contribution to additional food production.

In Cuba, the Forest Law (85/1999) in its Chapter 1, Article 2, defines *non-timber forest products* as all plant and animal products, as well as goods and services derived from forests, other forest lands and trees outside the forest, excluding wood, and Agrosilvopasture to the set of techniques and procedures by which they manage in a rational and sustainable way

agricultural crops or livestock of different types in association with forests, thereby pursuing multiple use and maximum yield of forest lands.

As can be seen, the term TOF is integrated into non-timber forest products and constitutes a set of goods and services that contribute to the production of food in different agricultural forms.

Assimilating the landscape approach to understand the social, productive and ecosystem complexity of the territories has begun to make visible the potential of Tree-Based Systems, and within them Agroforestry Systems (AFS), to simultaneously contribute to mitigation, adaptation to climate change and livelihoods (Minang, 2015).

Integrated agricultural systems are an effective step towards implementing sustainable practices. Their objective is to maximize diversity, emphasize the conservation and management of soil fertility, optimize the use of energy and available local resources, and are highly resistant (Funes and Tittonell, 2009).

In Cuba, agriculture is constituted as a primary activity, in many cases to the detriment of other areas such as livestock or forestry. New productive forms are increasing at the local level, however, the lack of an inventory of TOF and an analysis of their function in sustaining the production systems in which they are inserted persist within them.

The objective of this study was to analyze the evolution of TOF on the Maripa farm, based on different temporal scenarios that have occurred over time.

MATERIALS AND METHODS

The study was carried out on the Maripa farm, located in Cuchilla 20, municipality of Cumanayagua, Cienfuegos province, Cuba, coordinates: 220908N 801204°, given its geographical location in an area adjacent to the Guamuhaya Mountain Range and the intramontane valley of the municipality, distinctive of a vulnerable natural landscape environment. The study site dates back to the first half of the 20th century, at that time, with

a gross area of 67.10 ha. It was divided into five farms or "plots" of approximately 13.42 hectares each.

To study the evolution of the TOF, a diachronic analysis was approached through the method of synchronous cuts (Bolós, 1992), which consists of the comparison of different temporal scenarios that occur over time, based on the realization of spatial cuts.

The chosen temporal axis was specified in three successive sections in time, 1935-1965, 1966-1996, with an interval of 30 years and 1997-2023, with 26 years. In the three cases, an approximate reconstruction of the conditions of the most significant elements of the landscape was carried out, and the main dynamics of change that occurred in the landscape model of the tree outside the forest for this space were analyzed.

In the research, a cross-sectional examination design with a descriptive approach was used, where qualitative and quantitative aspects were measured, although without correlating or manipulating variables. This design allowed us to investigate the behavior of the local landscape and the dynamics of the TOF in the study area through documentary management, interviews and participatory observation.

In 2023, (the year in which the last cut closes), a floristic inventory of the TOF was carried out down to the family and species level. They were identified taxonomically according to Acevedo y Strong (2013) and Werner y Rankin (2022). On the other hand, it was verified whether the species had any threat category according to the Red List of Cuban Vascular Flora (González, 2016).

The following ecological indicators were also calculated, adjusted to the TOF present on the farm in the third cut (2023):

1. Species richness (S):
    - Number of actual species at the sampling site.
2. Margalef index (Dmg) according to
    - 02.0 Low richness

- 3.05.0 Mean richness
- 5.0 High richness

3. Simpson's Dominance Index (λ):

- 0 0.33 Low dominance.
- 0.34 0.66 mean dominance.
- 0.67 High dominance.

4. Simpson's Diversity Index (1/D):

- Infinite diversity
- There is no diversity.

The range of diversity indicators was according to Villareal *et al*., (2004).

RESULTS AND DISCUSSION

General characteristics of landscape components

Period: 1935-1965

In the original properties of what would constitute the Maripa farm, the existence of a natural forest was not defined as such. The environment was shaped by the presence of large compact groves, with formations that grew in areas naturally occupied by other types of plant cover. In this regard, Matteucci (2012) considered that "groves and forests are not the same thing"; a set of trees alone does not make a forest and trees are not found only in forests. As a consequence, managing trees outside the forest requires specific knowledge about the relationships between trees and their environment.

Table 1 reflects the species mostly present in this first cut. It can be seen how in the beginning there was relative predominance of the space with groves of forest and fruit trees. Highlight the presence on its properties of the Manacas stream, coming from the Guamuhaya

Mountain Range that flowed stable throughout the year and housed riparian species (narrow strip of vegetation along the stream) that accentuated a peculiar environment of the landscape.

Among the most frequent species were: *Bursera simaruba* (L.), *Cedrela odorata* (L.), *Hibiscus elatus* Sw., C *alycophyllum candidissimun* (Vahl) DC., *Andira inermis* (W. Wright) DC., *Zanthoxylun martinicense* (Lam.) DC., *Ceiba pentandra* (L.) Gaertn., *Terminalia tetraphylla* (Aubl.) G & Boatwr (Yellow Jucaro), *Calophyllum antillanum*, *Genipa Americana* L. and *Roystonea regia* (Kunth) O.F. Cook.

The lower stratum was composed of species such as: *Oxandra lanceolata* (Sw.) Baill., *Amyris balsamifera* L., *Nectandra coriácea* (Sw.) Griseb., *Samanea saman* (Jacq.) Merr., *Ehretia tinifolia* L., *Gymnanathes lucisa* (Yaiti), *Cecropia schreberiana* Miq., *Swietenia mahagoni* (L.) Jacq., *Hibiscus elatus* Sw., *Delonix regia* (Bojer ex Hook.) Raf., *Cordia gerascanthus* L., *Crescentia cujete* L., *Juglans jamaicensis* C. DC., *Trichilia hirta* L., *Eryhtoxylon havanense*, *Poeppigia procera* C. Presl.

Table 1. *- Trees in the original area of the farm (1935-1965)*

No.	Family	Species	common name
1	Anacardiaceae	*Mangifera indica* L.	mango
2	Anacardiaceae	*Anacardium occidentale* L.	cashew
3	Anacardiaceae	*Spondias mombin* L.	jobo
4	Anacardiaceae	*Spondias purpurea* L.	plum
5	Annonaceae	*Annona reticulata* L.	custard apple
6	Annonaceae	*Oxandra lanceolata* (Sw.) Baill.	yaya
7	Annonaceae	*Annona squamosa* L.	anon
8	Annonaceae	*Annona muricata* L	soursop
9	Annonaceae	*Annona montana* Macfad.	maroon soursop

10	Annonaceae	*Annona glabra* L	baga
eleven	Arecaceae	*Cocos nucifera* L.	coconut
12	Arecaceae	*Roystonea regia* (Kunth) OF Cook	royal palm
13	Asparegaceae	*Beaucarnea recurvate* L.	elephant foot
14	Apocynaceae	*Pachypodium lamerei* Drake	madagascar palm
fifteen	Bixaceae	*Bixa Orellana* L.	bija
16	Bignoniaceae	*Crescentia cujete* L.	guira
17	Boraginaceae	*Cordia gerascanthus* L.	baria
18	Boraginaceae	*Ehretia tinifolia* L.	chicharron
19	Boraginaceae	*Cordia collococca* L	tie
twenty	Burseraceae	*Bursera simaruba* L. Sarg.	almácigo
twenty-one	Combretaceae	*Terminalia catappa* (L.)	almond
22	Combretaceae	*Terminalia tetraphylla* (Aubl.) G & Boatwr.	yellow jucaro
23	Clusiaceae	*Garcinia bakeriana* (Urb.) Borhidi	manaju
24	Calophyllaceae	*Calophyllum antillanum* Britton	ocuje
25	Euphorbiaceae	*Ricinus communis* L.	higuereta
26	Euphorbiacea	*Adelia ricinella* L.	jia
27	Euphorbiaceae	*Gymnanathes lucida* Sw	yaiti
28	Euphorbiaceae	*Sapium laurifolium* (A. Rich.) Griseb.	dairy
29	Erythroxylaceae	*Eryhtoxylon havanense* Jacq.	arab
30	Fabaceae	*Samanea saman* (Jacq.) Merr.	carob tree
31	Fabaceae	*Gliricide sepium* Kunth	flowering pine nut
32	Fabaceae	*Lonchocarpus domingensis* (Pers.)	guama
33	Fabaceae	*Senna tora* (L.) Roxb	guanine

3. 4	Fabaceae	*Delonix regia* (Bojer ex Hook.) Raf.	framboyan
35	Fabaceae	*Andira inermis* (W. Wright) DC	yaba
36	Fabaceae	*Tamarindus indica* L	tamarind
37	Fabaceae	*Poeppigia procera* C. Presl	tengue
38	Fabaceae	*Guibourtia hymenaeifolia* (Moric.) J.	caguairan
39	Juglandadaceae	*Juglans jamaicensis* C. DC.	walnut
40	Lauraceae	*Persea Americana* Mill.	avocado
41	Lauraceae	*Laurus nobilis* L	laurel
42	Lauraceae	*Nectandra leathery* (Sw.) Griseb	sigua
43	Lauraceae	*Nectandra hihua* (Ruiz & Pav.) Rohwer	sweet potato stick
44	Lythraceae	*Punica granatum* L.)	grenade
Four. Five	Moringaceae	*Moringa oleifera* Lam	moringa
46	Malpighiaceae	*Malpighia emarginata* Sessé & Moc.	cherry
47	Malpighiaceae	*Bunchosia glandulifera* (Jacq.) Kunth	venezuelan plum
48	Malvaceae	*Hibiscus elatus* (Sw.)	majagua
49	Malvaceae	*Guasuma ulmifolia* Lam	guasima
fifty	Malvaceae	*Ceiba pentandra* (L.) Gaertn	ceiba
51	Meliaceae	*Gaurea guidonia* (L.) Sleumer	yamagua
52	Meliaceae	*Trichilia havannensis* Jack.	siguaraya
53	Meliaceae	*Swietenia mahagoni* (L.) Jacq.	mahogany
54	Meliaceae	*Cedrela odorata* L.	cedar
55	Meliaceae	*Trichilia hirta* L	guaban
56	Myrtaceae	*Syzygium malaccense* L. Merr. et Perry.	malacca pear
57	Myrtaceae	*Syzygium jambo* (L.) *Alston*	rose apple

58	Myrtaceae	*Psidium guajaba* L.	guava
59	Myrtaceae	*Eugenia monticola* (Sw.) DC.	guairaje
60	Moraceae	*Ficus membranecea* C. Wright	jaguey
61	Moraceae	*Morus alba* L.	mulberry
62	Moraceae	*Artocarpus altilis* Parkinson) Fosberg	breadfruit tree
63	Oxalidaceae	*Averrhoa carambola* L.	cannon
64	Oxalidaceae	*Averrhoa bilimbi* L.	pickle
65	Polygonaceae	*Coccoloba uvifera* (L.)	caleta grape
66	Rhamnaceae	*Ziziphus jujube* Mill	little apple
67	Rosaceae	*Prunus myrtifolia* (L.) Urb.	cuajani
68	Rosaceae	*Prunus persica* (L.) Batsch	peach
69	Rutaceae	*Amyris balsamifera* L	cuaba
70	Rutaceae	*Amyris elemifera* L.	white cuaba
71	Rutaceae	*Zanthoxylum martinicense* (Lam) DC.	ayúa
72	Rubiaceae	*Calycophyllum candidissimun*	dagame
73	Rubiaceae	*American Genipa* L.	jagua
74	Sapotaceae	*Pouteria zapota* (Jacq.) HE	red mamey
75	Sapotaceae	*Sideroxylon foetidissimum* Jacq	jocuma
76	Sapotaceae	*Pouteria campechiana* (HBK) Baehni.	canistel
77	Sapotaceae	*Chrysophyllum cainito* L.	caimito
78	Sapindaceae	*American cupania* L.)	guarana
79	Sapindaceae	*Melicoccus bijugatus* Jacq.	mamoncillo
80	Samydaceae	*Casearia laetioides* (A. Rich.) Northr.	guaguasi
81	Urticaceae	*Cecropia schreberiana* Miq	yagruma

The most representative fruit trees: *Averrhoa carambola* L., *Averrhoa bilimb* i L., *Syzygium malaccense* L., *Persea americana*, *Tamarindus indica* L., *Annona glabra* L., *Psidium guajaba* L., *Annona muricata* L., *Spondias purpurea* L., *Annona montana*, *Spondias mombin* L., *Mangifera indica* L., *Artocarpus altilis* Fosberg, *Cordia collococca* L., *Anacardium occidentale* L., *Melicoccus bijugatus*, *Pouteria campechiana*, *Pouteria sapota*, *Chrysophyllum cainito* L., *Terminalia catappa* L., *Annona reticulata* L., *Annona squamosa* L., *Cocos nucifera* L. and *Persea americana.*

As a need for the growth of Cuban industry, to facilitate the use of its natural resources and eliminate agricultural monoculture, on May 17, 1959, the First Law of Agrarian Reform was promulgated and later in 1963 the Second Law, which brought with it a change gradual increase in land use. The loss of forested areas increased and timber species were reduced. The promotion of agricultural spaces for the production of various crops began with a fragmentation of the farm.

Period: 1966-1996

Between 1966 and 1990, the transformation of the environment was accentuated with the breakup of compact groves and a trend towards agroforestry landscape, whose differentiation parameter has been based on the behavior of the "tree" element (natural or cultivated trees; dense or dispersed; continuous or discontinuous).

Between the years 1993-2002, the reform was present in the Cuban agricultural model on the possession and exploitation of land linked to the decentralization of agricultural exploitation through the delivery of land in usufruct and the creation of the Basic Cooperative Production Units and other productive forms (Casimiro, 2016).

For this stage, there was an important constructive growth in infrastructure in the area of the new agricultural proposals that arose (new types of dairy farms, breeding centers, family houses, administrative spaces, roads, etc.). In the municipality, transformations occurred in the components of the landscape, both natural and agroforestry, with a tendency toward urban growth.

Period: 1997-2023

An increase in lands given in usufruct to natural and legal persons was reported with the implementation of Decree Law 259/2008, later repealed by Decree Law 300/2012, which led to the highest percentage of agricultural land dedicated to the production of various crops were under the cooperative regime (Casimiro, 2016). The above accentuated the fragmentation of the area and facilitated the incorporation of new owners, reinforced by Decree Law 358/2018.

In 2008, the farm was established as an independent productive form. Already in 2021, it assumed the name of Maripa, as a family farm, attached to the Basic Cooperative Production Unit (UBPC) Urban Agriculture of the municipality of Cumanayagua.

Maripa currently maintains an agroforestry landscape with intrusions that break the continuity that this space offered in the temporary cuts, although small spaces of natural vegetation appear, made up of extensions that behave like stands of vegetation, and are interspersed with mixed crop plots and edge trees limited to open space (boundaries), which mix profusely with other components of the landscape.

At the end of the first half of 2023, a survey of the TOF present on the farm was carried out to determine the ecological indices (Table 2)

Table 2.- *Species richness and diversity indices*

Families	Individuos	Species richness (S)	Margalef index	Simpson index	
				Dominance	Diversity
33	933	64	9,212	0.168	0.831

The presence of 64 species can be seen on the Maripa farm. The families with the greatest representation are: Fabaceae (7), Annonaceae (5), Anacardiaceae (4), Sapotaceae (4), Meliaceae, Myrtaceae, Lauraceae and Euphorbiaceae with three species respectively. The Margalef Index, with a score of 9.212, reflected a high species richness (> 5.0), according to Villareal *et al.* (2004).

Regarding the Simpson Index, dominance was low, with a value of 0.168, while diversity was high, 0.831, both cases according to Villareal *et al.,* (2004). An inversely proportional behavior of diversity with respect to dominance is observed. This information allows us to assert that on the Maripa farm the TOF are diverse and at the same time equitable in terms of the presence and distribution of species.

García *et al.,* (2022) carried out a survey of fruit tree species in the Rafaelito Popular Council of the municipality of Cumanayagua, an area adjacent to the study site, and reported 33 botanical families with 69 species, among the most represented: Rutaceae, Annonaceae, Anacardiaceae and Sapotaceae, as well as low dominance with high diversity.

Values greater than five of the Margalef index can give an idea of the high species richness in the systems (López *et al.,* 2017), while Magurran (1988), cited by Blanco (2014), considers values greater than five as an indicator of high diversity in the ecosystem, which seems to coincide with the results achieved.

As a result of the survey carried out, 20 species were located, represented by a single specimen (*Oxandra lanceolata* (Sw.) Baill, *Annona glabra* (L.), *Crescentia cujete* (L.), *Guibourtia hymenaeifolia* (Moric.) J, *Gymnanathes lucida Eryhtoxylon havanense, Delonix regia* (Bojer ex Hook.) Raf, *Laurus nobilis* L, *Punica granatum* L.), Nectandra *coriacea* (Sw.) Griseb, S *yzygium malaccense* L. Merr. et Perry, *Syzygium jambo* (L.) Alston, *Ceiba pentandra* (L.) Gaertn, *Bunchosia glandulifera* (Jacq.) Kunth, *Coccoloba uvifera* (L.), *Prunus persica* (L.) Batsch, *Amyris balsamifera* L, *Melicoccus bijugatus* Jacq. , *Pouteria campechiana* (HBK) Baehni., *Chrysophyllum cainito* L.), which indicates the need to increase its reproduction.

In the analysis of the plant species, *Guibourtia hymenaeifolia* (Moric.) J. was located in the preliminary category of Threatened (T) according to the Red List of the Cuban Vascular Flora (2016), which indicates that the species faces a high risk of extinction in the wild. Table 3 lists the tree species that are not currently found in relation to the removal of the first cut (1935-1965). This result indicates 21.95% of species disappeared over time.

Table 3. *- Species not present on the farm in the third time cut (2023)*

.	Family	Species	Common name
1	Annonaceae	*Annona montana* Macfad.	maroon soursop
2	Boraginaceae	*Ehretia tinifolia* (L.)	chicharon
3	Combretaceae	*Terminalia tetraphylla* (Aubl.) G & Boatwr.	yellow jucaro
4	Clusiaceae	*Garcinia bakeriana* (Griseb.) Borhidi	manaju
5	Calophyllaceae	*Calophyllum antillanum* Britton	ocuje
6	Euphorbiaceae	*Sapium laurifolium* (A. Rich.) Griseb.	lechero
7	Fabaceae	*Andira inermis* (W. Wright) DC	yaba
8	Juglandadaceae	*Juglans jamaicensis* C. DC.	walnut
9	Lauraceae	*Nectandra hihua* (Ruiz & Pav.) Rohwer	sweet potato stick
10	Meliaceae	*Cedrela odorata* (L.)	cedar
eleven	Meliaceae	*Swietenia mahagoni* (L.) Jacq.	mahogany
12	Malvaceae	*Hibiscus elatus* Sw.	majagua
13	Moraceae	*Ficus membranecea* C. Wright	jaguey
14	Myrtaceae	*Eugenia monticola* (Sw.) DC.	guairaje
fifteen	Rubiaceae	*American genipa* (L.)	jagua
16	Rubiaceae	*Calycophyllum candidissimun*	dagame
17	Rutaceae	*Amyris elemifera* (L.)	white cuaba
18	Samydaceae	*Zuelania guidonia* (Sw.) Britton & Millsp.	guaguasi

CONCLUSIONS

A dynamic change of the landscape towards an agroecosystem was evident over time, in close coexistence of cultivated lands and forest remnants, with 21.95% of species not present on the farm in relation to the first cut.

At the close of the third cut, 64 species belonging to 33 botanical families were quantified, with a greater representation of: Fabaceae, Annonaceae, Anacardeaceae and Sapotaceae.

The species *Oxandra lanceolata* (Sw.) Baill, *Annona glabra* L, *Crescentia cujete* L, *Guibourtia hymenaeifolia* (Moric.) J, *Gymnanathes lucida, Eryhtoxylon havanense* , *Delonix regia* (Bojer ex Hook.) Raf, *Laurus nobilis* L, *Punica granatum* L.), *Nectandra coriacea* (Sw.) Griseb, *Syzygium malaccense* L. Merr. et Perry, *Syzygium jambo* (L.) Alston, *Ceiba pentandra* (L.) Gaertn, *Bunchosia glandulifera* (Jacq.) Kunth, *Coccoloba uvifera* (L.), *Prunus persica* (L.) Batsch, *Amyris balsamifera* L, *Melicoccus bijugatus* Jacq., *Pouteria campechiana* (HBK) Baehni., *Chrysophyllum cainito* L. are represented by only one specimen.

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