Research Article

Mutation of Cultural Information on the Use of Plant Complexes in Local Medical Systems

Janilo I. M. Dantas,1 André L. B. Nascimento,2 Taline C. Silva,3 and Ulysses Paulino Albuquerque1

1Laboratório de Ecologia e Evolução de Sistemas Socioculturais, Centro de Ciências Biológicas, Universidade Federal de Pernambuco, Recife, Brazil
2Departamento de Biologia, Universidade Federal do Maranhão, Campus III-Bacabal, Bacabal-MA 65700-000, Brazil
3Grupo de Pesquisa em Etnobiologia e Conservação de Ecossistemas Nordestinos, Departamento de Ciências Biológicas, Universidade Estadual de Alagoas, Palmeira dos Índios-AL 57604-595, Brazil

Correspondence should be addressed to Ulysses Paulino Albuquerque; upa677@hotmail.com

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Despite being an affable strategy of adaptive expectation, the transmission of cultural information can result in unintended changes in the information. This is known as “mutation” in the theory of cultural evolution. The occurrence of information mutations in local medical systems may be greater in some situations. For example, “vegetable complexes” can be used as good study models to show a greater accumulation of mutations due to the variation in the mixtures and combinations of information. Here, we tested the following hypotheses: (H1) medicinal plants in plant complexes generate a greater accumulation of mutations than isolated plants in local medical systems; (H2) information on the medicinal function of the plant species generates a greater proportion of mutations than information on the parts of plants used medicinally; (H3) plants in plant complexes perceived as less efficient undergo more information mutational events; and (H4) changes in information on plant complexes are more random (mutation) than intentional (guided variation). We conducted the study in the Lagoa do Junco community, state of Alagoas, Northeast Brazil. For data collection, we used semistructured interviews to address the use of isolated medicinal plants and plant complexes. Additionally, we assessed the informants’ perceptions about the effectiveness of the plants used in these preparations. We found that the mutation rate was higher when isolated plants were used than when plant complexes were used (p = 0.02), and it was also higher for function than for parts of the medicinal plants (p < 0.001). No relationship between the mutations and perceived efficiency of the plants (p = 0.19) was observed, and changes in information were more random (mutation) than intentional (guided variation) (p < 0.001). From an evolutionary perspective, greatly varying information, such as that on plant complexes, did not explain a greater accumulation of mutations. Thus, we suggested that further studies that include other evolutionary parameters that may cause the accumulation of information mutations must be conducted.

1. Introduction

The use of plants for medicinal purposes is considered one of the main strategies adopted by human populations to cure or alleviate various diseases [1, 2]. This shows that the existence of diseases has led people to experiment with natural resources present in the environment, contributing to the formation of local medical systems [3]. In this context, the local medical system is a set of perceptions that humans have about diseases and the methods and resources they use to treat health problems [3, 4].

In local medical systems, isolated medicinal plants or plant mixtures or preparations, herein referred to as plant complexes, can be used. The plant complexes include the “bottled,” “syrups,” and “lickers” [5]. Various local populations produce these complexes as home remedies with the
function of curing or alleviating one or more diseases [6, 7]. The use of plant complexes dates back many centuries [6]. The practice of using them preferentially for the treatment of diseases, even in the presence of other local options, has become popular [8–10].

The use and production of plant complexes in local medical systems result from the social transmission of information among individuals [8, 11]. However, cultural information is not always reliably transmitted, allowing errors to occur often [12, 13]. Thus, according to the theory of cultural evolution, errors that occur during the transmission of cultural information are called cultural mutations [14]. The errors that occur randomly during the transmission of cultural information are called “information mutations” (information is changed unintentionally) [14]. On the other hand, the errors that occur when information is intentionally altered by individuals are called “guided variations” [14]. Therefore, although the transmission of cultural information plays a key role in cultural evolution, the emergence of certain mutations can lead to failed exchanges of information in social systems because the occurrence of these mutations implies the establishment of behaviors that do not contribute to individual survival (poorly adapted cultural traits) [12, 14, 15].

In the case of information mutations, since local medical systems are characterized as social information systems permeated by the exchange of cultural information [12], the establishment of this process in these systems depends on a set of main factors including (I) incomplete transmission of information [13] (only parts of complex or varied information can be transmitted or assimilated in the minds of individuals); (II) concealment of information [12] (the information transmitted socially among individuals is not always verified after being acquired, favoring people to learn what to do without understanding the reasons for it) [16]; and (III) confusion of the types of information (although the human mind is largely adaptive, its associative authenticity can be counterproductive, leading people to transmit probable information instead of adequate information) [17].

Based on the aspects mentioned above, information mutations may occur when plant complexes are used in local medical systems. These preparations are produced using a combination of widely varying information on medicinal plants and other specific elements [9, 18] in a single event of cultural information transmission, implying a greater probability of the occurrence of information mutations. Thus, in this work, we sought to investigate whether plant complexes functioned as points of accumulation of information mutations in local medical systems. For this, we tested four hypotheses concerning the process of mutation of information. The first hypothesis (H1): the use of medicinal plants in plant complexes tends to generate a greater accumulation of information mutations than the use of isolated plants in local medical systems. Additionally, we expected other factors in the local medical system to contribute to the greater occurrence of information mutations. The second hypothesis (H2): information on the medicinal function of plant species generates a greater amount of mutations than information on the parts of plants used as medicine. In local medical systems in the caatinga environment (seasonal dry forest), the information on the medicinal function of plants tends to vary more than the information on the parts of plant species used by individuals. When this occurs, the use of several plants in plant complexes can cause a “causal mismatch” (unintentional combination of information) [19]. When several plants are used together, there may be a lack of understanding of the real medicinal function of the plants that are included in these preparations.

Considering the evidence that, over time, individuals began memorizing more relevant information from an adaptive point of view due to the limited capacity of the human brain to store complex information about the environment [20], we proposed the third hypothesis (H3): medicinal plants in plant complexes perceived as less efficient suffered the highest number of information mutational events. Furthermore, we proposed the fourth hypothesis (H4): information changes that occur when plant complexes are used are more random (mutation) than intentional (guided variation). Learning information from others, compared to intentionally creating, innovating, or changing information (guided variation) [21], is a faster and less costly adaptive strategy [22].

2. Materials and Methods

2.1. Study Area. The study was conducted in the “Lagoa do Junco” community located in the municipality of Santana do Ipanema in the state of Alagoas, Northeast Brazil [23]. The municipality of Santana do Ipanema has a population of 48,232 inhabitants and is located in the mesoregion of the Sertão Alagoano, 207 km from the state capital Maceió [23]. “Lagoa do Junco” has a semirural population, characterized as one of the largest urban and popular neighborhoods in the municipality. Totally 188 individuals (63 families), of which 144 individuals were over 18 years old, resided in this community. In the locality, there are some commercial establishments and public spaces, such as a school, a municipal creche, churches, and a municipal health post, in which individuals from the community can access health services. Additionally, a forest, from where individuals obtain and use natural resources and medicinal plants, surrounds the community. This community was selected for the study because it is comprised of people who produce plant complexes that are used traditionally and supplied to local markets and other neighboring locations in the region.

2.2. Ethical and Legal Aspects. The realization of this study included instructions from the Resolution (466/12) of the National Health Council for research with human beings. The study proposal was sent to the Research Ethics Committee (CEP) and approved under number CAAE: 97380918.9.0000.5207 of the University of Pernambuco (UPE). Additionally, it was submitted to the Biodiversity Authorization and Information System (SISBIO), which provided proof of registration under number 64841-1 for the collection of botanical material from the study site. Those
who agreed to collaborate with the data in this study were invited to sign the Free and Informed Consent Form (ICF).

2.3. Data Collection. The data for this study were obtained from September 2018 to June 2019. For data collection, we conducted semistructured interviews [24] of all people who were over 18 years old and agreed to participate in the research. Thus, 120 people were interviewed (corresponding to 82% of the adult population). To investigate their knowledge on local medicinal plants, we applied the free listing technique [24], according to which the informants were asked to list the names of all plants, used for medicinal purposes, known to them. Following that, we conducted semistructured interviews to address the use of plants individually and in plant complexes. For each plant mentioned by the informants, we asked certain questions including the following: (1) For what disease or diseases is this plant indicated? (2) What are the symptoms related to this health problem? (3) What parts of the plant are used for the treatment? (4) How is the medicine prepared? (5) Of the plants that were mentioned, are any of them used in association with others? (6) If so, what other plants are used? (7) What health problems can be treated using this mixture? (8) From whom did you obtain this knowledge?

2.4. Plant Collection and Identification. Following the semistructured interviews, the guided tour technique [24] was used to collect the botanical material, and the informants were invited to indicate the medicinal plants that were within or near their properties. For this, we collected specimens with their reproductive materials and identified the collected material with the help of botanical specialists. Exsiccated specimens were deposited at the Institute of Agricultural Research of Pernambuco-IPA.

2.5. Local Perception of the Efficiency of Medicinal Plants. After conducting semistructured interviews, we conducted a new stage of data collection in the community. Individual forms were provided to each interviewee, who mentioned using plant complexes, to collect information related to the perceived effectiveness of medicinal plants. We asked each participant to place the plants used in each type of plant complex in the order of their efficiency in treating the indicated diseases, and this resulted in the classification of more and less efficient plants. Additionally, we checked whether possible changes in information were random (mutation) or intentional (guided variation). For this, we assessed the information obtained from individual apprentices (person who acquired information from a specific individual in the local medical system) and transmitters (person who was mentioned as a transmitter of information by the individual apprentices in the local medical system).

2.6. Classification of Information Mutation and Guided Variation. To identify the presence of possible information mutations, we compared the information units (IUs) obtained from the person who learned the information with those obtained from the person who transmitted the information. An IU was the association of the therapeutic target with the plant species and the part of the plant used [25]. For example, "pain–Lippia alba–leaf," "pain–Myracrodruon urundeuva–bark," and "cut–Myracrodruon urundeuva–leaf." For this assessment, we analyzed and compared the data collected in the interviews of the apprentices with that of the transmitters. Mutation was considered when: (1)—the therapeutic target (disease) within the IU indicated by the apprentice was different from that indicated by the transmitter and (2)—when the part of the plant used within the IU indicated by the apprentice was different from that indicated by the transmitter. To avoid misinterpretation of the local therapeutic indications, we referred to the symptoms of each disease mentioned by the informants.

Each individual apprentice and transmitter, who presented divergent information, was notified of their information transmitted during the semistructured interviews. We then asked some inductive questions including the following. (1) You mentioned that you use this mixture to cure the disease X. However, can this mixture be used to cure another type of disease? If so, which one? (2) Have you ever used this mixture to cure another disease in the past? If so, which one? (3) You mentioned that you use parts of certain plants X and Y in this preparation. However, can other parts of plants X and Y be used in this preparation? If so, which ones? It was then possible to compare the IUs obtained from the person who learned the information with those obtained from the person who transmitted the information, verifying whether the divergence was random (mutation) or intentional (guided variation).

2.7. Data Analysis. To assess whether information mutations occurred more frequently in plant complexes than in isolated plants, we calculated the number of times information mutations occurred in individual plants and plant complexes. Then, the average mutation rates for individual plants and plant complexes and the difference in the averages were calculated. Finally, using the Monte Carlo technique, we created a hypothetical null scenario, in which the differences between the averages were simulated 1000 times at random to obtain greater credibility of the statistical results. The differences between the real averages were considered significant when the probability of occurrence was less than the random probability generated by the null scenario \( p < 0.05 \). We used the same procedure to compare (1) the average mutation rate with the average guided variations in plant complexes; (2) the average mutation rate considering the part of the plant used with the average mutation rate considering the medicinal function (treated disease).

To determine whether the perceived efficiency of plants in the plant complex affects the occurrence of mutation, we developed a generalized linear model (GLM) using the binomial family. The dependent variable was the occurrence (1) or not (0) of mutation of cultural information, while the independent variable was the value of the order of the perceived efficiency of the plant. Considering that each plant
complex has a different size (variety in the number of plants inserted in each complex), a factor that directly affected the calculation of the effect of the independent variable in a multilevel GLM was used to consider the variable differences of the complexes. Thus, we verified the effect of efficiency on the mutation rate of random information of each plant complex and tested the existence of an explanatory trend in the GLM, compared with the null model, using ANOVA analysis. All analyses were performed in the R development environment [26] using “lme4” package [27] for multilevel analysis.

3. Results

In the present study, we identified 52 medicinal plant species used alone or in association (Table 1). Of the 120 individuals interviewed, 108 mentioned that they produced or used some type of plant complex. We identified and divided 141 types of plant complexes (Table 2) into five categories: 7 types of medicinal baths (plants immersed in water to obtain decoctions to be used topically), 39 types of teas (plants immersed in water to obtain decoctions to be used orally), 26 types of bottled medicine (plants mixed with alcoholic or sweetened substances to form a preparation to be used through closed containers), 64 types of “lambodes” (plants immersed in sweetened substances to obtain decoctions), and 5 types of syrups (plants immersed in honey to obtain decoctions) (Table 2).

Contrary to our expectations, the results showed a higher mutation rate in isolated plants than in plant complexes; hence, the average mutation rate was significantly higher ($p = 0.02$) for isolated plants (mean = 0.45; standard deviation (SD) = 0.89) than for plant complexes (mean = 0.24; SD = 0.54). Additionally, our analysis showed that the average mutation rate was significantly higher ($p < 0.001$) for function (mean = 0.56; SD = 0.99) than for plant parts (Mean = 0.11; SD = 0.4).

The results indicated that the perceived efficiency of plants in plant complexes was not a reliable variable to explain the existence of information mutations because the inclusion of this variable did not generate a better explanatory model than the null model ($\chi^2 = 1.71; p = 0.19$). Thus, perceived efficiency was not a factor that affected the information mutation rates (Table 3). We also observed that the mean of change was significantly higher ($p < 0.001$) for mutations (mean = 0.24; SD = 0.52) than for guided variations (mean = 0.03; SD = 0.16).

4. Discussion

4.1. Does the Use of Medicinal Plants in Plant Complexes Cause a Greater Accumulation of Information Mutations than the Use of Isolated Plants? In general, some studies [28, 29] have shown that many of the plant complexes used in traditional medicine consist of various medicinal plants. We expected that this fact would make the transmitted information more susceptible to changes during the information transmission process. However, the information on these preparations was more conservative than the information on isolated medicinal plants.

Studies that specifically address the different types of individual learning are necessary to explain the mechanisms that may cause information on plant complexes to become more conservative than information on isolated medicinal plants. These mechanisms include obtaining information on (I) isolated medicinal plants and (II) plant complexes. For instance, since plant complexes are produced using a combination of plants and specific elements, information on these preparations could be acquired from “prestigious individuals” in the local medical system. Prestigious individuals have a high social status due to their personal experiences and generally become models for other people who imitate their behaviors and follow their traditional customs and knowledge. In contrast, the acquisition of information on isolated medicinal plants can take place through different learning pathways, such as from parents to children (horizontal), between individuals of the same generation (vertical), and between individuals with no kinship (oblique) [14]. This would increase the chances of inheritance of information with mutations [21].

It is important to consider the finding that, over time, due to great information diversity, human memory systems have evolved, allowing certain information that is more relevant from the adaptive point of view to be more easily memorized [30]. Thus, we suggested the need for further studies that will assess the differences in the perceived importance of the use of isolated medicinal plants and plant complexes. If the use of plant complexes is perceived more important, this can be considered a determining factor of the information on these preparations being more conservative.

4.2. Does the Information on the Medicinal Function of Plant Species Generate a Greater Amount of Mutations than Information on the Parts of Plants Used Medicinally? The lower mutation rate for information on the parts of plants used medicinally could be explained by the pattern of use of plant species in the local medical system because only stem, bark, and leaves of plants were used medicinally. Thus, since several plants are used together in plant complexes, there may be a lack of understanding of the real purpose of each plant part in these preparations or that transmitted information was more susceptible to judgment errors [17].

4.3. Do Medicinal Plants in Plant Complexes Perceived as Less Efficient by People Suffer the Highest Amount of Information Mutational Events? Over time, individuals had to filter out information relevant to their survival due to the limited capacity of the human brain to store complex information about the environment [20, 30]. Thus, we expected that the information on plants that were considered more efficient by informants would be more conservative than that on plants.
that were considered less efficient by informants. However, although some plants in the local medical system were perceived as more efficient than other plants, the perceived efficiency did not influence the occurrence of information mutations. Thus, modification of information occurred, regardless of the importance of the information.

### 4.4. Are Changes in Information on the Use of Plant Complexes More Random (Mutation) than Intentional (Guided Variation)?

Our results indicated that the changes in information occurring in the system were random, and thus, information transmission was an uncontrollable process [14]. This randomness occurred due to the following mechanisms:

| Common name | Latin name | Botanic family | Voucher |
|--------------|------------|----------------|---------|
| Aroeira      | Myracrodruon urundeuva Allemão | Anacardiaceae | Dantas, JIM929563 |
| Serguêla    | Spondias purpurea L. | Anacardiaceae | Dantas, JIM 92947 |
| Babosa       | Aloe vera (L.) Burm.f. | Asphodelaceae | Dantas, JIM Estéril |
| Grajaú      | Fridericia chica (Humb. & Bonpl.) L.G.Lohmann | Bignoniaceae | Dantas, JIM Estéril |
| Umburana    | Commiphora leptophloeos (Mart.) J.B.Gillett | Burseraceae | Dantas, JIM 92951 |
| Rabo de Raposa | Harrisia adscendens (Gurke) Britton & Rose | Cactaceae | Dantas, JIM 93420 |
| Muçambé     | Tarenaya spinosa (Jacq.) Raf. | Capparaceae | Dantas, JIM 92702 |
| Pratudo     | Kalanchoe cf. crenata (Andrews) Haw. | Crassulaceae | Dantas, JIM 92699 |
| Bom Nome     | Monteverdia rigida (Mart.) Biral | Celastraceae | Dantas, JIM 92952 |
| Melão de São Caetano | Momordica charantia L. | Cucurbitaceae | Dantas, JIM 92696 |
| Pião Roxo    | Jatropha gossypifolia L. | Euphorbiaceae | Dantas, JIM 92700 |
| Quebra Pedra | Phyllanthus amarus Schumach. | Euphorbiaceae | Dantas, JIM 92956 |
| Carrapateira (Mamona) | Ricinus communis L. | Euphorbiaceae | Dantas, JIM 92705 |
| Hortelâ da Folha Pequena | Mentha × villosa Huds. | Lamiaceae | Dantas, JIM 92949 |
| Sambacaitá  | Mesophaerum pectinatum (L.) Kuntze | Lamiaceae | Dantas, JIM 929562 |
| Manjericão  | Ocimum americanum L. | Lamiaceae | Dantas, JIM 92948 |
| Hortelâ da Folha Grande | Plectranthus amboinicus (Lour.) Spreng. | Lamiaceae | Dantas, JIM 92950 |
| Boldo       | Plectranthus ornatus Codd. | Lamiaceae | Dantas, JIM 949561 |
| Alercim     | Rosmarinus officinalis L. | Lamiaceae | Dantas, JIM 949510 |
| Mororó       | Bauhinia chelanthra (Bong.) Steud. | Leg. Caes | Dantas, JIM 92953 |
| Jatobá      | Hymenaea courbaril L. | Leg. Caes | Dantas, JIM 93419 |
| Catingueira | Poinciana pyramidalis (Tul.) L.P. Queiroz | Leg. Caes | Dantas, JIM 92944 |
| Angico       | Anadenanthera colubrina var. cebil (Griseb.) Altschul | Leg. Mím. | Dantas, JIM 92955 |
| Tamarindo   | Tamarindus indica L. | Leg. Mím. | Dantas, JIM 92701 |
| Mulungú     | Erythrina velutina Willd. | Leg. Pap. | Dantas, JIM 92959 |
| Romã         | Punicia granatum L. | Lythraceae | Dantas, JIM 92697 |
| Acerola      | Malpigia emarginata DC. | Malpighiaceae | Dantas, JIM 92945 |
| Hibisco     | Hibiscus rosa-sinensis L. | Malvaceae | Dantas, JIM 92707 |
| Pitanga     | Eugenia pitianga L. | Myrtaceae | Dantas, JIM 92703 |
| Goiabeira   | Psidium guajava L. | Myrtaceae | Dantas, JIM 92706 |
| Capim Santo | Cymbopogon citratus (DC.) Stapf | Poaceae | Dantas, JIM 929564 |
| Juazeiro    | Ziziphus cotinifolia Reissek | Rhamnaceae | Dantas, JIM 92698 |
| Noni         | Morinda citrifolia L. | Rubiaceae | Dantas, JIM 93422 |
| Pé de Limão | Citrus sp. | Rutaceae | Dantas, JIM 92708 |
| Laranjeira  | Citrus x aurantium L. | Rutaceae | Dantas, JIM 92954 |
| Quixabeira  | Sideroxylon obtusifolium (Roem. & Schult.) T.D.Penn. | Sapotaceae | Dantas, JIM 92946 |
| Pimenta     | Capsicum frutescens L. | Solanaceae | Dantas, JIM 93421 |
| Erva Cidreira | Lippia alba (Mill.) N.E.Br. | Verbenaceae | Dantas, JIM 92704 |
| Testa de Touro | Kallstroemia tribuloides (Mart.) Steud. | Zygophyllaceae | Dantas, JIM 92950 |
| Sabugueiro  | Reproductive material not collected | | |
| Poejo        | Reproductive material not collected | | |
| Pau Darco   | Reproductive material not collected | | |
| Mastruz      | Reproductive material not collected | | |
| Jaramataia  | Reproductive material not collected | | |
| Gengibre     | Reproductive material not collected | | |
| Eucalipto   | Reproductive material not collected | | |
| Endro        | Reproductive material Not collected | | |
| Colônia     | Reproductive material Not collected | | |
| Ouricuri     | Reproductive material Not collected | | |
| Amora        | Reproductive material Not collected | | |
| Canela       | Reproductive material Not collected | | |

Table 1: Plants used for medicinal purposes were isolated and as plant complexes by individuals from the Lagoa do Junco community, Santana do Ipanema, Alagoas, NE Brazil.
| Plant complexes | Plants used in the complex | Medicinal function of the complex | Number of people who use it |
|-----------------|----------------------------|----------------------------------|----------------------------|
| Bath 1          | Eucalipto, Hortelã da folha pequena, and Manjericão | Fever                           | 01                         |
| Bath 2          | Aroeira and Alecrim | Respiratory fatigue             | 01                         |
| Bath 3          | Aroeira and Angico | Fever                           | 01                         |
| Bath 4          | Mamona and Hortelã da Folha Grande | Fever and diarrhea             | 02                         |
| Bath 5          | Hortelã da folha grande and Eucalipto | Fever                           | 01                         |
| Bath 6          | Pau darco and Pratudo | Fever                           | 01                         |
| Tea 1           | Capim santo and Erva cidreira | Stress, headache, fever, and diarrhea | 07                         |
| Tea 2           | Goiabeira, Pitanga, and Seriguela | Diarrhea                        | 01                         |
| Tea 3           | Alecrim, Limão and Hortelã da folha Grande | Flu                           | 01                         |
| Tea 4           | Hortelã da folha grande and Hortelã da folha pequena | Headache, flu, and nausea       | 10                         |
| Tea 5           | Pitanga and Goiabeira | Stress                         | 01                         |
| Tea 6           | Erva Cidreira, Capim Santo, and Camomila | Insomnia                      | 01                         |
| Tea 7           | Erva cidreira and Hortelã da Folha Grande | Stress, flu, and fever         | 03                         |
| Tea 8           | Hortelã da Folha Grande, Hortelã da folha Pequena, and Sabugueiro | Flu                           | 01                         |
| Tea 9           | Capim Santo, Hortelã da Folha Grande, Hortelã da Folha Pequena, and Eucalipto | Headache and flu             | 01                         |
| Tea 10          | Hortelã da Folha Grande, Hortelã da folha pequena, Quebra Pedra, and Barbatimão | Flu, prostate, and kidney stone | 01                         |
| Tea 11          | None and Erva Cidreira | Fever                          | 02                         |
| Tea 12          | Angico and Aroeira | Gastritis                      | 02                         |
| Tea 13          | Hortelã da Folha Grande, Hortelã da Folha Pequena, and Alecrim | Flu                           | 01                         |
| Tea 14          | Tamarindo and Hortelã da Folha Grande | Flu                           | 01                         |
| Tea 15          | Hortelã da Folha Grande and Juazeiro | Flu                           | 01                         |
| Tea 16          | Mastruz, Hortelã da folha Grande, Hortelã da Folha Pequena, Alecrim, Juazeiro, and Romã | Flu, fever, cough, and headache | 01                         |
| Tea 17          | Hortelã da Folha Grande and Arruda | Flu                           | 01                         |
| Tea 18          | Sabugueiro and Hortelã da Folha Grande | Fever                        | 01                         |
| Tea 19          | Alecrim and limão | Flu                            | 01                         |
| Tea 20          | Eucalipto and Aroeira | Fever                          | 01                         |
| Tea 21          | Hortelã da Folha Grande and Pratudo | Fever                        | 01                         |
| Tea 22          | Hortelã da Folha Grande and Alecrim | Flu                           | 01                         |
| Tea 23          | Arruda and Alecrim | Flu                            | 01                         |
| Tea 24          | Alecrim, Capim Santo and Boldo | Headache and diarrhea          | 01                         |
| Tea 25          | Cana de Macaco and Romã | Fever                        | 01                         |
| Tea 26          | Boldo, Eucalipto and Manjericão | Fever                        | 01                         |
| Tea 27          | Alecrim and Eucalipto | Headache                      | 01                         |
| Tea 28          | Boldo and Eucalipto | Fever                         | 01                         |
| Tea 29          | Pratudo and Boldo | Diarrhea and fever             | 02                         |
| Tea 30          | Pratudo and Hortelã da Folha Grande | Flu                           | 01                         |
| Tea 31          | Pratudo and Umburana | Flu                           | 01                         |
| Tea 32          | Pau Darco and Romã | Fever                         | 01                         |
| Tea 33          | Quixabeira and Pau Darco | Migraine                     | 01                         |
| Tea 34          | Pau Darco, Quixabeira, and Babosa | Headache and fever     | 01                         |
| Tea 35          | Aroeira and Pra tudo | Fever and headache            | 02                         |
| Tea 36          | Umburana and Alecrim | Flu                           | 01                         |
| Tea 37          | Capim Santo and Alecrim | Fever                        | 01                         |
| Tea 38          | Gengibre and Boldo | Headache and diarrhea         | 01                         |
| Tea 39          | Pra tudo and Eucalipto | Fever                        | 01                         |
| Bottled medicine 1 | Hortelã da Folha Grande, Babosa, Alecrim, and Gengibre | Flu and headache       | 01                         |
| Bottled medicine 2 | Hortelã da Folha Grande, Hortelã da Folha pequena, Alecrim, and Mastruz | Flu                           | 01                         |
| Bottled medicine 3 | Hortelã da Folha Pequena, Pratudo, and Babosa | Flu                           | 01                         |
Table 2: Continued.

| Plant complexes | Plants used in the complex | Medicinal function of the complex | Number of people who use it |
|-----------------|----------------------------|-----------------------------------|-----------------------------|
| Bottled medicine 4 | Hortelã da Folha Pequena, Hortelã da Folha Grande, Arruda, and Gengibre | Flu | 01 |
| Bottled medicine 5 | Aroeira, Pau Darco, Cajueiro Roxo, and Umburana | Gastritis | 01 |
| Bottled medicine 6 | Aroeira, Pau Darco, and Umburana | Knock | 01 |
| Bottled medicine 7 | Pra tudo, Hortelã da Folha pequena, and Laranjeira | Flu and fever | 01 |
| Bottled medicine 8 | Mastruz, Hortelã da Folha Grande, Hortelã da Folha pequena, alicrim, Romã, and Juazeiro | Cough, inflammation, flu, and fever | 01 |
| Bottled medicine 9 | Mastruz, Capim Santo, Aroeira, and Angico | Gastritis | 01 |
| Bottled medicine 10 | Umburana, Angico, Hortelã da Folha Grande, Maracujá de Estralo, Arruda, and Babosa | Flu, gastritis, diarrhea, tiredness, and headache | 01 |
| Bottled medicine 11 | Aroeira, Acriom, and Laranjeira | Wounds and infection | 01 |
| Bottled medicine 12 | Hortelã da Folha Grande, Eucalipto, Juazeiro, Pueijo, and Aloe | Fever, diarrhea, headache, and flu | 01 |
| Bottled medicine 13 | Romã, Mastruz, Hortelã da Folha Grande, and Quixabeira | Gastritis | 01 |
| Bottled medicine 14 | Romã, Hortelã da Folha Grande, and Babosa | Diarrhea | 01 |
| Bottled medicine 15 | Hortelã da Folha Grande, and Aroeira | Flu and fever | 01 |
| Bottled medicine 16 | Angico and Aroeira | Flu and diarrhea; headache and fever | 03 |
| Bottled medicine 17 | Babosa and Hortelã da Folha Grande | Dandruff and headache | 02 |
| Bottled medicine 18 | Babosa and Aroeira | Gastritis and flu | 01 |
| Bottled medicine 19 | Acriom and Pra tudo | Flu and fever | 02 |
| Bottled medicine 20 | Angico, Aroeira, and Umburana | Fever, migraine, and gastritis | 02 |
| Bottled medicine 21 | Angico and Hortelã da Folha Grande | Fever | 01 |
| Bottled medicine 22 | Aroeira, Angico, and Acriom | Flu, fever, and cough | 01 |
| Bottled medicine 23 | Babosa and Pra tudo | Gastritis | 01 |
| Bottled medicine 24 | Angico, Aroeira, and Hortelã da Folha Grande | Flu, headache, and dandruff | 02 |
| Bottled medicine 25 | Aroeira, Angico, and Gengibre | Flu, headache, and fever | 03 |
| Bottled medicine 26 | Umburana and Aroeira | Fever | 01 |
| “Lambedor” 1 | Hortelã da Folha Grande, Hortelã da Folha pequena, and Alho | Cough | 01 |
| “Lambedor” 2 | Hortelã da Folha Grande and Hortelã da Folha pequena | Flu, cough, and fever | 06 |
| “Lambedor” 3 | Sambacaita and Erva Cidreira | General inflammation | 01 |
| “Lambedor” 4 | Hortelã da Folha Grande, Hortelã da Folha pequena, Alho, and Limão | Flu | 01 |
| “Lambedor” 5 | Hortelã da Folha Grande, Hortelã da Folha Pequena, and Cebolinha | Stress | 01 |
| “Lambedor” 6 | Aroeira and Cajueiro Roxo | Uterus inflammation and flu | 02 |
| “Lambedor” 7 | Muçambê, Catingueira, Hortelã da folha Grande, Maracujá de Estralo, Angico, and Aroeira | Asthma and bronchitis | 01 |
| “Lambedor” 8 | Hortelã da folha Grande, Hortelã da folha pequena, and Babosa | Flu | 01 |
| Plant complexes | Plants used in the complex | Medicinal function of the complex | Number of people who use it |
|----------------|----------------------------|----------------------------------|-----------------------------|
| "Lambedor" 9   | Hortelã da Folha Grande, and Babosa | Flu                             | 01                          |
| "Lambedor" 10  | Hortelã da Folha Grande, Alecrim, and Limão | Flu and fever              | 02                          |
| "Lambedor" 11  | Hortelã da Folha Grande, Babosa, and Boldo | Headache and flu | 01                          |
| "Lambedor" 12  | Hortelã da folha Grande, Hortelã da folha pequena Alecrim, and Babosa | Headache         | 01                          |
| "Lambedor" 13  | Hortelã da Folha Grande, Hortelã da Folha Grande, and Umburana | Flu and headache | 02                          |
| "Lambedor" 14  | Hortelã da Folha Grande, Hortelã da Folha Grande, and Gengibre | Cough              | 01                          |
| "Lambedor" 15  | Mastruz, Gengibre and Hortelã da Folha Grande | Flu             | 01                          |
| "Lambedor" 16  | Hortelã da Folha Grande, Hortelã da Folha pequena, Alecrim, Mastruz, Pra Tudo, Boldo, and Eucalipto | Flu and headache | 01                          |
| "Lambedor" 17  | Hortelã da Folha Grande, Hortelã da Folha Pequena, Alecrim, and Boldo | Migraine and dizziness | 02                          |
| "Lambedor" 18  | Hortelã da Folha Grande, Hortelã da Folha pequena, and Pra Tudo | Headache and flu | 02                          |
| "Lambedor" 19  | Hortelã da Folha Grande, Gengibre, Alho, and Arruda | Flu and headache | 02                          |
| "Lambedor" 20  | Laranjeira, Eucalipto, and Capim Santo | Fever         | 02                          |
| "Lambedor" 21  | Laranjeira, Eucalipto, Capim Santo, Hortelã da Folha Grande, and Hortelã da Folha pequena | Flu | 01                          |
| "Lambedor" 22  | Hortelã da Folha Grande, Hortelã da Folha pequena, Mastruz, and Muçambê | Fever | 01                          |
| "Lambedor" 23  | Limão, Hortelã da Folha Grande, and Capim Santo | Flu and headache | 02                          |
| "Lambedor" 24  | Hortelã da Folha Grande, Pra Tudo, and Romã | Flu and fever | 01                          |
| "Lambedor" 25  | Pra Tudo, Alecrim, Hortelã da Folha Pequena, and Arruda | Flu | 01                          |
| "Lambedor" 26  | Hortelã da folha Pequena, Areoeira, Alho, and Pra Tudo | Headache, flu, and fever | 02                          |
| "Lambedor" 27  | Erva Cidreira, Hortelã da Folha Grande, Alho, and Cebolinha | Flu | 01                          |
| "Lambedor" 28  | Pra Tudo and Hortelã da Folha Grande | Flu and tiredness | 01                          |
| "Lambedor" 29  | Hortelã da folha pequena and Camomila | Headache | 01                          |
| "Lambedor" 30  | Pra Tudo, Hortelã da Folha Grande, and Alho | Headache | 01                          |
| "Lambedor" 31  | Hortelã da folha Grande and Alecrim | Flu and fever | 03                          |
| "Lambedor" 32  | Muçambê, Juazeiro, Alecrim, and Angico | Flu | 01                          |
| "Lambedor" 33  | Juazeiro, Alecrim, and Angico | Flu and fever | 01                          |
| "Lambedor" 34  | Pra tudo, Mastruz, and Hortelã da Folha Grande | Flu | 01                          |
| "Lambedor" 35  | Hortelã da Folha Grande, Hortelã da Folha Pequena, Erva Cidreira, and Umburana | Headache | 01                          |
| "Lambedor" 36  | Hortelã da Folha Grande, Hortelã da Folha Pequena, Alecrim, Cebolinha, and Gengibre | Cough | 01                          |
| "Lambedor" 37  | Pra tudo, Mastruz, Areoeira, Sambacaitá, Limão, and Eucalipto | Cough, bronchitis, breathlessness, and fever | 01                          |
| "Lambedor" 38  | Mastruz and Capim Santo | Flu and cough | 01                          |
| "Lambedor" 39  | Angico and Muçambê | Cough | 01                          |
| "Lambedor" 40  | Hortelã da Folha Grande, Hortelã da Folha pequena, and Alecrim | Cough, allergy, flu, hemorrhoid, headache, and fever | 04                          |
| "Lambedor" 41  | Alecrim, Endro, Testa de Touro, and Babosa | Flu | 01                          |
| "Lambedor" 42  | Alecrim, Endro, and Testa de Touro | Fever | 01                          |
| "Lambedor" 43  | Hortelã da Folha grande, Hortelã da Folha Pequena, Laranjeira, Pra Tudo, and Limão | Cough | 01                          |
| "Lambedor" 44  | Hortelã da Folha Grande, Hortelã da Folha Pequena Pra Tudo, and Catingueira | Fever | 01                          |
| "Lambedor" 45  | Hortelã da Folha Grande, Hortelã da Folha pequena, Alecrim, Manjericão, and Babosa | Flu, fever, cough, and sore throat | 01                          |
| "Lambedor" 46  | Sambacaitá, Hortelã da Folha Grande, Hortelã da Folha Pequena, and Mastruz | Cough | 02                          |
| "Lambedor" 47  | Erva Doce and Erva Cidreira | Stress | 01                          |
| "Lambedor" 48  | Hortelã da Folha Grande, Hortelã da Folha pequena, Alecrim, Poejo, Mastruz, and Eucalipto | Flu | 01                          |
(I) concealment of information [12]—information transmitted socially among individuals was not verified, since the people enjoyed transmitting information to other individuals, regardless of whether the information was correct or altered [12, 16]; (II) incomplete transmission of information [13]—since plant complexes are produced using a wide variety of plants and specific elements, only parts of the information on these preparations were memorized and transmitted; and (III) confusion of the different types of information—due to the great variety or complexity of information, altered and/or inadequate information was transmitted [17].

It was found that the exchange of cultural information among individuals was often associated with “trade-offs” (cost and benefit) [21]. Although guided variation favored individuals to adapt to their personal experiences better, learning information from others, compared to intentionally creating, innovating, or changing information, is a faster, more adaptive, and less costly strategy [22]. Therefore, there is a need for further studies that specifically address the preferences of the people in the local medical system between obtaining information and creating their own information.

5. Conclusions

This study highlighted the occurrence of information mutations in local medical systems and showed that the transmission of knowledge on medicinal plants was one of the main factors of this process. Consequently, it may contribute to the establishment of poorly adapted local cultural traits. However, we found that greatly varying

| Plant complexes | Plants used in the complex | Medicinal function of the complex | Number of people who use it |
|-----------------|----------------------------|----------------------------------|-----------------------------|
| “Lambdor” 49    | Hortelã da Folha Pequena, Eucalipto, Alho, Limão, and Alecrim | Diarrhea                          | 01                          |
| “Lambdor” 50    | Pra tudo, Hortelã da folha Grande, Hortelã da Folha pequena, Eucalipto, Alho, Limão, and Alecrim | Flu and cough                     | 01                          |
| “Lambdor” 51    | Pra tudo and Hortelã da Folha Pequena | Flu and headache                  | 02                          |
| “Lambdor” 52    | Hortelã da Folha Grande, Pra tudo, and Romã | Fever                            | 01                          |
| “Lambdor” 53    | Alecrim, limão, Boldo, and Hortelã da Folha Pequena | Diarrhea and headache             | 01                          |
| “Lambdor” 54    | Hortelã da Folha Grande, Babosa, Alecrim, and Mastruz | Flu and cough                     | 02                          |
| “Lambdor” 55    | Hortelã da Folha Grande, Babosa, and Eucalipto | Fever and headache                | 02                          |
| “Lambdor” 56    | Hortelã da Folha Grande, Babosa, Cana de Macaco, and Eucalipto | Fever and headache                | 01                          |
| “Lambdor” 57    | Pra Tudo and Alecrim | Fever and flu                      | 02                          |
| “Lambdor” 58    | Arruda, Alecrim, and Hortelã da Folha Grande | Flu                               | 01                          |
| “Lambdor” 59    | Arruda and Hortelã da Folha Grande | Flu                               | 01                          |
| “Lambdor” 60    | Alecrim and Eucalipto | Headache                          | 01                          |
| “Lambdor” 61    | Arruda, Alecrim, Jatobá, and Pra Tudo | Flu                               | 01                          |
| “Lambdor” 62    | Angico, Aroeira, and Pra Tudo | Fever, diarrhea, headache, and flu | 01                          |
| “Lambdor” 63    | Gengibre, Hortelã da Folha Grande, and Aroeira | Flu                               | 01                          |
| “Lambdor” 64    | Hortelã da Folha Grande, Aroeira, Gengibre, Alecrim, and erva Cidreira | Fever, headache, and flu         | 01                          |
| Syrup 1         | Hortelã da Folha Grande, Hortelã da Folha Pequena, and Umburana | Flu                               | 01                          |
| Syrup 2         | Hortelã da Folha Pequena, and Erva Cidreira | Flu                               | 01                          |
| Syrup 3         | Hortelã da Folha Grande, Hortelã da Folha Pequena, and Limão | Flu and virosis                   | 01                          |
| Syrup 4         | Hortelã da Folha Grande, Hortelã da Folha Pequena, and Gengibre | Flu and sore throat               | 01                          |
| Syrup 5         | Hortelã da Folha Grande, Gengibre, and Alecrim | Flu                               | 01                          |
information that must be transmitted did not explain the greater accumulation of information mutations because the occurrence of greater or fewer information mutations might be influenced by other evolutionary factors during the transmission of knowledge. This requires further scientific investigation. Therefore, we suggested that future studies that address the establishment of information mutations in local medical systems and the understanding of this evolutionary process by considering other responsible parameters, such as perceived importance and cultural validation, must be conducted. Accumulation of maladaptive information in local medical systems must be studied further.

5.1. Limitations. This study has some limitations. We did not have specific questions for people experienced with medicinal plants and plant complexes, and this made it impossible to identify prestigious individuals. Consequently, a robust analysis of the relationship between the acquisition of information from these individuals and the occurrence of mutations could not be performed. Thus, we suggested that future studies that assess whether the transmission of information from these individuals significantly influences the occurrence of mutations in the system must be conducted.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this article.

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