

# THE AGROECOLOGICAL TRANSITION IN PEASANT PRODUCTION

## A TRANSIÇÃO AGROECOLÓGICA NA PRODUÇÃO CAMPONESA

## LA TRANSICIÓN AGROECOLÓGICA EN LA PRODUCCIÓN CAMPESINA

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### Abstract

The present article discusses the importance of the agroecological transition in peasant production, in the northern region of Ceará. Based on the theorists who research Agroecology as a path to rural development, we seek to identify the strategies undertaken by peasants, as well as the results derived. The methodology used included bibliographical review and fieldwork. Visits were carried out in two production units and semi-structured interviews were recorded with the farmers and agricultural technicians involved. We verified that agroecological techniques are contributing to soil recovery and are more efficient than the conventional practices in the dry season. Besides this, it was found that there was a greater diversification of production, which reflects in the improvement of feed and, consequently, in the food sovereignty of the families involved. Keywords: Agroecological transition, peasantry, Food sovereignty, Ceará.

### Resumo

O presente artigo discute a importância da transição agroecológica na produção camponesa, na região norte do Ceará. Tendo por base os teóricos que pensam a Agroecologia como caminho para o desenvolvimento rural, procuramos identificar as estratégias empreendidas pelos camponeses e os resultados decorrentes. A metodologia utilizada contou com revisão bibliográfica e trabalhos de campo. Foram realizadas visitas em duas unidades de produção e entrevistas semiestruturadas gravadas com os camponeses e técnicos agrícolas envolvidos. Verificamos que as técnicas agroecológicas contribuem para a recuperação dos solos e são mais eficientes que as práticas convencionais nos períodos de estiagem. Além disso, foi constatado que houve uma maior diversificação da produção, o que reflete na melhoria da alimentação e consequentemente, na soberania alimentar das famílias envolvidas.

Palavras-chave: Transição agroecológica, campesinato, soberania alimentar, Ceará.

### Resumen

El presente artículo discute la importancia de la transición agroecológica en la producción campesina, en la región del norte del Ceará. Usando los teóricos que piensan la Agroecología como camino para el desarrollo rural, se identificaron las estrategias empleadas por los campesinos y los resultados obtenidos. En la metodología se aplicaron una revisión bibliográfica y trabajos de campo. Fueron realizadas visitas en dos unidades de producción y entrevistas semi-estructuradas grabadas con los campesinos y técnicos agrícolas. Verificamos que las técnicas agroecológicas contribuyen con la recuperación de los suelos y son más eficientes que las prácticas convencionales en los periodos de estiajes. Después de eso, se constató una mayor diversificación de la producción, lo que reflejó mejoras en la alimentación y consecuentemente soberanía alimentaria en las familias envueltas.

Palabras clave: Transición agroecológica, campesinato, soberanía alimentaria, Ceará.

## Introduction

The study on agroecological production, based on the theoretical arsenal of Geography, seeks to understand how changes in production techniques alter the social relations established in the area.

Faced with this, we investigate the paths taken by peasants in Ceará to identify forms of agricultural production compatible with the peasant life project. In this line of work, we highlight the Agroecological and Solidarity Farmers Network of the Curu and Aracatiáçu Valley Territory.

The two families interviewed had their first contacts with the so-called agroecological techniques in a Training Course of Agroecology Multiplier Agents, carried out in 2004 and 2005, by the Center for Labor Studies and Worker Advice (CETRA), with financial support from Non-Governmental Organization (NGO) Manos Unidas.

The methodology used in this research consists of a bibliographic review on the subject and technical visits during which semi-structured interviews were conducted.

### Agroecological transition: the road to peasant autonomy

The principles of Agroecology are based on the realistic and thorough observation of nature, whether by peasants or scientists. Based on the knowledge of the natural mechanisms, the techniques that better exploit the potential of the environment are formulated, without causing the degradation of the environment. Food production is a key factor in the balance of society and no one is immune to the crisis in food production. The agroecological transition is, therefore, a matter of social interest and cannot be the result of external initiatives alone, but rather of local actions, which must be born within the communities.

We noticed in the discourses of the subjects investigated in this study that for most peasants who accepted to try the experience of an agroecological transition process, the most difficult was to live with the criticism of family members and community members, the lack of public policy support, and the lack of information on the part of the consumer.

In one of the testimonies, we could see the struggle generated by the initiative to promote a change, even if it was punctual: “[...] I was very criticized by the people of the community, by my family [...] They

even wanted to put me up in a hospital, for them I was going crazy, but that did not stop me at all.” (Z. J. Peasant from the Varzea settlement of Mundaú-Trairi-CE).

This difficulty was also noticed by Batista (2014), studying the peasants of Ceará in the municipalities of Trairi and Tururu and by Schneider (2014), when studying the Pomeranian peasants of the municipality of São Lourenço do Sul, Rio Grande do Sul. It is noted that the process of agroecological transition corresponds to progressive advances, starting from the change of the conception of the relationship with nature.

The course on Agroecology Multiplication Agents followed the reading of Agroecology described by Toledo (2016), in which it is developed as a political and socially committed science, as a practice with its technological innovations and as a movement for social transformation. In the process, dialogue was gradually happening without the abandonment of ancestral knowledge, in which often the explanation for the phenomena of nature gains a mythic connotation, as can be observed in the testimony of M. G. P.:

The teacher's lesson alerted us to what we were doing. We were killing ninety species to grow two or three, so I realized that the species are not only plants, they are worms, they are spiders, they are all that chain there that is causing the earth not to end again, because you know that the fire, besides killing the insects, also kills the blood of the earth, when you burn a land that land turns to sand, then you took all the blood from the earth and that's where I started to be more interested, to stop burning, to stop using poison, to respect the environment more (M.G. P. Novo Horizonte Settlement – Tururu - CE).

It is in the confrontation of newly acquired knowledge with the mythological explanations about nature that agroecological techniques make sense for the peasants, who although at a certain point of life did not know Agroecology as a science, recall the knowledge that was passed on to them throughout the generations and delegitimized by the discourse of modernity.

Agroecology finds space in peasant agriculture because it rescues the ancestral teachings that the peasants have always cultivated, not denying their culture or reducing the labor force of the agricultural activity. Therefore, the role of agronomists and other technicians would

not be to dictate the best way to produce, but to accompany the peasant in this process, understanding their interests and giving them the conditions to use the knowledge they already have (DUFUMIER, 2011).

In a study on the agroecological forms of production undertaken by the peasants of Alto Sertão and Zona da Mata da Paraíba, Marcos (2007) found that the peasants adapted the technical teachings to their reality and possibility, modifying the practices to have a better result. According to the author, the peasants guarantee their self-sustainability by complementing the technical knowledge with the local knowledge (MARCOS, 2007).

It is understood that the agroecological transition is proposed by Gliessman (2000) in stages, and is not always linear, which consist of 1) change of the values that guide the decisions of production; 2) integrated pest management and soil fertility; 3) replacement of agrochemicals with environmentally beneficial inputs; and 4) redesign of the agroecosystem, so that it can be self-sustaining.

The stages of transition do not necessarily occur in this order, but generally, follow a pattern of gradual replacement of old practices and inputs by more sustainable ones. It is the results of experiments that will dictate the speed of change, as some crops can adapt well without pesticides, while others may be more difficult to produce.

Undoubtedly, the most arduous stage is the initial one, because the soil, usually very degraded, takes some time to recover its natural fertility, which can cause the decrease of productivity. In contrast, after the stabilization period, productivity increases and consequently the financial return as well. The peasants interviewed emphasized this point well:

Agroecology is a very slow step to get started and people like instant money. This needs a long time to unfold until the forest grows again until the plants reach adulthood so that we can start to reap the rewards. We do a job that is for the rest of our lives, so people think it's expensive and prefer to sell it daily or the product to someone else. (A.M.A. Várzea do Mundaú settlement-Trairi-CE)

The properties in which polycultures dominate, in general, are more economically and environmentally efficient. According to Altieri (2012, p.170), "polycultures, for example, when compared to monocultures, show greater stability of production and lower rates of decreased stability

during drought”, which is also observed by the peasants interviewed, as in the testimony that follows:

We plowed a large area to plant corn, beans, and cassava. Now I work in an area of 160 meters long by 20 meters wide, it is a very big difference, and inside this small area there is all this production, it has eggs, chicken, banana, macaxeira, peppers, fish, much more variety, sugar cane, and a multitude of things. (M.G. P. Novo Horizonte Settlement – Tururu - CE)

Variety in production has repercussions on the diet of peasant families. Self-consumption is a gain that can not be measured but undoubtedly improves the quality of life and guarantees food sovereignty, as can be seen in the testimony of a peasant about the changes that agroecological production has brought to his life and family:

One of [the changes] is in the health of the family and in the food habits that we now have, [...] we have several medicinal plants on the site and we are consuming healthy even our psychological state helps to confirm that we are healthy, and otherwise it is the amount of food that we have, if we go ten times to the farm, we bring back food ten times, every time we go to the farm we bring something to eat, it is different from when we ate only what came back home from the market [...] That's some of the changes! (A. M. A. Várzea do Mundaú Settlement- Trairi - CE).

Security and food sovereignty are key factors for the permanence of families in the countryside. Food sovereignty concerns not only the guarantee of food in sufficient quantity and quality to supply the nutritional needs of the population but also the autonomy of the people in producing these foods. This concept is related to the appropriation of knowledge, techniques, and means of production, including land, for agricultural production (STEDILE; CARVALHO, 2012).

A path that has been pursued and shown to be promising in the quest for Food Sovereignty in Ceará and other parts of Brazil, as revealed by Oliveira and Sampaio (2017), is Field Education, which has made a commitment to consolidate values defended by social movements, through the practical application of agroecological principles through school garden projects.

The dissemination of agroecological knowledge has proven to be a viable strategy for social transformation and consolidation of peasant

territory. It provides greater control of production, better living conditions and a greater connection with the land.

The strategies developed by the peasants in order to gain a better quality of life in the countryside and more space in society are as varied as possible and follow different paths since there is no ready-made income to follow. The initiatives start from the community's wishes, considering their material conditions (ROSSET, 2016).

In the case of the peasants interviewed, the experiments were gradually put into practice, so that some were abandoned altogether because they were not feasible, others partially exploited, and others successful. The results we have today are fruits of a long process of experimentation that is still ongoing. The peasant M. G. P. reports the experience she and other neighbors that are also part of the fairgoers of the Agroecological and Solidarity Fair in the city of Itapipoca - CE:

We've been through a lot of things here, first, we had a garden, there on the river path, along with other farmers. I worked there with bananas, papaya, a lot of fruit types, with vegetables, there really had vegetables to sell, every day there was a vegetable vendor ... Then, after spending some time there, we did a medicinal plant garden on the other side, we spent time there too, but it did not work because it was far from home, irrigation was badly done, and a lot of problems appeared. Then, one day, a boy from Emater-Ce came and offered a mandala project here. It was a small project to build a tank and give lessons to the people here in the semi-arid region. It was good here because it was closer and easier for the Fortaleza people to come to teach and the tank would stay for us, but the best of all was the class because the tank we can buy, but the class is different, right? This mandala here was for six families, but only we did not get the six families, so it was just me, my friend and my brother. Only the system was very weak, the water was not for everyone, so I went out and left the mandala there and set up a resource of my own and made mine. (M.G.P. Camponesa do Assentamento Novo Horizonte – Tururu - CE)

Another challenge to the dissemination of Agroecology in Ceará is that most of the experiences come from projects, often of short duration. In this case, when the appeal ends or when problems arise that were not thought of in the original proposal, it is difficult to resolve because there is no political and financial support.

## Experiences of agroecological transition in northern Ceará

The experiences of agroecological production among the peasants interviewed appeared in different contexts. The differences of natural, economic, family structure, and degree of engagement in social movements were no greater than the common ground that united them: the bond with the land, what is derived from it, and the certainty that it is necessary to care for the land in the best way.

In the group of tradesmen investigated, eight are seated, one owner and one borrower. The size of agro-ecological production units ranges from 0.25 to 4 hectares, where the labor force is predominantly family-owned, and outsourced staff is employed for sporadic services such as “clearing” and harvesting in peak cropping periods. The most expressive marketing channel is direct sales in Agroecological and Solidarity Fairs.

The strategies of agroecological production are varied since each family has its specific characteristics, but the social technology responsible for most of the production is the productive lawn.

The productive lawn is a system of polycultures, preferably cultivated near the residence, and is often an extension of the house. Therefore, it's a symbolic value for the family, especially for women, who use it as a living pantry for their daily practice of food preparation. The lawn also represents economic value because it means both food sovereignty as a source of income for the family and ecological value, as a space for experimenting with new practices and perpetuating traditional practices.

Other social technologies such as mandala and PAIS (Integrated Agroecological and Solidary Production) are also employed by some peasants.

The mandala is an agricultural production system, in which plants are grown in concentric circles to a source of water. In this system, the idea is to seek maximum utilization of interactions between species and water use efficiency.

The water reservoir built in the center should serve both for irrigation of the system and for fish farming, which plays the role of producers of organic matter, thus enriching the water that will be used to irrigate the plants, as well as another source of income and food for the family. In this production system, the distribution of the crops in the circles obeys criteria of the necessity of water and manpower. In the first

circles, near the tank, vegetables must be grown for family consumption, as this type of plant needs more constant care and more irrigation; from the fourth to the eighth circles commercial crops such as beans, corn, fruit plants, and roots should be cultivated; and in the ninth circle species that act as hedges must be planted, playing the role of protecting the mandala, especially from wind and external pollination.

During fieldwork, we had the opportunity to meet three production units. We visited the productive lawn and the PAIS system in the Mundaú Basin Settlement, in Trairi, owned by the Z.J. and F.M peasant families; we also visited the mandala / productive lawn of the family of Mrs. G. P. and the Mandala worked by the family of Mrs. F. and the family of Mr. R. P from the Novo Horizonte settlement in Tururu.

In the case of the mandala of the peasant M. G. P., in the Novo Horizonte Settlement, the production system does not have a circular format, considering the possibilities of the physical space of the family. The terrain the family had to make the experiment was rectangular, measuring 20 meters wide and 160 meters long. However, the question of form was not an impediment to the technique being employed and succeeding.

The peasant M. G. P. says that the production was made little by little, through many experiments. From her observations and the results of her experiments, she discovered that the proposal of the arrangement order of plants in circles was not the most appropriate for her reality, for even though she had built two tanks in the mandala, where she creates fish of the species *Tilapia*, there was not always enough water in the tanks to water the plants, without compromising the creation of the fish, thus opted to grow bananas (commercial culture) and no greenery in the area closest to the tanks.

She explained that:

Not all plants are irrigated, because the water is very limited, I have two tanks here that have fish and when it gets to a certain point it can no longer draw water, or the fish will die, it is very bad to plant vegetables there and also because the water is pulled by the motor and when there is no energy there is no water, it is too complicated. (M.G.P. Novo Horizonte Settlement - Tururu - CE).

Despite the difficulty of water mentioned by the peasant, it is worth remembering that the drought of the last five years (2012 to 2017) has not



prevented production in the production lawns, which in no way recalls the typical scenario of drought experienced.

It is not only the environmental conditions, such as soil, vegetation and water resources that dictate the production possibilities, but also the family structure, because it conditions the availability of labor. Regarding the organization of work in the mandala, M. G. P. also says that it is necessary to adapt the agroecological production to the possibilities of the family workforce, since in this case, it is limited, resulting in the limitations of the techniques that demand more effort:

The certainty of the project where we studied was to also feed the fish with the remnants of the mandala plants, but as time is short, we buy the feed and give it to them, because there are also the chickens to feed. Every day I need to put grass in the pigsty, right here [in the tanks] I only give them the store-bought feed, it is difficult to give them grass ... We also cater to the caterpillars since we do not spray, I put them there and they eat, eat cabbage leaves, things like that, they also feed on the flower of the banana trees [that fall in the tank], the chickens feed on store bought feed and also with the things of the mandala, the leaves, the remains of food, for example, yesterday I started the dough to make the cake to take to the fair, and what's left, I cooked and I gave it to them too, it's like this here, nothing goes to waste. (M.G.P. Novo Horizonte Settlement - Tururu - CE)

The peasant demonstrates that there is an integration of the production activities carried out in the mandala, where one complements the other and every resource is used: “nothing goes to waste”. Nevertheless, it recognizes that it is not always possible to carry out the work in the “true to the project” way, due to the insufficiency of family labor, and it is necessary to introduce external energy to the agroecosystem, “the store-bought feed”, in this case.

In the mandala of the family, besides the creation of fish, there is poultry raising, ornamental and medicinal plants, vegetables, and fruits. Diversification guarantees quality food to supply the family table and the agroecological fair.

The variety of cultivated plants ensures besides ecological services, such as increased biomass, greater economic security, especially in times of drought.

The stage of agroecological transition experienced by the family in question shows that many advances have already been achieved such as

increased soil fertility and longer water retention capacity. The peasant M. G. P. shows one of the techniques that he successfully learned and adapted to his yard, according to his testimony:

You see here we are on a high, but look at the size of the banana bunches, that's because I pay a boy to dig a foot or so, about a foot, then I get the rest of the banana, the rest of the corn, all these remains we get together with coconut shell, fill the ditch, when the ditch is full I cover it and make the beds on top. This system was not even for us, it was made for the semi-arid, but the system is so good that I adopted it here. Whatever part you make the beds that way will work. (M. G. P., Peasant of the Novo Horizonte Settlement - Tururu - CE)

The technique that the peasant is referring to relates to the increase of the number of nutrients in the soil and, consequently, of its fertility. This type of soil management favors the health of the plant, which in turn, is more resistant to pests and diseases, reducing or eliminating the need for pesticides.

One of the biggest challenges of production is undoubtedly in relation to the fight against pests, the peasant MGP says that it reduced the use of agrochemicals to almost zero, but that some crops are still very difficult to produce without the use of some type of poison, as in the case of bell peppers:

The only poison that we still use when they (the plagues) do not even let us produce is the trap for the field ant because it kills a very light plantation. We know it's not right, but we cannot really be agro-ecological because it does not let us produce anything, but I only use it as a last resort. I know how to fight it, I put the nim<sup>1</sup> leaf in the trap. (M.G.P. Peasant of the Novo Horizonte Settlement - Tururu - CE).

This fact represents a contradiction in the interviewee's discourse and also evidences something identified by Piccin and Moreira (2006, p. 306) among the peasants of the Ceres Settlement (RS), who use agroecology much more "as a possibility of productive arrangements than of a way of life". It is not possible to disregard the dynamics that mark socially the diverse individual trajectories in the region. Thus, this recognition does not disqualify peasants' social struggles, but rather values and recognizes the differences associated with the transition process.

In the statements of the other peasants interviewed there were no reports of the use of pesticides in any case, nor was it clear whether the product in which the pesticide is used is taken to the fair. Two factors contribute to this type of situation. The first is the lack of regular technical assistance and the other is the absence of enforcement mechanisms. However, it is good to remember that the agroecological transition is a gradual process (CAPORAL, COSTABEBER, 2000).

It was noted during the interviews that the denial of pesticides is a point that appears in the discourses of producers and consumers as what characterizes agroecology. This is the most commonly used argument for convincing customers at trade shows. In addition to the question of the use of pesticides, another action that peasants identify with Agroecology is not to use fires.

M. G. P. says that even after beginning to cultivate the land based on the principles of agroecology, he burned the garbage twice a year, which caused losses in relation to the plants:

From the day I burned garbage and destroyed a carambola tree, I almost cried, then my son-in-law came and guided me in what I should do: you pick up and separate the garbage, take everything that is not good, put it inside a drum, when the drum fills to a certain point you can set it on fire, because then you will ruin only the place where the drum is, you will burn less product at a time and will not destroy your lawn. (M.G.P. Peasant of the Novo Horizonte Settlement - Tururu - CE).

The process of agroecological transition is taking shape, as learning and experiences are incorporated with their mistakes and successes and the changes accepted. To try something different from what most people do is always an act of rebellion and a risk, but with persistence and with the humility of being guided by the teachings of nature, it is possible to do something new and better, as the peasant Z.J., who after the opportunity of the training course and exchange visits came to believe that he could change his life and his family by producing otherwise.

The dynamics of construction of agroecological knowledge by the peasants investigated followed the methodology, described by Sosa et al. (2010), of the Peasant-to-Peasant Agroecological Movement (MACAC), experienced in Cuba under the coordination of ANAP – Asociación Nacional de Agricultores Pequeños. This methodology proposes the

horizontal propagation of knowledge in order to instigate peasants to experiment with the techniques and select the processes that best fit their reality. It is in these moments of socialization and learning that the discourse becomes practical. The peasant confers the results of other peasants who have already begun the process of agroecological transition and is encouraged to replace conventional techniques and to design their own agroecosystem. The MCAC also has in itself an important principle in peasant culture: reciprocity. Each peasant who participates in the exchange is invited to practice the agroecological principles and later to socialize the results with other peasants in a future exchange, this time as host.

It was after the participation in some exchanges that the family of Mr. Z. J. started agroecological production, with a productive lawn and a PAIS system. The PAIS brings the same principle of the mandala, being more adaptable to semi-arid areas, because in the center a chicken coop is built, instead of the water tank, in order to obtain a source of protein and income for the family, besides producing the fertilizer for plants.

With PAIS irrigation is done by drip irrigation, whose source is a water tank located at a height of three meters. Drip irrigation saves water and energy and reduces peasant work with manual irrigation.

In spite of the differences in form and technique of these social technologies, the principles of agroecological production are the same in the productive lawn systems, PAIS and mandala, and may be complementary and cultivated in the same area, as in the case of the peasant Z.J. who PAIS production system is within the productive lawn.

The circle shape allows better integration between the chicken coop and vegetable garden, better visualization of the system and, the same distance from the chicken coop to all points of the same circle and greater use of the land.

At the time of the fieldwork carried out in the production area of Z.J., planting of vegetables for commercialization was temporarily suspended due to the effects of drought. The irrigation system made from PET bottles shows solutions accessible to peasants to improve production, which although not activated by lack of water, demonstrate the alternatives sought out.

Although the drought makes it impossible to irrigate the crops of the vegetables, the production of the lawn is not completely compromised,

since the income is extracted from other crops. Thus, it is evident the importance of the diversity remembered by authors such as Caporal and Costabeber (2000), Altieri (2012), Plog (2009), among others, who discuss the relation of peasantry and agroecology.

This type of farming system reveals the value of diversity to the food and economic sovereignty of the family. Peasant Z. J. says that he diversifies production with other activities, such as beekeeping, for example.

In addition to the production of domesticated bee honey, Mr. Z. J. produces honey from Jandaíra, a rarer species. He also trades seedlings of native plants to a reforestation project, sponsored by Petrobrás, in order to keep his income stable even in the dry season.

Besides the vegetables and the production of seedlings, the family lawn has countless species of fruit trees such as papaya, acerola, pineapple, custard apple, guava, grape, among others; species of ornamental plants and medicinal plants; and with species of roots that represent the local culture as the macaxeira. The area also has the creation of chickens. They are not used to feed the family but are taken to the agro-ecological and solidarity fairs in the cities of Itapipoca and Trairi.

The work is divided between the couple and a daughter, the only one of six children who live in the settlement. According to Marinho (2016) and Oliveira and Sampaio (2017), agroecological production has also been well developed in rural schools, which ensures that young people are brought closer to the traditional knowledge of peasantry, and new social technologies are focused on soil recovery and agricultural production. If before the only way seemed to be the rural exodus, today we find young peasants committed to the agroecological transition in the countryside.

During the fieldwork, peasant Z. J. showed the organic matter accumulated in his yard and made a point of explaining the importance of those plant remains to the equilibrium of the agroecosystem:

This here is compost, because nobody here burns. It is decomposing here and when it is time to plant, I pick up and take this one up and this one down and cover the plant beds. Instead of buying something else, we use it from here. That is why I always say that nature is rich, and we do not know where it comes from. One thing nature wants to receive is life, you do not want to know how many insects there are down here, how many lives there are here if I burn fire there how many lives have I not eliminated? (Z. J. Peasants of the Varzea settlement of Mundaú- Trairi-CE).

The testimony of the peasant reveals an important lesson on which Agroecology is based: nature has efficient mechanisms of life generation and biodiversity balance. We must understand them and be convinced that we can not intervene in all the processes, but that it is possible to extract the best that the earth has to offer.

### Final Considerations

Agroecology meant, for the peasants that studied it, the hope of taking from the land the necessary sustenance for their family, allowing them to stay in the field. Added to this, the practice of agroecological agriculture brought with it the valorization of the peasant as a farmer, a land worker, who is aware that his agricultural practices are also forms of resistance against the impositions of Capital and express their political position before society.

During the fieldwork in the production units, it was verified that the peasant lays hands on the acquired knowledge in a critical and investigative way, testing and perfecting the techniques, in order to adapt them to reality.

The investigated group is in “agroecological transition phase” (BATISTA, 2004, p, 53), which is marked by the gradual substitution of pesticides by natural pesticides and by soil management practices aimed at their recovery, such as the absence of burnings and the preservation of mulch. Although some challenges still persist as the use of pesticides in some cases, many results have already been achieved such as increased crop diversity and productivity, improved soil conditions and consequently the food and income of the families involved.

### Note

1 Scientific name of the plant *Azadirachta Indica A Juss.* Nim leaf is a natural insect repellent.

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## Authors' contributions

The authors offered scientific and intellectual contributions in the development of the article. The tasks of designing the study, preparing and drafting the manuscript as well as critical review were developed together. Maria Aline da Silva Batista was responsible for data systematization, interpretation, and analysis; The author Alexandra Maria de Oliveira was responsible for the theoretical and methodological coherence of the document.

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