



JATAÍ NATIVE BEE AND ITS CONTRIBUTIONS TO A HEALTHIER LIFE IN THE TAQUARAL SETTLEMENT CORUMBÁ-MS

ABELHA NATIVA JATAÍ E SEUS CONTRIBUTOS PARA UMA VIDA
MAIS SAUDÁVEL NO ASSENTAMENTO TAQUARAL CORUMBÁ-
MS

ABEJA NATIVA JATAÍ Y SUS CONTRIBUCIONES PARA UNA VIDA
MÁS SALUDABLE EN EL ASENTAMIENTO TAQUARAL
CORUMBÁ-MS

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Abstract: Native stingless bees occur in tropical and temperate environments and perform an invaluable service to the ecosystem and the agricultural production system, through pollination. They are responsible for 40% to 90% of cross-pollination. In addition to these numerous services provided to the environment, they are honey producers. Honey and its derivatives are used in the preparation of medicines by ancient peoples. This study aims to describe the popular practices of raising stingless bees of the species *Tetragonisca angustula*, and the use of its by-products (pollen, propolis, among others) by farmers in the Taquaral settlement in traditional medicine, as well as the importance of meliponiculture in conservation and environmental preservation. Interviews with farmers from the Taquaral settlement were adopted as a methodological procedure, and a structured questionnaire was used. The jataí species *Tetragonisca angustula* has been

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created in several models of hives by members of the Association of Beekeepers of Family Agriculture of Corumbá - AAAFC. In the Taquaral settlement, honey and propolis are demanded for the preparation of home remedies, especially the honey of the jataí species *Tetragonisca angustula*, as it is used to treat numerous illnesses.

Keywords: Native Bees, Meliponiculture, Environmental Sustainability, Climate Change.

Resumo: As abelhas nativas sem ferrão têm sua ocorrência em ambientes de clima tropical e temperado, e desempenha um serviço incalculável para o ecossistema e para o sistema de produção agrícola, por meio da polinização. Elas são responsáveis por 40% a 90% da polinização cruzada. Além desses inúmeros serviços prestados ao meio ambiente, elas são produtoras de mel. O mel e seus derivados são utilizados na elaboração de remédios pelos povos antigos. Esse estudo tem por objetivo descrever sobre as práticas populares de criação das abelhas sem ferrão da espécie *Tetragonisca angustula*, e o uso de seus subprodutos (pólen, própolis entre outros) pelos agricultores do assentamento Taquaral na medicina tradicional, bem como da importância da meliponicultura na conservação e preservação ambiental. Adotou-se como procedimento metodológico entrevistas com agricultores do assentamento Taquaral, e foi utilizado um questionário estruturado. A espécie jataí *Tetragonisca angustula* vem sendo criada em diversos modelos de colmeias pelos associados da Associação dos Apicultores da Agricultura Familiar de Corumbá – AAAFC. No assentamento Taquaral, o mel e o própolis são demandados para elaboração de remédios caseiros, em especial o mel da espécie jataí *Tetragonisca angustula*, pois seu uso é empregado para tratar inúmeras enfermidades.

Palavras-chave: Abelhas Nativas, Meliponicultura, Sustentabilidade Ambiental, Alterações Climáticas.

Resumen: Las abejas nativas sin aguijón tienen su ocurrencia en ambientes de clima tropical y templado, y desempeñan un servicio incalculable para el ecosistema y para el sistema de producción agrícola, por medio de la polinización. Ellas son responsables del 40% al 90% de la polinización cruzada. Además de estos innumerables servicios prestados al medio ambiente, ellas son productoras de miel. La miel y sus derivados son utilizados en la elaboración de remedios por los pueblos antiguos. Este estudio tiene como

objetivo describir sobre las prácticas populares de creación de las abejas sin aguijón de la especie *Tetragonisca angustula*, y el uso de sus subproductos (polen, propóleos entre otros) por los agricultores del asentamiento Taquaral en la medicina tradicional, así como de la importancia de la meliponicultura en la conservación y preservación ambiental. Se adoptó como procedimiento metodológico entrevistas con agricultores del asentamiento Taquaral, y fue utilizado un cuestionario estructurado. La especie jataí *Tetragonisca angustula* viene siendo criada en diversos modelos de colmenas por los asociados de la Asociación de Apicultores de la Agricultura Familiar de Corumbá – AAAFC. En el asentamiento Taquaral, la miel y el propóleos son demandados para elaboración de remedios caseros, en especial la miel de la especie jataí *Tetragonisca angustula*, pues su uso es empleado para tratar innumerables enfermedades.

Palabras clave: Abejas Nativas, Meliponicultura, Sustentabilidad Ambiental, Alteraciones Climáticas.

INTRODUCTION

Stingless bees, popularly known as native stingless bees or indigenous bees, live in colonies and are characterized by having an atrophied stinger. Meliponids of the genus *Trigona*, tribe Trigonini, occur in tropical regions of the planet, in almost all of Latin America, Africa, Southeast Asia, and northern Australia. Those belonging to the genus *Melipona*, tribe Meliponini, occur exclusively in South America, Central America, and the Caribbean Islands. There are approximately 400 species worldwide, and in Brazil, approximately 300 species, of which about 40 are of the genus *Melipona*, and the rest are *Trigona*s (VILAS-BOAS 2012; CELLA et al., 2017).

Native stingless bees are an important asset of the Brazilian entomofauna, participating in environmental preservation and maintaining the genetic variability of existing species. Of the nearly 400 species, 10 can be artificially reared (Meliponiculture). These bees are the main pollinators of native plants, participating in 40 to 90% of the pollination of native plant species, having great economic importance for the ecological balance in ecosystems. Thus, they ensure the production of fruits and seeds, allowing the survival of fauna and flora and communities that depend on their exploitation. Rural populations commonly adopt docile bee species that do not require equipment for their

handling (Jataí). The productive focus is artisanal honey, with recognized therapeutic value in folk medicine, reaching high prices in its market commercialization (FERREIRA et al., 2013).

Pollination carried out by bees and other pollinators is considered a service of regulation and maintenance of ecosystem balance on the planet. According to Oliveira et al. (2013), pollinators are of fundamental importance for maintaining human life on earth. Oliveira et al. (2013) points out that the intensive use of soil for monoculture production leads to habitat loss and has contributed to the isolation of pollinators, since 40% of arable land on all continents is being occupied for the planting of cultivars, and only 12% is destined for biodiversity protection. In the Brazilian territory, about 70% of the land was being occupied for the development of cultivars and pasture by 2006 (VIANA, 2016).

The interaction of pollinators in the ecosystem promotes cross-pollination, ensuring the perpetuation of plant species and increasing the vigor of fruits and seeds, enabling productivity. Bees constitute the most economically important group for commodity production, being responsible for 35% of food production in the world through their pollinating action. And their action is more significant in cross-pollination, as it can represent almost 73% of cultivated species on the planet. One of the species that exclusively depends on bees for pollination is the apple tree, for the production of quality fruits (ROSA et al., 2019).

In the Taquaral settlement, municipality of Corumbá-MS, there is a diversity of bee species that have been contributing to the perpetuation of native and exotic species, cultivated by the settlers for food. In addition to these contributions promoted by native bees in food production, they are also demanded by the settlers for honey and its derivatives, much sought after for use in traditional medicine in the production of remedies and syrups.

Given this context, this research aims to describe the popular practices of rearing stingless bees of the species *Tetragonistica angustula*, and the use of their by-products (pollen, propolis, among others) by farmers in the Taquaral settlement in traditional medicine, as well as the importance of meliponiculture in environmental conservation and preservation.

We organized the article in four parts. First, we aim to discuss the importance of meliponiculture in the Taquaral settlement and its uses for humans. Then, the use of Jataí propolis in alternative medicine. In the third part, we demonstrate the types of hives that

farmers use to rear Jataí bees in the Taquaral settlement, and finally, the research considerations.

MATERIALS AND METHODS

The research was conducted from May to August 2021 in the Taquaral settlement, Corumbá-MS. The researched group consisted of five settlers, two of whom were former community leaders responsible for handling homemade remedies to treat illnesses that affected the camped population, and three of whom were breeders of the Jataí *Tetragonisca angustula* species.

The research is qualitative in nature. For this research model, a questionnaire containing 5 open-ended questions was developed. In qualitative research, the researcher constructs a report composed of testimonies from people with subjective views, where the characters' speech adds to and contradicts each other, as in this model, the researcher has the freedom to inquire, being an active interlocutor (MINAYO 2012). The procedures were adopted taking into account the experience with the practice acquired in the daily lives of the settlers in handling the bees to achieve their objectives. The analyses rely on primary and secondary data. Primary data results from fieldwork carried out in the settlement, where interviews with a semi-structured questionnaire were conducted. The interview responses were noted and then analyzed. The research used a literature review, using specialized references in the area. The Taquaral settlement, established over 30 years ago, has its economy based on subsistence production with the raising of small animals, cattle, dual-purpose farming, milk and meat production, horticulture, and beekeeping, which is being developed by the Associates of the Association of Family Agriculture Beekeepers of Corumbá (AAAFC). These pillars are the economic foundation of the Taquaral settlement.

MELIPONICULTURE IN THE TAQUARAL SETTLEMENT AND ITS USES FOR HUMANS

Honey is a product that has attracted the human palate since antiquity, due to its sweetness and flavor, being one of the first sources of sugar consumed in their diet. In addition to being consumed as an energy source, honey is rich in natural antioxidants,

flavonoids, and phenolic compounds. Due to its therapeutic properties, it was already widely used by traditional peoples in folk medicine (BRAGHINI, 2017).

Currently, the population has been demanding a healthier diet, seeking to consume natural products. Among these products, honey is one of them, which can come from native bees or the exotic *Apis mellifera* species. Honey is a product that is always present on the settler's table, whether for daily consumption or for the preparation of homemade recipes to combat the numerous illnesses that affect the immune system.

Especially the honey from the native Jataí *Tetragonisca angustula* species has always been used by the settlers to treat various ailments, especially for oral thrush in newborn children, according to the "1st interviewed community leader." In addition to this ailment, it is also widely used by older people for the treatment of cataracts in the initial stage; for this purpose, the honey must be harvested very carefully to avoid contamination with pollen.

The honey produced by the native Jataí species is a differentiated product in flavor, consistency, and quantity, becoming rare and being highly sought after by more demanding consumers. Among the main characteristics that make it rare is its quantity when compared to honeys produced by *Apis*. Honey from native species has a notable difference that makes them more susceptible to fermentation due to their high moisture content, which can vary between 25% and 35%, depending on the species (BRAGHINI, 2017). The extraction of honey from native bees must be carried out quickly and efficiently, avoiding contamination. Harvesting should be carried out in strong colonies, especially in colonies that have closed and mature honey pots, to avoid fermentation (CELLA et al. 2017), as shown in Figure 1.



Figure 1. Honey Super Ready for Harvest of Capped Honey.

Source: Authors.

PROPOLIS PRODUCTION

Meliponines, in addition to honey and pollen, produce another valuable product, propolis (Figure 2), which consists of different types of resinous substances collected from various parts of plants and mixed with wax. There are few studies in the literature that discuss this product so important for asepsis and sealing in the hive, as pointed out by Cardozo et al. (2015).



Figure 2. Arrangement of Propolis in a Jataí (*Tetragonisca angustula*) Hive.
Source: Authors.

Propolis is a product that can be easily removed from the hive using a spatula. Figure 3 shows the propolis produced by Jataí in the meliponary at the Taquaral settlement, which has not yet been processed.



Figure 3. Propolis Collected in the Meliponary at the Taquaral Settlement.
Source: Authors.

For the processing of propolis extract, it is necessary to use food-grade grain alcohol and preferably dark glassware. If unavailable, aluminum foil should be used to prevent sunlight penetration, which could interfere with the properties of the propolis.

ALTERNATIVE MEDICINE WITH THE USE OF JATAÍ PROPOLIS

According to Pinto (2011), propolis can be produced by different species of native bees from the Trigonini tribe, and in terms of phytotherapeutic principles, it is as important as propolis produced by *Apis mellifera*. The author points out that there are few studies on its physical and chemical composition, as well as its use in pharmaceutical products.

Carneiro (2016) described that the use of propolis is ancient, as it was used in folk medicine and in the control of pests and diseases in some civilizations. There are reports that in ancient Egypt, propolis was highly sought after in the mummification process. The author also points out that in Roman and Greek civilizations, propolis was used as a healing agent.

According to the interviewee 2, who participated in numerous training courses for popular alternative health agents promoted by the Pastoral Land Commission (CPT) during the encampment period to learn how to enhance the natural properties extracted from nature for the benefit of the community. These courses were always taught by an outsider whom the CPT brought to teach community health leaders how to prepare, enhance, store, and treat the numerous diseases that affected the camped population. He

also emphasized that these preparations were highly sought after by the population, as they were constantly knocking on his door looking for remedies to treat respiratory infections, wounds, headaches, among other diseases that were very common during the encampment period. In the continuation of the conversation, interviewee 2 related the way to prepare a recipe that he learned in the popular training courses, a recipe that he has always prepared and kept for his use. For the preparation of propolis extract tincture, the main raw materials are propolis, Jataí bee honey, wax, pollen, and "solvents" that can be alcohol or cachaça.

Propolis was known in the popular language of the campers as resin, and pollen as "saborá." All these ingredients were collected from Jataí swarms that they found in the forest, which was the rustic way to produce propolis extract. The production of this extract was carried out as follows: the collected ingredients were added to alcohol or cachaça inside a dark glass jar (preferably) to prevent the penetration of ultraviolet rays.

The production process of propolis tincture took an average of eight to ten days. During this preparation period, it was necessary to shake the container every day so that the properties of the propolis would dissolve and form a tincture. After the curing period, the extract was ready to be used.

The extract could be used in the treatment of headaches, fever, and especially in the control of the flu. According to him, the administered dose was eight to ten drops of the tincture dissolved in a glass of water, twice a day. In Figure 4 is the prepared Jataí propolis extract that interviewee 2 uses daily



Figure 4. Geopropolis Tincture Produced by the Former Health Agent.

Source: Authors.

MEDICINAL USE OF JATAÍ HONEY

In 2018, the Ministry of Health, through integrative policies in the Unified Health System (SUS) for the integration of complementary health practices and popular knowledge, researched popular knowledge regarding the chemical and physical properties of honey, propolis, and apitoxin for therapeutic use (PACHECOLL et al. 2019).

Jataí bee honey, according to information from the six interviewees, is used as an eye drop to "clear blurred vision." The recommendation is to apply one drop of honey to the eye once a day until "the vision clears." People who reported using honey as eye drops recommend that the manipulation be done by careful individuals to avoid mixing it with pollen. They also state that the honey placed in the eye causes a burning sensation, promoting the cleaning of the affected eye.

Another recommendation that is very important to follow for successful treatment with Jataí honey, according to the "speech of the 6 interviewees," is that the honey should be collected from the hive with the aid of a sterilized spoon or a disposable syringe to avoid contamination during the treatment period. After this procedure, the honey needs to be stored in a sterilized container, preferably made of dark glass, and to not lose its therapeutic properties, it needs to be in an environment where there is no temperature fluctuation, preferably in a refrigerator.

Escobar Xavier (2013, p. 719) points out that the use of honey as a healing product is ancient, as there is literature describing its medicinal use since Egypt, Greece, and the Ayurvedic traditions of the Indian people. The author points out that in these civilizations, honey has always been used in the treatment of infections, wounds, or in the healing process, and in some civilizations, honey was used in the mummification process of pharaohs.

HIVES FOR REARING JATAÍ BEES IN THE TAQUARAL SETTLEMENT

The rearing of native bees, in a rational way, can occur in various hive models, and each producer uses the hive model that they find most convenient for management

and that provides comfort for the bees (CELLA *et al.*, 2017), and according to the financial resources available for investment in hives.

In the Taquaral settlement, meliponiculture is being developed in four hive models for rearing the Jataí bee species. One of the models has proven to be very promising in rearing the Jataí bee species, which is the hive made from polyethylene (PVC) pipe (Figure 5), a low-cost and easy-to-handle material. This model, in addition to being low-cost, has greater durability and excellent acceptance by the swarm for the production of honey and propolis. The hive is made with a 100-millimeter PVC pipe, the brood chamber with 16 centimeters in height, and the honey super with 10 centimeters in height.

This hive model allows the meliponiculturist easy access to the brood chamber, as the part that houses the brood chamber can be disconnected from the base, allowing visualization of the brood chamber without damaging the nest and allowing the meliponiculturist to clean and check for the presence of queen cells for a possible swarm division.



Figure 5. Hive Adapted with Polyethylene (PVC) Pipe.
Source: Authors.

In Figure 6 is the second model, which is a commercial stingless bee hive and has measurements recommended by meliponiculturists. This type of hive has divisions between the brood chamber (brood nest), honey super, and two removable honey boxes. For honey collection in this hive model, the same procedure can be performed: disconnect the honey box with the divider that gives access to the brood chamber.



Figure 6. Commercial Stingless Bee Hive.

Source: Authors.

In Figure 7 is the third hive model, with a brood chamber and two honey supers. In this model, the hive has two compartments, the brood chamber and two honey supers. And in Figure 8, the rustic hive model presents only one compartment.



Figures 7 and 8. Alternative Hive Models Used by Meliponiculturists.

Source: Authors.

CONCLUSION

In the Taquaral settlement, 4 hive models among the various existing models are being used for rearing the Jataí (*Tetragonisca angustula*) species and producing honey and propolis. All hive models meet the needs of the Jataí swarm.

The rearing of native bee species endemic to the region contributes to the maintenance of ecosystem biodiversity.

Meliponiculture is a pleasurable activity that does not require sophisticated equipment for its execution and can be developed on the property to obtain honey and income. It does not require high investments in the acquisition of equipment to set up a meliponary, and the hives can be produced with the reuse of pieces of PVC pipe used in civil construction or even surplus pipe used in the lining of artesian wells.

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