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Original Article

Perception of fungi by farmers in the Cerrado

Percepção de agricultores do Cerrado sobre os fungos

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Abstract

Fungi are important in several aspects of human life. In particular, to agriculture, pathogenic fungi are of great importance, as they are responsible for production losses of the most diverse types. Because of this, knowledge about pathogenic fungus is of extreme importance for farmers and professionals working in agricultural areas. Among farmers who use specific agroecological practices, this knowledge is even more valuable, since by not adopting conventional methods of production, they resort to non-invasive alternatives that are less or not harmful at all to the environment in consideration of production management methods. This study aimed to assess farmer perception in the Cerrado biome in the city of Goiás (GO), Brazil, in order to understand their ethnomycological perceptions to verify historical management practices, their knowledge about phytopathogenic fungi, and how these producers perceive fungi. We used the theoretical reference method "From peasant to peasant" formulated by ANPA - National Association of Small Farmers. Some aspects of farmers' ethnomycological knowledge are discussed. These ease identification the representatives of the Fungi Kingdom is associated with organisms that present easily recognizable characteristics, such as wood-ears or disease-causing fungi. In general, farmers are able to identify representatives of the Fungi Kingdom that are found in their daily lives. The perception of farmers about fungi, a group still much unknown by society, is very relevant for future actions of ethnomycology.

Keywords: agroecology, ethnomycology, fungal biology, popular knowledge.

Resumo

Percepção dos fungos por agricultores do Cerrado – Fungos são organismos importantes em vários aspectos da vida humana. Em particular, para a agricultura, fungos patogênicos são de grande importância, pois são responsáveis por perdas de produção dos mais diversos tipos. Por isso, o conhecimento sobre fungos patogênicos é de extrema importância para agricultores e profissionais que trabalham em áreas agrícolas. Entre os agricultores que utilizam práticas agroecológicas, esse conhecimento é ainda mais valioso, pois, ao não adotar métodos convencionais de produção, recorrem a alternativas não invasivas que são menos ou não prejudiciais ao meio ambiente, considerando os métodos de gerenciamento da produção. Este estudo teve como objetivo avaliar a percepção de um grupo de agricultores do bioma Cerrado, na cidade de Goiás (GO), Brasil, a fim de compreender suas percepções etnomicológicas, de modo a verificar práticas históricas de manejo, seu conhecimento sobre fungos fitopatogênicos e como esses produtores percebem os fungos, de modo geral. Utilizamos o método "de camponês para camponês", formulado pela ANPA – Associação Nacional de Pequenos Agricultores. Discutimos alguns aspectos do conhecimento etnomicológico destes agricultores. A facilidade de identificação de representantes fúngicos está associada a organismos que apresentam características facilmente reconhecíveis, como estereótipo orelha-de-pau ou fungos causadores de doenças em cultivares. Em geral, os agricultores do estudo são capazes de identificar representantes do Reino Fungi que são encontrados em suas vidas cotidianas. A percepção dos agricultores sobre os fungos, um grupo ainda muito desconhecido pela sociedade, é muito relevante para ações futuras dentro da etnomicologia.

Palavras-chave: agroecologia, conhecimento popular, etnomicologia, biologia fúngica.

1. Introduction

The diversity of fungi is currently estimated at 2.2 to 3.8 million species (Hawksworth and Lücking, 2017), of which just over 7% are identified (Willis, 2018). As one of the main biological components of ecosystems, fungi play several roles that guarantee the balance and function of practically all possible habitats in which they exist globally

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(Tedersoo et al., 2014). Members of the Fungi Kingdom, one of the most diverse kingdoms in the living world, are currently distributed in 18 phyla (Hibbett et al., 2007; Spatafora et al., 2016; Tedersoo et al., 2018) and participate in natural processes of decomposition and nutrient cycling as one of their main ecosystem functions (Alexopoulos et al., 1996). Other important biological processes are mediated by fungi. For example, mycorrhizal associations favor the aptitude and productivity of plants by improving their performance in capturing water and nutrients, which is an association of both symbiotic mutualism and evolutionarily balanced characteristics (Brundrett, 2004; Blackwell and Vega, 2018).

From a socioeconomic approach, fungi are important in several aspects, including: the potential use of various species in human nutrition, the production of various medicines, and inputs for industry, as well as being pathological agents for a series of diseases that affect plants and animals (Alexopoulos et al., 1996; Dean et al., 2012). Phytopathogenic fungi are responsible for production losses of the most diverse types, and thus, research on these group of fungi is constantly growing. Despite the great functional, ecological, and biological diversity of the group, as well as its considerable socioeconomic importance, there are gaps in the knowledge about these organisms in comparison with other groups. For Brazil, there are about 5,718 species of fungi (BGF: The Brazil Flora Group, 2018), of which just over 638 occur in the Cerrado biome (Maia et al., 2015).

Among potentially phytopathogenic species that are threats to agriculture, very little is known, considering the estimates of fungal species diversity and the fact that only about 8% of the estimated total have been identified (Hawksworth and Lücking, 2017). Dean et al. (2012) cited 10 species and/or genera of fungi (*Magnaporthe oryzae* B.C. Couch, *Botrytis cinerea* Pers., *Fusarium graminearum* Schwabe, *F. oxysporum* Schltdl., *Blumeria graminis* (DC.) Speer, *Mycosphaerella graminicola* (Fuckel) J. Schröt., *Colletotrichum* spp., *Ustilago maydis* (DC.) Corda, and *Melampsora lini* (Ehrenb.) Thüm.) that are especially aggressive to different cultivars around the world. This could even affect food security globally, since they attack important crops, such as rice, corn, and soybeans, and these threats are becoming more evident with the increase in emerging fungal diseases (Dean et al., 2012; Rafiqi et al., 2018).

Knowledge about pathogenic fungus for crops of economic interest is of extreme importance for farmers and professionals working in agricultural areas, in order to avoid various losses. Among farmers who use specific agroecological practices, this knowledge is even more valuable, since by not adopting conventional methods of production, they resort to non-invasive alternatives that are less or not harmful at all to the environment in consideration of production management methods. Among these methods, biological pest control, use of biological fertilizers, also known as effective microorganisms, and the use of natural compounds in the production of extracts of various uses are highlighted.

Popular knowledge about fungal biodiversity, its importance, and environmental applications is passed from one group to another over space and time, and this area of study is defined as ethnomycology, a branch of ethnobiology that deals specifically with popular knowledge about fungi (Wasson, 1980). All forms of uses, perceptions, and other relationships between different human groups and members of the Fungi Kingdom can be used to create two large groups, formed by mycophobic, those who have an aversion to fungi and see them as dangerous and who must be avoided, and mycophillic people, that are those that see fungi as beneficial components of nature and integrate them in their diet and activities in different ways (Fidalgo, 1965). In small farm populations, it is possible to find both groups, which is reflected in the crop management practices by passing this knowledge on to later generations (e.g. the children who maintain the family farming practice) and friends.

In this context, this study aims to assess farmer perception in the Cerrado biome in the city of Goiás (GO), Brazil, in order to understand their ethnomycological perceptions of fungi to verify historical management practices, their knowledge about phytopathogenic fungi, and mainly, how these producers perceive fungi assuming mycophobia and mycophilia, as well as their relationship with sustainable food production.

2. Materials and Methods

2.1. Study area and research participants

The city of Goiás is a municipality belonging to the state of Goiás. It was the state capital until 1937 when Goiânia became the state capital by decree. Located in the northwestern mesoregion of the Goiás state, microregion of Rio Vermelho (15° 56’08.1 “S, 50° 08’29.5” W), the municipality has an area of 3,108,019 km^2 (IBGE, 2020). The relief of the region varies from flat to very hilly, presents sandstone outcrops, and has a predominance of Oxisols, Cambisols, and Neossols type soils, including rocky outcrops. The vegetation and predominant climate in the region are characteristic of the Cerrado biome. There are phytophysiognomies of the seasonal semideciduous forest type (transitions from cerradão and evergreen forests), gallery forests, cerrado *stricto sensu*, dirty fields, clean fields, and rocky savanna with rocky outcrops. In general, the seasonal tropical climate is Aw type, according to Köppen-Geiger classification, with well-defined dry and rainy seasons (Ribeiro and Walter, 1998; Peel et al., 2007).

The survey was carried out in rural settlements located in the region of the Goiás municipality. Together, these settlements add up to an area of 28911.32 ha, in which more than 700 families are settled. Approximately 90% of families are registered to participate in some Federal Government social assistance program. Family succession within farm can a factor of concern, since there are many plots with less than three residents. The average age of the settlers is 39 years with education levels being inversely proportional to age. In other words, the highest education levels pertain to the children of the settlers. Within the plots, there is production of milk and dairy products, cattle, honey, sugar cane, corn, cassava, banana, passion fruit, and species of *Citrus* spp. They also perform some extractive and handicraft practices. Deforestation of permanent preservation areas, soil erosion, the indiscriminate use of pesticides, and the irregular disposal of their empty packaging are the main environmental impacts observed inside these settlements (Souza, 2016). An important characteristic among farmers is that some have adapted to produce without the use of pesticides and practices considered aggressive to the environment, adopting principles of agroecology (Altieri, 2012).

The research participants were separated into two groups for this research. The term *farmers in transition* is the group in transition to agroecology, and *conventional farmers* are those who maintain non-agroecological practices. Farmers participated by signing an informed consent form (ICF). Most of the participants (64.2%) were men with an average age of 53 years. Women represented 35.8% of the participants with an average age of 41 years. Regarding education, only one participant (7.1%) declared himself illiterate; 28.5% had incomplete Elementary Education; 21.4% have only completed elementary school; 35.7% are high school graduates; 14.2% have technical training in agriculture; 14.2% had higher education; and 7.1% had graduate degrees (Education Area). The research used the theoretical reference method "from peasant to peasant" formulated by ANAP - National Association of Small Farmers (Sosa et al., 2012), which is based on the exchange of knowledge between farmers, technicians, teachers, and students. Thus, the role of the farmer in the analysis and transformation of his own reality is fundamental, as well as the exchange and consolidation of knowledge that allows for a quality of life improvement.

2.2. Development of instruments for data collection

Collection of fungal and non-fungal specimens was performed through active search in different phytophysiognomies present in the Municipal Park of Estrada Imperial (in the City of Goiás) in August 2018. This site was chosen due to its preserved state in relation to nearby areas, thus making it possible to find naturally occurring fungi in the Cerrado. Sampling was carried out in areas of rupestrian field (ruf), dry forest (drf), and riparian forest (rif), in addition to the transitions between these phytophysiognomies (drf-rif). In these phytophysiognomies, fungi belonging to the phylum Ascomycota and Basidiomycota were collected, considering both ascomas and basidiomas, and lichenized ascomycetes and leaves of different plant species with signs of infection by phytopathogenic or endophytic fungi were also gathered.

In order to additionally verify the ability of research participants to recognize fungal structures, were collected structures produced by insects (mealybugs), and bryophytes (mosses), whose structures may confuse a non-expert audience, based on its resemblance with some fungal structures. The collected materials were stored in paper bags and dried in the shade for 48 hours. Subsequently, they were identified taxonomically and organized by taxonomic grouping. The structures were separated by groups, enumerated, and fixed with glue and pins on Styrofoam plates (Figure 1). The finished plates were used as exhibition material for the interviews with farmers. At the end of the interviews, the exhibition material was donated to the Federal Institute of Goiás (IFG, Cidade de Goiás) as educational material.

2.3. Data collection and statistical analysis

A total of 14 participants, nine farmers in transition and five conventional farmers, were interviewed. The interviews were conducted with farmers from the Dom Fernando Settlement Project (in loco, n = 6), as well as approaching some present in the Municipal Market and at the Organic Products Fair in the City of Goiás (n = 8). The interviews were audio recorded and photographed in order to facilitate data recording. At first, the team and research objectives were presented to the participants, followed by revealing the plates with the biological material. Then, they were asked which of the structures presented, numbered 1 to 20 (Figure 1), they recognized as being a fungus or fungal structure. In a second step, an interview was conducted with the participants, using a semi-structured script with questions about the production method of each interviewee in order to classify them among conventional and transitional farmers. In addition, the roadmap also included general questions about biology and the importance of fungi in ecosystems. After conducting the interviews, the researchers again presented the organism plates to explain which figures represented fungi, they also gave a general explanation of these organisms as an immediate response to the activity in which they participated.

The responses obtained through the exposure of the plates were counted as the total number of correct answers, errors, and/or the declaration of not recognizing the observed material as fungi. These data were tabulated and checked for normality, using the Shapiro-Wilk test at $P < 0.05$. Subsequently, an analysis of variance (one-way ANOVA) was performed, followed by a Tukey HSD post-hoc test (honestly significant difference) at $P < 0.05$ when statistically significant differences were observed in the total responses obtained between groups of farmers. These analyses were performed in an R environment, using the vegan package (Oksanen et al., 2016; R Core Team, 2019).

Based on responses for each of the specimens presented on the organism plates, the research aimed to observe if there was a pattern of influence of stereotypes commonly associated with fungi (mushroom, wood-ear type organisms) in the responses provided by the interviewees. For this, a non-metric multidimensional scaling (nMDS) was used, based on the Gower similarity index, in order to observe the formation of stereotyped "as-fungi" groups directed to the three possible answers (right, wrong, and did not know). This analysis was conducted in the PAST v.3.1 statistical environment (Hammer et al., 2001).

The other questions were analyzed based on the qualitative methodology of discourse and content analysis (Caregnato and Mutti, 2006). At this stage, the responses were analyzed as a whole in order to better define farmers perception of fungi. This was done according to their ability to recognize the importance of these organisms in terms of both positive and negative aspects so that

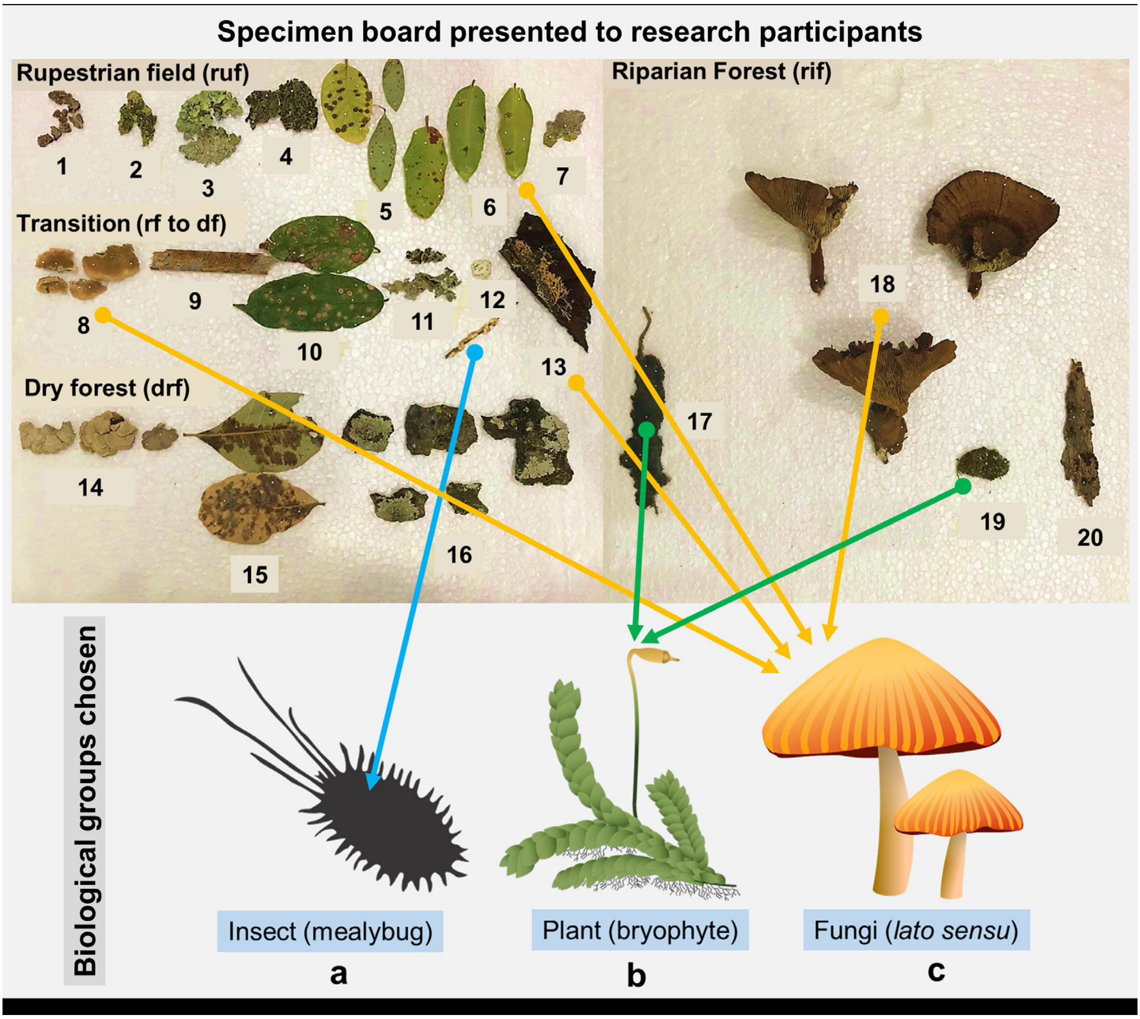

Figure 1. Setup of the organism plates presented to the research participants to assess knowledge of the Fungi Kingdom. The plate was composed of different biological structures, both belonging to the Fungi Kingdom (c), as well as to other groups (a, b), in order to encourage participants to reason and bring up previous knowledge about the group. The background knowledge was accumulated in different capacities by the participant (lectures, courses, conversations with acquaintances/family members, television programs, among other communication/learning vehicles). Numbers 1 to 20 represent the different materials collected. Source: prepared by the authors.

they could characterize them beneficial or harmful in an anthropocentric view.

3. Results and Discussion

In general, the interviewed farmers were able to identify representatives of the Fungi Kingdom among the 20 specimens available on the plates. Even when presenting unusual fungal groups that did not fulfill the "mushroom stereotype" like endophytic fungi, farmers were able to associate them with the Kingdom by stating that "*they were of fungal origin*" or because they had already seen similar structures on their properties.

It was observed that the ease in correctly identifying representatives of the Fungi Kingdom was associated with the fact that the organisms presented on the plates were fungi with easily recognizable characteristics. These include species such as wood-ears (members of the phylum Basidiomycota) or fungi that cause diseases in plants (mainly members of Ascomycota) and lichenized fungi typically leafy or fruitful (Ascomycota). These are common in tree trunks and bark, which are commonly observed (Figures 2 and 3). The identification of somatic mycelium as being "of fungal origin", as mentioned by the interviewees, may be associated with the fact that they were similar to the soil fungi "captured" by farmers in transition from biofertilizers named EM (effective microorganisms), as reported by Silva et al. (2016). However, it is important to note that the EM biofertilizer does not exclusively present fungi in its composition, and it is noted that bacteria, protists, and other non-fungal organisms will also be present in the compound (Paredes-Filho and Florentino, 2016). This lack of knowledge may explain the

Figure 2. Different moments from the interviews about mycological knowledge carried out between agricultural producers of settlement projects in the City of Goiás, Goiás. (a-d) research participants are presented to the organism plates; (e) participant showing places where he has already found fungi; (f-h) moments of explanations about fungi; (i-l) different places where the interviews were conducted, that is, where the interviewees market their products: Municipal market (i) and the Organic Products Fair (j-l).

fact that many farmers identify fungi as bacteria and/or organisms belonging to the same group.

The recognition of fungi by farmers is closely related to the understanding of fungus-plant-environment relationships, especially because they highlight the negative aspects attributed to fungi. When asked where they could find fungi, they highlighted the soil, *Citrus* plantations, vegetables, trees, litter, fallen logs, and dung (biofertilizer or cattle dung/manure), and there was little mention of natural areas in the Cerrado. Figure 2e, for example, represents the case where a participant shows the compost with cattle droppings, where she claims to have found "magic mushrooms", psychoactive members belonging to Psilocybe cubensis (Basidiomycota).

When requested to point out fungi among the plate organisms, the highest percentage of correct answers was provided by farmers who use conventional management practices (65%), while 5% of the answers were correct among farmers in transition with agroecological practices (Figure 4, Table 1). These differences were considered significant by analysis of variance (F_{anova}: 30.34, P-value: < 0.0001). This difference may be associated with mycophillic and mycophobic events, respectively being affinity and aversion to fungi (Vargas-Isla et al., 2013). These effects would be associated with the preconceived ideas about fungi presented by these farmers.

This low association of fungi with natural environments and, consequently, as important components of ecosystems, reflects a culture in which fungi are perceived in an anthropocentric view, being harmful or presenting little benefits to humans. This tends to depend on the community and their level of education and/or interest in the taxonomic group, as villains in nature. Even with knowledge about positive aspects that these organisms play, as observed among some interviewees, it is still perceived that there is need to combat them, superseding their understanding of their importance in ecosystem stability. As one interviewee said, "*prevention is better than cure, right*?" (woman, farmer in transition to agroecology, 46 years old).

Unfortunately, there are marked differences between traditional peoples in the Americas regarding the knowledge and use of fungi. In Latin America, Mexico stands out as the country with an expressive mycophile tradition. The popular knowledge of Mexican communities, mostly known as mycophillic people, on the edible mushrooms includes dozens of species, such as representatives of Ascomycota, Basidiomycota, and even plasmodial slime molds from Amoebozoa such as myxomycetes (Montoya et al., 2019; Haro-Luna et al., 2020). Also notable is the commercial exploitation of native/wild mushroom species by Mexican communities, such as the Nahuatl-speaking peoples of the Nahua peoples (Contreras Cortés et al., 2018). In Brazil, we have some trades of edible native/wild fungi carried out mainly by Yanomami indigenous peoples (Vargas-Isla et al., 2013). However, there are still few studies focused on the bromatological aspects of these fungi, which can encourage their consumption at the expense of exotic species (Silva-Neto et al., 2019). We emphasize that a better knowledge of native edible mushrooms could also improve the diet

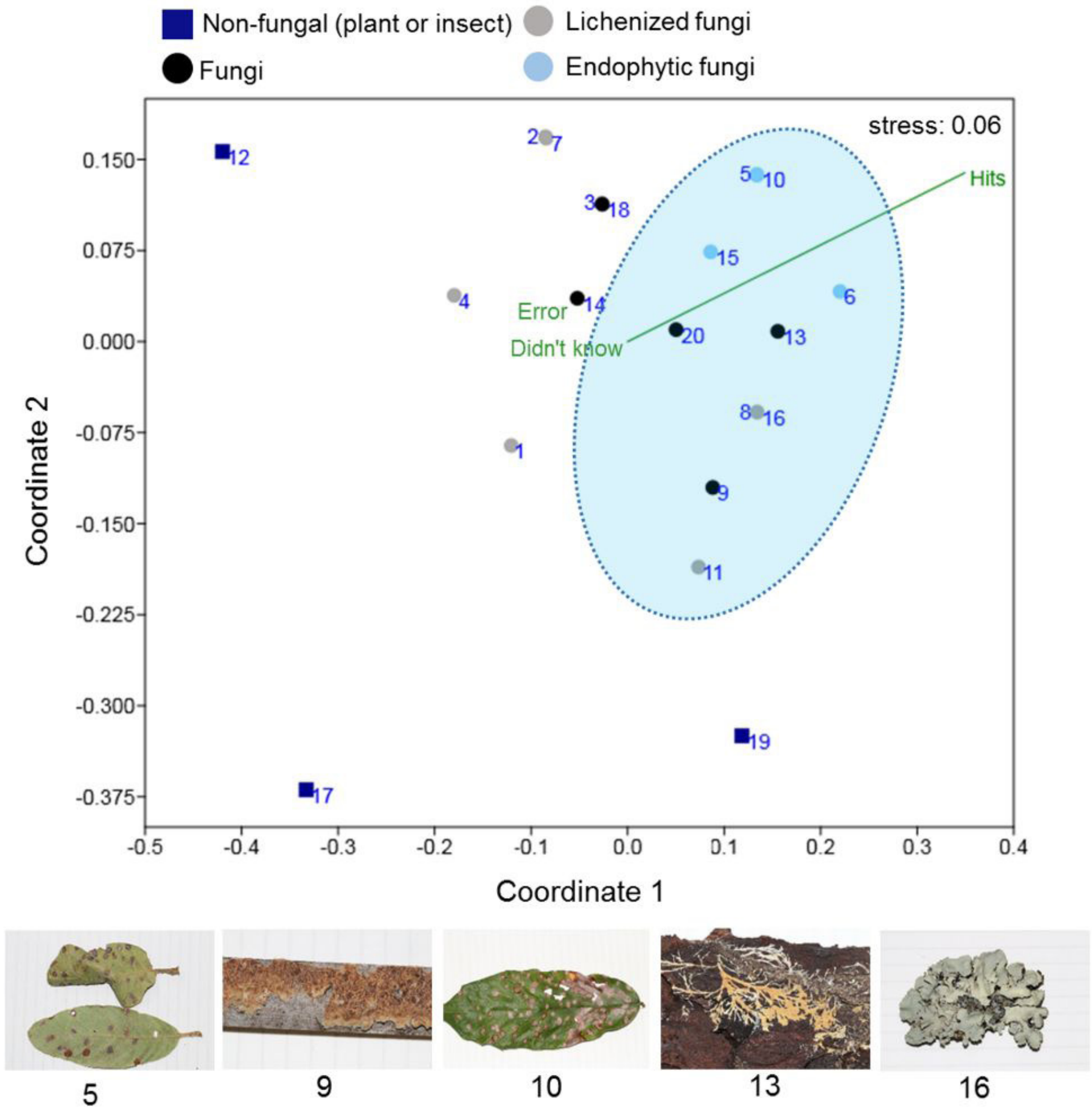

Figure 3. Non-metric multidimensional scaling (nMDS), based on the Gower similarity index, that was carried out with the answers given by the research participants about their ability to identify fungi or fungal structures. Most respondents noted specimens with characteristics that reminded them of something they had already seen on their property and/or cultures, such as corticoid fungus (No. 9, in the images in detail), vegetative mycelium (No. 13), fungus lichenized (no. 16), and endophytic fungi (no. 5 and 10). These were recognized either because of plant diseases or the fungi they saw growing in compost or wood, which were more easily associated with being fungi. Organisms that did not clearly show these characteristics (such as non-fungal or crusted lichens) were mistakenly classified as fungi or received the "I don't know" option as an answer.

of farmers' families, in the concept of 'ecological niche of family farmers', proposed by Cavallini and Nordi (2005), once it is a healthy food item.

It was observed that conventional farmers had a greater understanding of what fungi are, as they could identify fungi as being harmful to crops. This is because many are phytopathogenic to a great diversity of cultivable species and of economic importance (Dean et al. 2012, Vivas et al., 2020). These farmers know more about the species of fungi that cause diseases in different productions and the methods of combating them, usually through the use of pesticides or other chemical compounds. On the other hand, farmers in transition recognize different groups of fungi, but they know fewer species (or associate them as harmful) precisely because they understand that they have different functions in ecosystems and their occurrence is natural. Thus, they do not worry about knowing all the species that occur in their production practices, as they avoid the use of chemicals in their agricultural management. An important step to be taken in future studies would be to verify whether events of mycophobia and mycophilia among farmers could be associated with the use of more or less aggressive measures to combat diseases in different crops.

When asked about the first concept that came to mind when they heard about fungus, 85.7% of the responses highlighted negative aspects, mainly by associating them with the damage that some can bring to crops, such as:

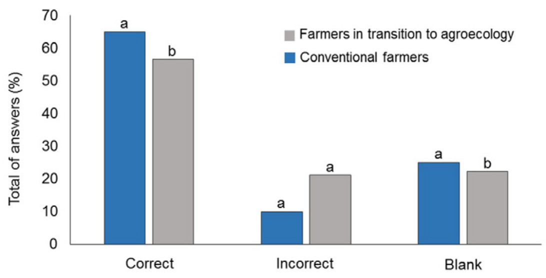

Figure 4. Comparison of the total number of correct and wrong answers in distinguishing fungal representatives between different living for conventional and in transition farmers with respect to their agroecological practices. Different letters in each set of responses represent statistically significant differences (P <0.05) after analysis of variance (F_{anova}: 30.34, P-value: <0.0001).

"*I remember plant and animal diseases*" (man, conventional farmer, 68 years old).

"*I think it is something like bacteria, which may or may not be harmful*" (man, farmer in transition, 61 years old).

"*I immediately think that it is an animal, right, that is there affecting the plant, adding something that is not to be there, and it is practically invisible, right, because it is there, and we don't see it, but I think it's always bad. The fungus can retard the plant, I don't know if it can corrode the plant, but I think it can delay the plant*" (woman, farmer in transition, 59 years old).

"*Ah, I remember a disease, the powdery mildew, which is caused by excess water, I already lost okra and citrus plantations because of the powdery mildew, I'm not sure if it's fungus but I associate it with a problem*" (woman, farmer in transition, 46 years).

"*I think it damages the plant, you know, which makes it a disease*" (man, conventional farmer, 66 years old).

Fungi were perceived by farmers to be living beings who can be both "good" or "bad" in an anthropocentric context. The fact that fungi act in the decomposition of organic matter was, for example, a positive aspect that the interviewees attributed to these organisms. They recognize

Table 1. Answers from survey participants about which of the 20 organisms presented to them on the plates were members of the Fungi Kingdom to their understanding. Values are given in percent (%).

nº	Samples	Yes	Not	Do not know
1	Lichenized fungus	42.8	35.7	21.4
2	Lichenized fungus	57.1	14.2	28.5
3	Lichenized fungus	64.2	14.2	21.4
4	Lichenized fungus	42.8	28.5	28.5
5	Endophytic fungus	78.5	7.1	14.2
6	Endophytic fungus	85.7	0	14.2
7	Lichenized fungus	57.1	14.2	28.5
8	Wood decomposing fungus	71.4	21.4	7.1
9	Wood decomposing fungus	64.2	28.5	7.1
10	Endophytic fungus	78.5	7.1	14.2
11	Lichenized fungus	57.1	14.2	28.5
12	Cochineal (insect)	28.5	21.4	50
13	Sterile mycellium	78.5	14.2	7.1
14	Wood decomposing fungus	57.1	21.4	21.4
15	Endophytic fungus	71.4	14.2	14.2
16	Lichenized fungus	71.4	21.4	7.1
17	Moss	71.4	7.1	21.4
18	Wood decomposing fungus	57.1	14.2	28.5
19	Moss	42.8	57.1	0
20	Wood decomposing fungus	64.2	21.4	14.2

that the decomposition process is beneficial to crops, as they enrich the soil and help supply necessary nutrients for the plant. Yet, the antagonistic effects of fungi negatively affecting other organisms can eventually hurt crops, such as insects, viruses, and bacteria. However, these ecosystem functions are not performed by fungi for this anthropocentric purpose, rather they are simply stages of their life cycle and history.

As observed in other studies with similar communities (Curvo, 2006; Sousa et al., 2015, 2017), such perceptions about the benefits and drawbacks of fungi are passed on and perpetuated in space and time through various vehicles. Thus, these ideas and concepts tend to remain stable in populations, evolving and being modulated by the culture and perceptions that each individual makes with respect to the environment. After verifying the agroecological techniques and methods that farmers typically use, it was observed transfer of knowledge is part of how they combat or use fungi to their advantage. For example, less environmentally aggressive techniques, such as the use of bordeaux mixture, are effective agricultural antifungals with very low toxicity, are accepted in organic agriculture, they are composed of copper (II) sulfate, hydrated lime or virgin lime, and water in a simple mixture (Schwengber et al., 2007). Another example of the less aggressive technique is the use of some hyperparasitic fungi against phytopathogenic fungi, especially those aggressive and resistant to conventional treatments, such as *Asperisporium caricae* (Speg.) Maubl. (Ascomycota: Mycosphaerellaceae) that causes the black-spot in the papaya crops (Vivas et al., 2020). The production of biofertilizers by capturing fungi from the soil is also a viable alternative recognized by these farmers.

They also mention other techniques based on popular knowledge, such as the use of smoke syrup with alcohol, pepper syrup, garlic or onion, coffee grounds, cow urine, among others, as measures to combat fungi or fertilization. These farmers, especially those who consider themselves in transition to agroecological practices, mentioned the use of these products because they are alternatives to the use of pesticides, as fungicides with a high degree of toxicity. When asked about substances, one interviewee stated that they can be used to fight fungi, such as fungicides: "*Fungicide is poison too, right? I don't know if it can be used for fungus ... I don't know if antimycotics work either ...*", woman, agroecological producer, 59 years old.

Compared with mycophile populations, it is clear that the group of farmers studied has a tradition of passing on knowledge in the opposite direction to that observed, for example, between traditional mycophile communities, where knowledge about the usefulness and value of fungi is passed on to the next generations with greater relevance than its negative aspects (Haro-Luna et al., 2019) Thus, farmers in general are able to identify representatives of the Fungi Kingdom that are found in their daily lives, even when presenting unusual fungal groups to the general public, such as endophytic fungi. The ease in identifying the representatives of the Fungi Kingdom is associated with organisms that present easily recognizable characteristics, such as wood ears (members of the phylum Basidiomycota) or disease-causing fungi.

The perception of farmers about fungi, a group still much unknown by society, is very relevant for future actions of ethnomycology. The different perceptions among farmers associated with different agricultural management strategies highlights that these management styles also reflect the way one perceives the natural environment, which in this case, reflected understanding of the fungal community. Thus, it is emphasized that the recognition of fungi by farmers is related to the understanding of fungus-plant-environment relationships, especially when they highlight the negative aspects attributed to them.

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