

MULUNGU SETTLEMENT AND INNOVATION IN PRODUCTION TECHNOLOGY

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ABSTRACT

The Mandalla system is an innovation in production technology that has been well disseminated in Northeast Brazil and in the Mulundu Settlement was introduced in the agricultural system of community. The aim of this study was to expose the use of the mandalla, its installation in the community and the appropriation of the technology by the farmers, in order to analyze their contribution from the real reports of the use of the traditional homegardens. The methodology included Ethnography, with the use of the field notebook Rapid Participative Diagnostics and workshops with participatory methodologies. Families and their tasks are fundamental to understanding reality and in this dynamic there are different ways of thinking, acting and even producing. In the mandalla system the families that previously produced a diversity of activities that supplied their needs follow a model that was imposed, which carries a theory and must practice it and start to dedicate themselves to a camouflaged production chain, since the productive system presents functionality through available water making it unproductive most of the year taking into account the climatic conditions of the semi-arid region of Ceará, Brazil.

Keywords: Homegardens, Mandalla system, Small farmers, Ethnograph, Productive system

1. INTRODUCTION

The present work came after a long period of experiences started in 2011, in which the strictly agrarian context reserves a complexity of information that are focus of discussions, such as family farming and agricultural production technologies.

Thus, in addition to the commitment established with farmers and personal interests, the subject studied aims to contribute to social solutions of the Field, which involve organization, social policies, economics and other interesting aspects for development consistent with the agrarian reality.

Considering the repercussion that the technological package “mandalla system” has been taking in Brazil, present in 12 states of the country (Mesiano and Dias, 2008), the question is asked why this excitement, considering that the model presents indicators such as the incipience in the creation of fish, which do not fit the reality of the farmers, besides not having registered evaluations about this system.

According to the experiences in the Northeast, given that the Mandalla system has been well disseminated in the region, sometimes other animals such as chicken and duck are added in addition to fish in the circular space around the central water reservoir. However, there is evidence that the integration of the animals with the crops is still distant, and requires a deeper understanding of animal management and relationships with other components of the Mandalla system (Lima, 2013).

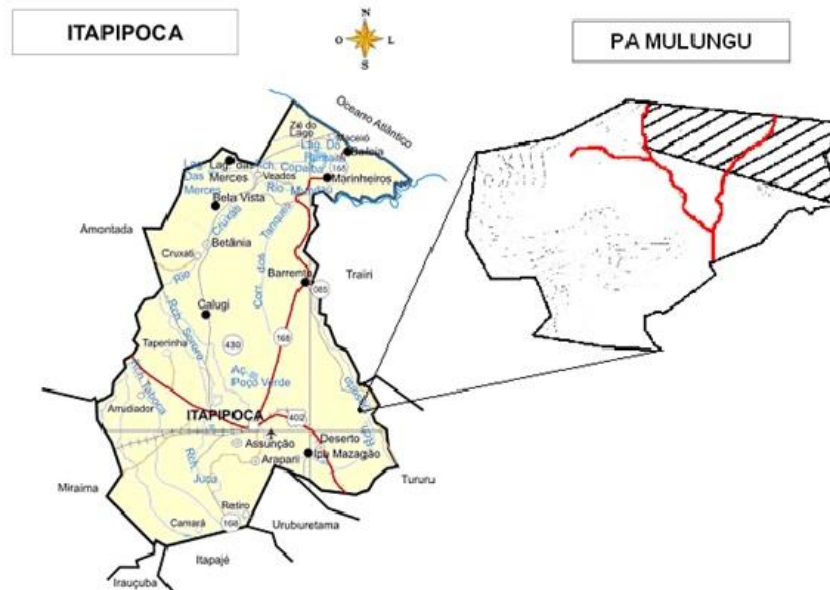
It is also necessary to take into account the cultural reality linked to the model of hierarchical agriculture, which shows the low presence of technologies. For farmers' ownership areas being classified as smallholdings do not require such sophisticated technological improvements, but rather those that can meet their long-term needs that are consistent with their reality and with little monetary costs.

The research proposal is to expose the use of the mandalla productive system, starting from the history of dissemination in the Northeast region, installation in the community and appropriation of this technology by the settlers, in order to analyze their contribution from real reports, the use of the traditional system of vegetable garden.

2. MATERIAL AND METHODS

The access to the Mulungu settlement from Fortaleza is given by BR 222, located 119 km from Ceará State (Figure 1), State of Ceará, Brazil, with reference to the watershed of the Mundaú River, the main water source of the Settlement and sub-basin of the Litoral Basin, it is inserted between latitudes of 03°09'29 "S/03°39'48" S and longitudes of 39°18'05 "W/39°50'23" W.

Fig. 1: Location of the Mulungu settlement in the municipality of Itapipoca, State of Ceará, Brazil.



Ethnography is a common method in the social sciences. It depends on being close, personal experience and possible participation not only on the part of the trained researcher. The research is multidisciplinary, because in ethnography often learn the culture, intensively study a particular field, requires a mixture of historical, observational and interview methods (Genzuk, 2003).

Linked to ethnography and as the main tool for archiving information was the field diary, brought by Weber (2009) "as a technique that is based on the exercise of direct observation of the cultural behaviors of a social group."

Participatory Rural Diagnosis (DRP) was also used, considering that, according to Verdejo (2006), the objective of a DRP is to promote self-analysis and self-determination of community groups, where in a participatory way primary information is obtained and analyzed or "Field" in the community.

Thus, from the holistic view and the coexistence, it was possible to bring the main elements regarding the collective production system of the Mulungu Settlement, being the farmers the subjects of the research, for then to sharpen the systemic view and to induce it methodologically to specify the situations proposed by the work.

Throughout the experience workshops were held in order to strengthen ties with farmers to facilitate and streamline data collection complemented by informal conversations. The activities were carried out in a group, where the purpose of each tool was initially explained, such as community map, settlement history, seasonal calendar, problem tree, then questioning questions were sent to the farmers group, in order to direct the information that was registered by setting up tables in wooden papers, fixed in a strategic place and that allowed easy visualization, and at the end the group was discussing the results and then analytically analyzed by the researcher.

3. RESULTS AND DISCUSSION

The Settlement came after a strenuous process of fighting a Lord who, through purchase, sale and possessions, "allowed" about 200 families to continue living there, paying nothing and cultivating as usual. The residents, however, should provide services, sell their production only for him, with the price that he presented and, who did not follow the rules, that is, sold to another person, was expelled from the farm (Souza *et al.*, 2008).

Residents were supported by the Land Pastoral Commission (CPT) and the Union of Rural Workers (STR), and expropriation took place on 25 September 1987 by INCRA, where 61 families were benefited but are currently estimated to live in the Settlement 160, adding up the families settled 99 families added.

The residents received an area of 1,176,0443 ha that was measured and recorded, and of this total on average each family registered has around 19, 2794 ha, a year later was issued the document of use and possession of that area (Souza *et al.*, 2008).

The workspaces in the settlement are divided between individual and collective areas, such as productive yards and mandrels, respectively. It is in the productive backyards where most of the family is gathered, especially during the rainy season, where all who have blood ties or not, work and cultivate the land.

Something interesting and that marks the agricultural tradition and way of life in the community is the conservation of the memory of their ancestors. Mulungu farmers preserve their seeds, they do not give up preserving the inherited knowledge (Roseno *et al.*, 2011). Carvalho (2003) defines seeds as symbolic histories, living structures formed from the fertilized ovules of plants representing the universe and the path of the person in process to meet and articulate to the world.

For those who do not know the habits of the farmers, they can not understand the affection with which they deal with the land, from which they derive their livelihood. Certainly, many scholars who are full of scientific concepts would say that they are unprepared people who do not know

how to deal with the soil, causing them to wear away with practices that they consider to be inadequate (burns, drills) (Roseno *et al.*, 2011). However, it is worth mentioning that they are practices used by ancestors and have been propagated and produced life between generations.

In the agricultural practices to report on the mandallas that are part of a technological package of production that was made available by the state government and in 2009 the first five production structures were completed where they began to grow vegetables, fruits and fish.

The mandalla arose with the proposal to diversify the production, distribution of water to the productive circles of vegetables and fruits through irrigation and serves for the creation of fish, which produce organic fertilizer destined to these crops, has become a source of income through from the sale of garden products to the groups of settled workers, when water is available. However, ignorance of the management of fish farming led households to prioritize vegetables and fruit plants (Figure 2).

Fig. 2: Collective Area of the Mulungu Settlement in the municipality of Itapipoca, State of Ceará, Brazil.



Initially the production system aroused the enthusiasm of the settlers, to the point of seeking resources to build more productive systems, arriving in 2014 a project for the construction of another 10 mandallas, in this period the drought already affected drastically the water reservoirs (Figure 3, a), but accepted and currently due to lack of rainfall the system is not very productive (Figure 3, b).

Fig. 3: Mandalla system during periods of water scarcity and the arm of the Mundaú river in the municipality of Itapipoca, State of Ceará, Brazil.



Published descriptive works about their reality usually point to benefits as well as a main limitation, the lack of technicians, that help in the activity, in view of the novelties of production, an example is cited by Sousa *et. al.* (2014).

One of the difficulties encountered in the system is the optimization of the entire production space of the mandalla. The water retained in the reservoir could be used for the cultivation of fish, mainly *Oreochromis niloticus* (Nile Tilapia), a rustic species and easy to grow in captivity, but there is a need for technical assistance in the area to result in better efficiency of the final product.

In some years of follow-up and in the case of water reality in the north-eastern semi-arid region, the Settlement in question takes a step forward by being able to keep part of its reservoirs with water only with the help of nature and its geographical location. And yet, there are periods in which the productive system is highly productive and perceptible to the eye, but in the meantime there is a significant decrease in production, rendering it unproductive.

In these spaces one can perceive the constant dynamics and it is fundamental to analyze the phases of occupation of the territory. This allows us to evaluate the pressure exerted on the landscape by the farm models (Fontoura *et al.*, 2003), even if these changes are at the level of family livelihood.

From the general view of the work organization and the management of the productive areas from the cultural practices that are common to the individual and collective areas, the equipment commonly used by the farmers are the hoe, fan, shovel and shovel. The preparation of the soil is by means of the drill, burned, application of manure and green matter.

A mandalla with six deltas with nine circles of concentric beds and a six-foot-deep circular tank six meters in diameter takes approximately ten days to be built by the group consisting of fourteen family representatives and help from the backhoe.

In the individual areas are planted corn, beans and apple, the seeds of these crops are mostly landrace, already in the collective area are planted fruit trees such as banana, pineapple, acerola, vegetables such as coriander, chives and peppers and seeds purchased in local commerce.

The production of the individual areas is primarily for family consumption, but in the mandallas prioritizes the commercialization. The organisms that most influence the plantations, therefore, feed on it in a disorderly way are the caterpillars and scale insects, as control farmers use natural pesticides. The main one is neem (*Azadirachta indica*). After the productive cycle, manual harvesting is performed and post-harvesting is not common.

In the observed cases the rustic equipment used in the agricultural work are derived from ancestral practices and are sufficient for the purpose of these realities. However, the natural modification of society and customs introduce additional tools that gradually facilitate the development of activities, exemplified by the irrigation system, on the other hand the harvest and post-harvest are still carried out manually.

Like seeds, when they are inserted in technological packages, even if they do not use chemical products, they are commercially acquired, they make up the distinct model of the cultural heritage, a picture of the meaning and purpose of what is being produced, feeding and sale of surplus.

These family farmers who have entered into an exogenous context their reality, even if there is cultural integration, to use their management in the system created by others and this system keeps them directly linked to technical assistance, commercial seeds, cooperatives and training processes. In the latter, the discussion is opened regarding the importance of these formations to broaden their visions, exemplifying agroecology.

The term agroecology gained visibility in the 1970s by science, but the practice of agroecology is as old as agriculture. Agroecology is often incorporated into agronomic ideas associated with the environment and social issues focusing not only on production but on the ecological sustainability of the production system (Hecht, 1997).

This multidisciplinary concept that combines complex relationships between people, crops, soil, water and animals, that is, in a holistic way is the field of knowledge that provides the scientific basis to support the transition process of the model of agriculture conventional approach to ecologically or sustainably based farming styles, as well as from the conventional model of development to sustainable rural development processes (Caporal *et al.*, 2009).

Expanding critical thinking as well as understanding its space from other experiences that are being developed in its majority in a participatory way causes the production process to go beyond harvesting, including processing and cooperativism.

On the other hand, to the point that there are tools that include family producers in a context closer to their reality, the dynamics to which this reality is inserted requires to question and review other factors, such as the water issue.

In the publication "The Water Question in the Northeast" of the National Water Agency (ANA, 2012, pp. 34-36) is better understood the phenomenon to which the Northeast Region as everything is exposed, and is Ceará.

Ceará has an annual rainfall regime centered on the period from January to April. The main mechanism that causes rainfall over the Northeast and the Intercropical Convergence Zone (ITCZ) and the interannual variations of rainfall totals over the Northeast Region cause, in the years of rainfall deficit, the so-called dry season, ie , an extended period of drought that occurs during the rainy season on a region.

Even with the deficit each reality develops strategies for accumulation of water be it wells and even government incentives such as cisterns. These serve both for food production and for quenching animal and human thirst.

However, in critical times of drought it is worth mentioning, even if this is not the focus of research, but in the agrarian context what has contributed to a large extent in the feeding of families are the scholarship programs offered by the federal government.

It is through governmental investments, be they social policies such as the various exchanges offered or technological packages for the field that the farmers of the realities experienced manage to dribble the cycle of the water deficit. Understanding that in this cycle, where there are rains, however, these are not enough to keep the reservoirs until the next rainy season (FUNCEME, 2018).

Thus, those who are directly engaged in agricultural work are at the mercy of agrarian standardization, that is, of that model offered in technological packages, but which are often not in keeping with the dynamics of the farmers' production.

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These distinctions are perceived as the farmer does not refuse the technological package, highlighting two attractions: i) it does not have any implementation costs, because in these cases, the labor force is not accounted for; ii) throughout the management of the productive unit the farmer tends to remodel it; however, the agencies responsible for the dissemination of the same, do not take into account the "reality" factor, but the visibility and data that marketing will generate for that instance.

4. CONCLUSIONS

Families and their activities are important to understand reality and in this dynamic there are different ways of thinking, acting and even producing. These are brought daily in collective and individual actions. In the mandalla system the families that previously produced a diversity of activities that supplied their need follow a model that was imposed, which carries a theory and must practice it and start to dedicate themselves to a camouflaged production chain, since the productive system presents functionality through available water making it unproductive most of the year taking into account the climatic conditions of the semi-arid region of Ceará, Brazil.

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