# Use of Medicinal Plants of Brazilian Caatinga in a Perspective of Solidarity Economy

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***Abstract—*** *The culture of using medicinal plants is a practice that has been present since ancient times and is passed on from generation to generation by indigenous peoples, traditional populations that are made up of farmers, researchers. This work aims to perform a survey of the ways in which medicinal plants are used by students of Youth and Adult Education and their perspectives for a solidarity economy in a Municipal School in the Picuí city, Paraiba, Brazil. This research has a qualitative and quantitative character, which involves the obtaining of descriptive data, obtained in the direct contact of the researcher with the studied situation, emphasizes the process more than the product and is concerned with portraying the perspectives of the participants about the use of medicinal plants, using as main tools the application of questionnaires and a lecture-class. According to the characteristics of the system of production of medicinal plants described in this research, family farming presents favorable conditions for its cultivation. It is, therefore, another alternative in the generation of employment and income through a solidarity economy for this segment so important and representative of Brazil.*

***Keywords— Medicinal Plants, Solidary Economy, Family Agriculture.***

## I. INTRODUCTION

The culture of using medicinal plants is a practice that has been present since ancient times and is passed on from generation to generation by indigenous peoples, traditional populations that are made up of farmers, researchers and so on [1]. According to the World Health Organization medicinal plant is any and all plant which possesses, in one or more organs, substances which may be used for therapeutic purposes or which are precursors of semi-synthetic drugs, which when used for the treatment of both human as of animals, through their pharmacological action are capable of alleviating, curing or preventing physical or mental illnesses [2].

According to Heinrich et al. [3], a plant with a relatively high index can suggest a real effectiveness in the treatment of the disease, because in ethnobotanical studies this index will facilitate the selection of species for pharmacological tests that may prove an efficacy of its active principles. The study of medicinal plants and their relationship with the people over the years is studied by ethnobotany [4]. The term ethnobotany was formally designated in 1895 as the study of plants used by primitive and aboriginal peoples and, by virtue of this initial definition, has long been understood on the basis of this concept.

Brazil has the greatest biological diversity on the planet, becoming a target of greed for scientific communities around the world. The Brazilian cerrado contains more than 6000 vascular plants, many of them used as food and for therapeutic purposes. In the area of medicine, tropical plants offer properties for the production of analgesics, tranquilizers, diuretics, laxatives and antibiotics among others. The global commercialization of secondary products totals an average of 200 million dollars a year [5, 6].

The Caatinga biome occupies an exclusively Brazilian area of 850 thousand km², representing 10% of the Brazilian territory and encompassing the nine states of the Northeast, plus the north of Minas Gerais. Rich in biodiversity, the Caatinga biome houses 591 bird species, 177 reptiles, 79 amphibian species, 241 fish species, 221 bees and 178 mammal species. The flora of the Caatinga has peculiar characteristics that differentiate it from the variety of exuberant colors of the humid tropical forests, the physiognomies visualized by many transcends the idea of biome of very low diversity starting from the assumption of the aspects as its vegetation presents / displays aspects of an ugly one and dry. The vegetation that characterizes the Caatinga is composed mainly by plants like umbuzeiro (*Spondia tuberosa*), the belly (*Chorizia ventricosa*), the kidney beans (*Capparis yco*), the barauna (*Schnopsis brasiliensis*), the favelone (*Cnidosculus phyllacanthus*), the iron-dick (*Caesalpinia ferrea*), juazeiro (*Ziziphus joazeiro*), the camaratuba (*Cratylia mollis*), catingueira (*Caesalpinia pyramidalis*), canafistula

(*Peltophorum dubium)*, amburan (*Commiphora leptophloeos*) and the pinhão-bravo (*Jatropha molíssima*) and the *cactaceae* that occur most frequently in the region are the palms *Opuntias*, mandacaru (*Cereus jamacaru*), xique-xique (Pilocereus *gounellei*), crown of monks (*Melocactus Zehntneri*) [7-10].

In relation to the knowledge how medicinal plants are used for medicinal purposes are the most diverse in the Caatinga areas. The knowledge practiced in the daily life in rural communities about medicinal plants are intrinsically related to the natural resources available in the environment in which they are inserted as well as in the reproduction of customs and practices that are passed on over the years from generation to generation. According to Albuquerque [11], rural communities are responsible for maintaining a large number of native and exotic plants to meet the most varied needs, especially food and medical needs, so empirical knowledge of these populations can provide important information for research and thus, many scientific discoveries can and will happen.

According to Albuquerque [11], medicinal plants are plant species that have several types of active principles, which can act in the organs of humans and animals, combating various diseases, eliminating causative agents such as worms, fungi and bacteria. Strong preventive action against many other health problems. In a number of forums, claims and scientific research have identified the need for a directive that will provide guidelines to be followed by all in order to promote the conscious and sustainable use of plants used to treat pathologies [12].

A large part of the world's population relies on traditional approaches to day-to-day health care, and about 80% of the population, especially in developing countries, relies on medicinal plant derivatives for their health care are worked by groups of people who share and exercise the principles and actions of the Solidarity Economy [13].

A characteristic aspect of this type of situation is the combination between the valorization of the local space and the search for answers to specific problems, inserting the solidarity in the collective elaboration of the economic activities involved in the planting. This concern with the local community can lead to two other key characteristics of experience: a combination of economic activities with other social, educational, and political activities; the concern with the appreciation of the sense of work and the commitment to the community. The opening of Solidarity Economy enterprises or ventures is seen as an important basis of competitiveness and as a way of creating new jobs.

The Solidarity Economy is an important tool that goes against the consequences caused by social exclusion for presenting as an alternative income generation to an audience that on several occasions feel the margins in society for being part of a group of people who experience a series of needs arising from social inequalities [14]. The Solidarity Economy is practiced by millions of workers and workers of all extracts, including the most excluded and vulnerable population, organized collectively managing their own work, fighting for their emancipation in thousands of economic solidary enterprises and thus guaranteeing the reproduction of popular life. They are initiatives of collective productive projects, popular cooperatives, collecting and recycling cooperatives of recyclable materials, production, commercialization and consumption networks, financial institutions focused on joint ventures, self-managed companies, family farming cooperatives and Agroecology, service cooperatives, among others, that stimulate local economies, guarantee decent work and income to the families involved, and promote environmental preservation.

Most communities of family farmers have low levels of education, and therefore attend Youth and Adult Education. The new identity with which the Education of Young and Adults presents itself is very heterogeneous, fragmented and complex; Their brand seems to be in the diffusion that people should seek, in education, skills and abilities that endow them with the possibility of employability. This conception is guided by the individualistic horizon and submission, and is expressed in the idea that being educated is to be employable [5]. Farmers attending youth and adult education have various perspectives on the future, they believe that this education can be determinant in school formation as well as in socialization thus promoting improvements in the quality of life, and this can be done through practices of Solidary Economy.

Several daily activities can be incorporated into the Solidarity Economy as a source of income for communities of needy family farmers. Practical knowledge of traditional communities about medicinal plants is closely related to the available natural resources and their cultural heritage, being a sociobiocultural and economic reproduction of their ancestors, which has been transmitted to the present generations. With regard to cultural traits, there is evidence that certain cultures tend to stimulate values that contribute to a greater propensity to entrepreneurship, in that they value initiative and autonomy.

This study aims to provide information to the residents of the city of Picuí, Paraiba, on the benefits of the use of medicinal plants as well as their implications for human health, as well as their viability as a presupposition for the practice of the Solidarity Economy. Therefore, it intends to contribute knowledge that leads to the proper use of plants and, consequently, to the wellbeing of individuals. The poorest communities, and even those with little study, are responsible for maintaining knowledge of a large range of native and exotic plants, to meet the most varied needs, especially food and medical needs, thus empirical knowledge of these populations, can provide important information for research and thus, many scientific discoveries. In this way, the general objective of this work is to perform a survey of the ways in which medicinal plants of the Caatinga are used by family farmers of young and adult education and their perspectives for a Solidary Economy.

## II. MATERIALS AND METHODS

### 2.1 Public Studying

The study site was the municipality of Picuí that is located in the mesorregion of Borborema, in the microregion of the eastern semiarid of Paraiba, Brazil. The climate is semiarid (desert), hot and dry, with average temperature of 26ºC. The native vegetation predominant in the municipality is the Caatinga, of the arboreal shrub type. The study was conducted with 220 farm students attending the Youth and Adult Education in a Municipal School.

### 2.2 Research Characterization

This research has a qualitative and quantitative character, which involves the obtaining of descriptive data, obtained in the direct contact of the researcher with the studied situation, emphasizing the process more than the product and is concerned with portraying the perspectives of the participants about the use of medicinal plants of the Caatinga.

### 2.3 Procedure

The research activities began with a classroom in the form of a talk wheel; we use media resources where we approach concepts about youth and adult education. A semi-structured questionnaire was used to know the socioeconomic profile of the farmer's students and also served as the basis for a second part of the research where the participants' perspectives on Youth and Adult Education, medicinal plants and the Solidarity Economy were investigated through a Lecture-class. The questionnaire briefly explains the intentions of the research in which no participant is identified. To fulfill the research objectives, the questionnaire was divided into two parts. The first part includes socioeconomic data such as sex, age, schooling, family income and number of people per residence. The second part investigates the use of medicinal plants of the Caatinga, the expectations regarding the return to the school environment and the perspectives of the use of medicinal plants in the Solidarity Economy.

A brief quantitative analysis of students' perspectives and a qualitative evaluation of the relationship between knowledge about medicinal plants from the Solidarity Economy perspective were carried out. For the organization and processing of data we use elements inspired by content analysis to identify what is being said about a given topic. The answers of the interviewees, when they appear, will be transcribed in italics and in quotation marks for a better differentiation in relation to the text of the discussion.

## III. RESULTS AND DISCUSSIONS

The study was carried out with 220 family farmers' students attending the Municipal School in the form of Education of Young and Adults, sixth and seventh year. Approximately 60% of the family farmers of the Education of Youths and Adults, interviewed are male. The data obtained in the aforementioned study suggest that women are more difficult to return to the school environment, but when they return to the classroom, drop-out is lower. Interviewees attending school have varying ages, ranging from 15 to 59 years of age: 36% up to 20 years; 18% between 20-30 years; 23% between 30-40 years; 5% between 40-50 years and 18% between 50-60 years. These data show that the profile of the pupil in this school is made up of young and middle-aged adults, raising the hypothesis that the search for education is present in the most diverse age groups.

Regarding the time that the participants of this study were distant from the classroom, there was enormous variation between the answers. Among those interviewed, approximately 50% are adolescents who, for reasons of work in agriculture, were transferred from other shifts. The time they spent outside of school ranged from one to three years. They do not consider that they stopped studying, say that because of various difficulties they have not yet been able to complete their studies and see in

teaching young people and adults a possibility to move forward to achieve better opportunities in life. Given the results obtained, it is observed that many people are returning to the school environment due to the consequences generated by the knowledge gap and others because they did not attend school when children and adolescents due to residing in rural areas at the time and help parents in the Agriculture being, at that time, unable to study because of difficulties in access to education.

When asked why they wanted to go back to school, the reasons were varied. The objectives are distributed on a large scale that covers the most diverse searches of knowledge, which go from learning to perform calculation of simple sum to the pleasure of writing a letter to a friend. They are desires and dreams that can be achieved with a learning built in the school environment and in the coexistence with other students. When questioned about the importance of youth and adult education, 70% of respondents broadly answered that it is important, because they work during the day and study at night, thus being a way to progress in studies. Some lines are quoted below:

*"The right and opportunity to make up for lost time and qualify for the job market."*

*"Learning is life-enhancing and having the day to hunt a job."*

It was sought to know the importance of Youth and Adult Education in the lives of the agricultural students. In the interviewees' speeches, it was observed that the search for systematized knowledge and the return to the school environment is of the utmost importance for workers citizens who need to learn new knowledge for the development of their abilities, to seek a job and for the well-being of the social individual. According to data related to the size of the families of the students interviewed in this study, it is observed that approximately 65% belong to families composed of more than four members, with houses with up to seven people found. The data show that families are numerous and survive on low pay.

Inquiring whether the research participants use medicinal plants, it was found that 85% of the interviewees use the plants for the purpose of curing the diseases and only 15% said they do not use the plants for that purpose. However, some of these participants contradict themselves when they report using a specific plant to cure fever and flu. The use of medicinal plants is a customary practice. It was questioned if the medicinal plants offer some benefit and among the participants it was almost unanimous that the plants always cure the diseases. The students highlight the healing power of various pathologies, mainly of problems related to the respiratory system, digestive system and in the treatment of inflammatory processes. There is mention, several times, of the low cost and benefit ratio caused by medicinal plants. Among the methods of preparation and use of medicinal plants, we sought to know which are most frequently used: Tea, plaster, licker, mixtures of plants with solvent, cooking and others.

The plants are used for phytotherapic purposes in the forms of lickers, bottles and cooking in most cases to treat flu, stomach problems and inflammatory processes. Most of the interviewees (85%) use medicinal plants in the form of teas. Tea is a drink that can be prepared through maceration, infusion and decoction. The most used method of preparation is to take the part of the plant along with water to the fire until it reaches the boil. In this process it is common to use flowers, leaves, stems and roots [15].

If on the one hand these new ways of life assimilate the essence of the urban forms of coexistence, on the other, they retain old practices from their rural origins, which continue to manifest themselves in vocabulary, cooking, arts, sociability, etc. In these communities, high levels of unemployment and underemployment are observed, as well as serious shortages of basic services [16]. Vulnerability to food, nutritional and health insecurity is a recurring characteristic among families, due to the combination of two interdependent factors: the difficulty of access to food, due to low levels of family income, and the tendency towards homogenization of dietary habits, which prevails the low nutritional quality of the diets, usually lacking vitamins and minerals. The interviewees were asked which plants were most used in phytotherapic form and what the purpose of use was. The above-mentioned plants and herbs can be seen in Table 1.

Regarding the way of acquisition of medicinal plants, it is noticed that the majority of the interviewed grows in their backyards or acquires with neighbors and relatives for free. There is an interchange of plants and related knowledge, this is generally passed down from generation to generation and constitutes an important traditional knowledge that must be preserved.

**TABLE 1**
**NAMES OF PLANT FAMILIES VERSUS INDICATIONS AND NUMBER OF CITATIONS.**

| Plant Family | Scientific name | Popular name | Indicated use | Number of quotes |
|---|---|---|---|---|
| Amaranthaceae | *Chenopodium ambrosioides.* | Mastruz | Flu and Worm | 30 |
| Anacardiceae | *Myracrodruon urundeuva* | Aroeira | Cured bad flu | 40 |
| | *Anacardium occidentale* | Cashew | Infections | 30 |
| Asteraceae | *Achyrocline satureioides* | Marcela | Intestine | 20 |
| Caprifoliáceas | *Sabucus ebulis L.* | Elderberry | Fever | 70 |
| Euphorbiaceae | *Cnidoscolus phyllacanthus* | Favelone | Anti-inflammatory | 20 |
| Fabaceae | *Amburana cearensis* | Imburama | Inflamation | 10 |
| | *Dipteryx odorata* | Cumaru | Flu and Fever | 10 |
| | *Bauhinia forficata* | Mororó | Diabetes | 20 |
| Lamiaceae | *Rosmarinus offcinallia* | Rosemary | Heart, Soothing | 20 |
| | *Mentha x villosa* | Small Flower Mint | Flu | 30 |
| | *Ocimum basiliam* | Basil | Earache and Cholesterol | 20 |
| | *Melissa officinali* | Bee balm | Intestine | 110 |
| | *Mentha spicata* | Broad Leaf Mint | Infections and Influenza | 40 |
| Liliaceae | *Aloe vera* | Slug | Worms | 50 |
| Monimiaceae | *Peumus boldus* | Boldo | Intestine | 110 |
| Mytaceae | *Eucalyptus globulus* | Eucalyptus | Flu and Fever | 10 |
| Poaceae | *Cymbopogon citratus* | Holy grass | Soothing and Intestine | 20 |
| Rubiceae | *Moringa citrifolia* | Noni | Inflamation | 10 |
| Rutaceae | *Citrus sinensis* | Orange | Soothing | 10 |
| | *Ruta graviolens* | Rue | Heart | 30 |
| Sapotáceae | *Sideroxylon obtusifolium* | Quixabeira | Anti-inflammatory | 20 |

One of the principles of the Solidarity Economy is the collective appropriation of the means of production by the members of collective decisions and deliberations on the directions of production, the use of surpluses and also on collective responsibility for the eventual losses of the economy organization Bauhardt [14]. A solidarity practice occurs in the relations of coexistence between the students farmers. This became clear at the time the questionnaires were being applied in the classroom, as well as when respondents stated that they purchased the plants at family sites with almost no financial cost whatsoever. There is a Solidarity Economy established in actions of good neighborhood, using and passing on knowledge about the use of medicinal plants. In the definition of Solidary Economy, the answers were the most diverse: two participants did not respond, one said they did not understand and the others exposed their concepts even in a practical way:

*"It is a work that acts in groups and one helps the other and divides the profits in half"*

*"Sharing with the other helps next."*

*"Work groups without anyone taking advantage of the other in profits."*

*"The economy that benefits the people in my house."*

Analyzing qualitatively the answers of the questionnaires, it is possible to verify that the collaborators of this study know, understand and practice Solidary Economy. In their statements they emphasize that it is the correct partition [of goods] without using illicit means with the companion. Another participant recognizes that in their family they practice solidarity

economy, because their parent makes wooden toys and members of the whole family participate in the process, either assisting in the finalization of the products or performing sales services.

Some strategies have been considered as priorities to support and intermediate the adaptation of family agriculture to the new market requirements, including in the Solidarity Economy. According to Suess-Reyes and Fuetsch [17], values-oriented markets such as ethics, tradition, natural and ecological production, and social justice have emerged and have shown significant growth. The cultivation of differentiated products is a good example of this movement. Meeting new requirements in terms of quality and respecting the environment, these alternatives reveal great opportunities for the use of production systems suitable for small properties.

In this context, the production of medicinal plants also forms part of an interesting solidarity economy alternative for family producers [18]. From these plants, active principles are extracted for the manufacture of medicines used for the treatment and cure of diseases (herbal medicine). Its sustained production, both cultivated and exploited (extractivism), sees great market potential, whether for artisanal or industrial use, or for the internal or external market.

## IV. CONCLUSION

It was verified that the interviewed farmers know a great amount of native and exotic plants, belonging to several botanical families, and informally practice a type of Solidary Economy. The planting and cultivation of medicinal plants in the Picuí city, by young and adult educators, have important interfaces with several other aspects of the urban ecosystem that go beyond the production of herbal products. One of the fundamental dimensions is the cultural rescue, of relation and care with the environment and with the plants, besides propitiating new sociabilities. The fact is that the recovery of ties of sociability and the elevation of self-esteem provided by urban culture dynamics contribute directly to the search for collective and individual strategies to promote higher levels of food, nutritional and health security.

According to the characteristics of the system of production of medicinal plants described in this research, family farming presents favorable conditions for its cultivation. It is, therefore, another alternative in the generation of employment and income through a Solidarity Economy for this segment so important and representative of Brazil.

## REFERENCES

[1] H. A. Rezende, M. I. Cocco, and M. Sérgio. A utilização de fitoterapia no cotidiano de uma população rural. Rev. Esc. Enferm., vol. 36, n. 3, pp. 282-288, 2002.

[2] D. P. Briskin. Medicinal plants and phytomedicines. Linking plant biochemistry and physiology to human health. Plant Physiology, vol. 124, n. 2, pp. 507-514, 2000.

[3] M. Heinrich, S. Edwards, D. E. Moerman, and M. Leonti. Ethnopharmacological field studies: a critical assessment of their conceptual basis and methods. J. Ethnopharmacology, vol. 124, n. 1, pp. 1-17, 2009.

[4] J. Friedman, Z. Yaniv, A. Dafni, and D. Palewitch. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev Desert Israel. J. Ethnopharmacology, vol. 16, n. 8, pp. 275-287, 1986.

[5] M. C. B. Fischer, and A. C. F. Godinho. Work, Education and Human Emancipation Humana: Affirming Youth and Adult Education as a right. Educ. Policy Anal. Archives, vol. 22, n. 1, pp. 65-69, 2014.

[6] M. A. M. Maciel, A. C. Pinto, V. F. Veiga Junior, N. F. Grynberg, and A. Echevarria. Plantas medicinais: a necessidade de estudos multidisciplinares. Quím. Nova, vol. 25, n. 3, pp. 429-438, 2002.

[7] E. L. Araújo, C. C. Castro, and U. P. Dynamics of Brazilian Caatinga - A review concerning the plants, environment and people. Functional Ecosystems and Communities, vol. 1, pp. 15-28, 2007.

[8] J. C. O. Santos, A. P. Costa, A. L. Araújo, J. S. Martins, L. F. B. Oliveira, V. C. Lima, R. J. Oliveira, D. L. Dantas, and F. M. A. Melo. The Juazeiro (*Ziziphus Joazeiro Mart.)* and the Formation of Concepts and Parameters in Chemical Technology Education. Asian J. Appl. Sci., vol. 5, n. 2, pp. 137-141, 2017.

[9] J. C. O. Santos, A. P. Costa, A. L. Araújo, and J. S. Martins. Chemistry and Sustainable Development: The Use of Brazilian Regional Plants in the Context of Chemical Concepts. Acad. J. Scient. Res., vol. 4, n. 9, pp. 276-278, 2016.

[10] J. C. O. Santos, J. P. Dantas, C. A. Medeiros, P. F. Athaíde-Filho, M. M. Conceição, and A. G. Souza. Thermal Analysis in Sustainable Development: Thermoanalytical study of faveleira seeds (*Cnidoscolus Quercifolius*). J. Therm. Anal. Calorim., vol. 79, n. 5, pp. 271–275, 2005.

[11] U. P. Albuquerque, P. M. Medeiros, A. L. S. Almeida, J. M. Monteiro, E. M. Lima Neto, J. G. Melo, and J. P. Santos. Medicinal plants of the Caatinga (semi-arid) vegetation of NE Brazil: a quantitative approach. J. Ethnopharmacology, vol. 114, n. 3, pp. 325-354, 2007.

[12] E. F. Okosodo, J. O. Orimaye, and O. O. Ogunyemi. Foraging Strategies of Some Bird Species Feeding on Moringa oleifera Leaves in Covenant University Farm Ota, South Western Nigeria. Acad. J. Agric. Res., vol. 3, n. 11, pp. 337-341, 2015.

[13] F. C. S. Oliveira, R. F. M. Barros, and J. M. Moita Neto. Plantas medicinais utilizadas em comunidades rurais de Oeiras semiárido piauiense. Rev. Bras. Plantas Med., vol. 12, n. 3, pp. 282-301, 2010.

[14] C. Bauhardt. Solutions to the crisis? The green wew deal, degrowth, and the Solidarity Economy: Alternatives to the capitalist growth economy from an ecofeminist economics perspective. Ecological Econ., vol. 102, n. 1, pp. 60-68, 2014.

[15] L. C. Di Stasi, G. P. Oliveira, M. A. Carvalhaes, M. Queiroz-Junior, O. S. Tien, S. H. Kakinami, and M. S. Reis. Medicinal plants popularly used in the Brazilian Tropical Atlantic Forest. Fitoterapia, vol. 73, n. 1, pp. 69-91, 2002.

[16] C. D. Souza, and J. M. Felfili. Uso de plantas medicinais na região de Alto Paraíso de Goiás, GO, Brasil. Acta Bot. Bras., vol. 20, n. 1, pp. 135-142, 2006.

[17] J. Suess-Reyes, and E. Fuetsch. The future of family farming: a literature review on innovative, sustainable and succession-oriented strategies. J Rural Stud., vol. 47, n.1, pp. 117-140, 2016.

[18] A. Zezza, and L. Tasciotti. Urban agriculture, poverty, and food security: empirical evidence from a sample of developing countries. Food Policy, vol. 35, n. 4, pp. 265-273, 2010.