

SYMBOLIC ASPECTS OF MANDALLATECNOLOGY

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ABSTRACT

Family farming is recognized by various sectors of Brazilian society and the concept emerged in the political perspective in order to ensure rights to social groups living in rural areas and are directly linked to land use. Gradually the discussions on the subject and advance, as the achievements for the improvement of life in the country have been consolidated, there are new production technologies such as mandalla system. This article aims to bring symbolic elements and questions implied the proposed mandalla system and its role within the rural reality of the settlement Mulungu. Presents concepts related to family farming, the mandala in symbolic terms, the mandalla production system and finally how these issues are linked. It is concluded that there are elements that attempt to make the production system mandalla a difference in the field, however, an improvement in the local cultural heritage and which mainly provide water activities could ensure the sustainability of farmers, they are practices belonging to their culture. The question is not discount innovative technologies to the field, but to make the subject beneficiaries to participate minimally in this decision to make this closer to its reality technology.

Keywords: Family farming, Production system, Semiarid

INTRODUCTION

Family farming has now been recognized by various sectors of Brazilian society, but still passes through resistance, given that this concept emerged in the political perspective in order to ensure rights to social groups living in rural areas and are directly linked to land use.

The use of this term is recent in Brazil and so on Schneider (2003) states:

“Currently, the discussion of family farming is gaining social legitimacy, political and academic in Brazil, starting to be used more frequently in the speeches of rural social movements by government agencies and segments of academic thought, especially by students of Social Sciences that dealing with agriculture and the rural world”.

It is from these facts that gradually advance the discussions and as they gain space achievements for the improvement of life in the country has been consolidating. However, it made clear that these improvements are often linked to technologies that do not match the peasant reality. Since from the marked green revolution, changes have been taking place in these spaces.

Regarding the green revolution focused criticism both in the sense of the problems associated with production practices about nature and ecosystems as, in order to emphasize the character concentrator of wealth and social benefits associated with it. What generates the search technologies and practical alternatives to this technological standards as well as social productive forms of organization less concentrators (Moreira, 2000).

These technologies that are practiced in the field and are used only elements of their traditions, as past plantations practices between generations. So is the dynamic daily life of family farmers, full of complex symbolic aspects that make up the agrarian reality. For, in addition to agricultural production we are dealing with people who interact with the environment and with the environment your reality.

Calls attention to the description and analysis of production units taking as base the perception of the two main social actors involved: farmers, why are indeed who operates agricultural systems and on the other hand, the technical professionals agricultural sciences, because they are responsible for the contribution that science can and should make to the improvement of production methods¹therefore, these cases can be represented symbologies increasingly closer to real.

Bringing the discussion to another element of this study, in this case, the mandalla production system, the Agency Mandalla DHSA (Desenvolvimento Nordestino, 2007) describes the process as being Mandalla:

“a participatory method of planning and organization of production that evolves from food self-sustaining seed systems for associative and

¹AZEVEDO, R.A.B. **Introdução a Analise e Descrição de Sistemas Agrícolas**. Redenção, 23p. Not published.

agroindustrial complexes, conceptualized as multiparticipativas companies that enable the improvement of quality of life, economic productivity and environmental balance of the communities involved through the dissemination of information and simplified technologies when traditions and customs, developing easy to understand actions, promoting a practical and comprehensive reinvestment of creative processes, innovative, achievable and cost-effective, fundamental in Rescue of Human Dignity by the rational use of productive potential existing, land and water in food production, quality, productivity, social responsibility and the exercise of citizenship, combating hunger and poverty”.

In the case of new methods in the cultural heritage of farmers automatically thought brings us more challenges in the case of Mandala valley make it clear that this is not the recipe "magic" that solves all problems. Given that this production system depends on the water supply and to some realities that is the major limitation (Sidersky, 2008).

From this perspective and approaching the symbolic field with technology mandalla this article aims to bring symbolic elements and questions implied by the proposed Madalla system and its role within the rural reality of the settlement Mulungu and present concepts related to family farming, the mandala in terms symbolic, the mandalla production system and finally how these issues are linked.

METHODOLOGY

The settlement Mulungu came after an arduous process of fighting a man who said he was "landlord", with the support of the Pastoral Land Commission (CPT) and the Rural Workers Union (STR). Expropriation took place on 25 September 1987 by INCRA where 61 families have benefited, but currently estimated to live in settlement 160, adding to the resettled families, 99 families aggregate.

The main tool used was the diary, and from the descriptions contained therein, the research problem has been founded. It is considered that the information analyzed were contained in a broader context, which was intended to take into account all the tangible aspects of a system.

Aided by the tools selected from Participatory Rural Appraisal (PRA), given that, according to Verdejo (2006), the objective of a PRA is to boost the self-analysis and self-determination of community groups where, in a participatory manner, are obtained and analyzes primary information or "field" in the community.

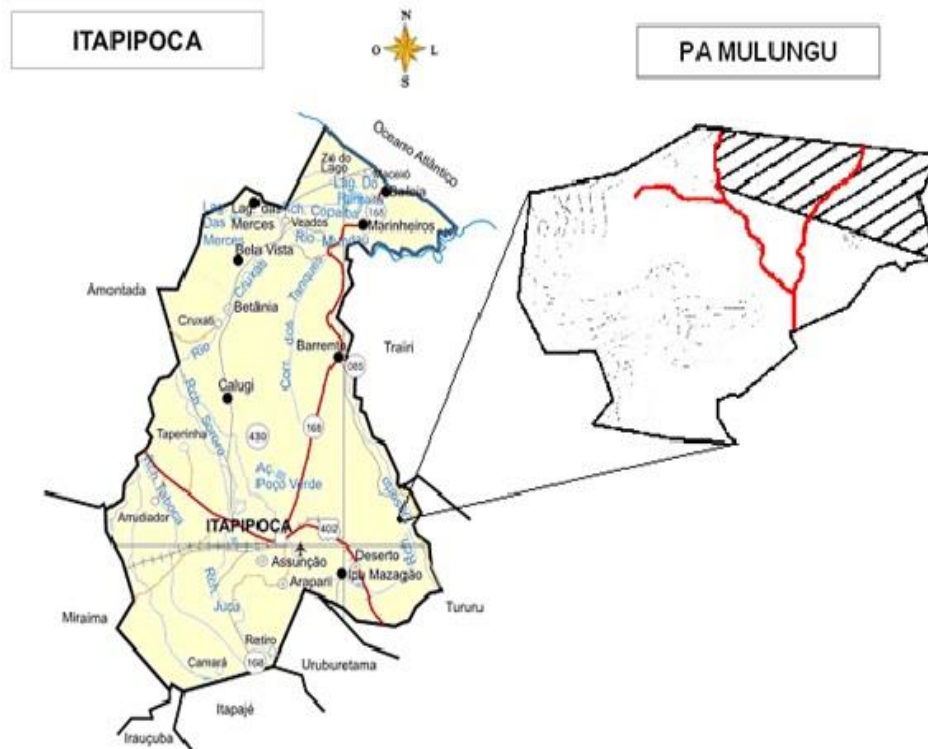
RESULTS AND DISCUSSION

1. The studied Community

The agricultural character of the community is inserted in one of the "... mountainous areas scattered throughout the hinterland depressions, positioned near the coast with altitudes between 650-900m; strongly dissected reliefs features hills and ridges in the crystalline basement rocks "(Lima *et al.*, 2000).

Access to Settlement Mulungu departing from Fortaleza is by BR 222, located 119 km from Ceará Capital (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 Coastal basin, it is inserted between the latitude 03°09'29"S/03°39'48"S and longitudes 39°18'05"W/39°50'23"W.





Source: PDA- Plano de Desenvolvimento do Assentamento (2008).

Figure 1: Map of location of the Settlement Project.

The settlement came after an arduous process of struggle against Lord through buying, selling and possessions "allowed" to about 200 families continue living on site, without paying anything and cultivating as usual. Residents, however, should provide services, sell their produce only to him, the price the same present and who did not follow the rules, or sell to someone else, was expelled from the farm (Souza *et al.*, 2008).

Residents had the support of the Pastoral Land Commission (CPT) and the Rural Workers Union (STR). Expropriation took place on 25 September 1987 by INCRA where 61 families have benefited, but currently estimated to live in settlement 160, adding to the 99 families settled aggregated families.

The Settlers received an area of 1176.0443 ha which were measured and recorded, of the total on average each registered family owns around 19 ha in 2794, a year later was issued document usage and possession of that area (Souza *et al.*, 2008).

Workspaces in the settlement are divided between individual and collective areas, such as productive backyards and mandallas respectively. They are in productive backyards where most of the family together are mainly during the rainy season, where all blood ties or do not work and cultivate the land.

Still have 2 hectares (ha) of irrigated cashew trees to be worked collectively, but these also are stagnant. Already mandallas that are part of a technological package of production that was made available by the state government in 2009 concluded the first five production facilities where they began to grow vegetables, fruit and fish.

With the proposal to diversify production, which distributes water to productive circles of fruits and vegetables through irrigation and serves for fish farming, which produce organic fertilizer for these crops and became a source of income by selling products of vegetable gardens for the four working groups of settlers, when water is available. However, the lack of management of fish caused families prioritize vegetables and fruit plants (Figure 2).



Source: First author.

Figure 2: Mandalla production system between the years 2013 and 2014.

Initially the production system aroused the enthusiasm of the settlers, to the point of seeking resources to build more productive systems, reaching in 2014 a project to build 10 more mandallas in this period drought have dramatically affected water reservoirs (Figure 3) however they accepted and currently a lack of rain throughout the system is non-productive (Figure 4).



Source: First author

Figure 3: a) Rio Mundaú dry; b) Açude settlement without water.



Source: First author

Figure 4: a) Each of the first five Mandala in dry period; b) One of the ten mandallas being built

In places like this, where you can perceive the constant dynamic is crucial to analyze the phases of occupation of the territory. This allows us to evaluate the pressure that the models farm have

on the landscape in the course of its conformation (Fontoura *et al.*, 2003), even if those changes are at the level of family income.

Something interesting and marking agricultural traditionalism and the way of life in the community is the preservation of the memory of their ancestors, where farmers Mulungu preserve their seeds, do not give up keep the inherited knowledge is the confidence in their farming practices they have learned (Roseno *et al.*, 2011).

Carvalho (2003) works the seeds as symbolic stories, living structures formed from eggs fertilized plants representatives of the universe and the process in person the way to meet and articulate the world.

For those who do not know the habits of farmers, can not understand the affection with which they deal with the land, which make their living. Certainly many scholars full of scientific concepts would claim that they are unprepared and do not know how to deal with the ground, causing it to wear with practices they consider inadequate (fires, drills) (Roseno *et al.*, 2011). However, it makes it clear valley that are practices used by ancestors and has been propagated and (re) producing life between generations.

2. Family Agriculture

Mazoyer and Roudart (2010) are historical accounts of agriculture in the world, as the process of using the land to grow food and other purposes that has been applied to about 10,000 years, with people of prehistory, which gradually began to practice cultivation and breeding, taming a range of species. It was quirky and independently in different parts of the world, cultivating food from adverse conditions, such as in the desert region of the Nile and even marked the beginning of the commercialization of civilizations historically recognized as the Inca people. These experiences are improved increasingly throughout history and the world, and different points of views emerge about the models of agricultural crop that has been developed, authors and social scientists began to mark their resistance.

The model which takes into account the article is family farming, stressing the need to define in the group of farmers that drove the studies. The more accurate we are in our analysis of reflection more objects will contribute to decipher its labyrinths².

It means recognizing that family agriculture has territorial diversity, regardless of empirical cut adopted in terms of styles, as well as the inductive role of rural development, especially when

²AZEVEDO, R.A.B. **Uma proposta para abordagem agrônômica do conceito de agricultura familiar.** Redenção, 11p. Not published.

taking into account the social aspects and the local economic dynamics and regional (Conterato, 2008).

Caldart *et al.* (2012), also bring other terminology which can enter the family farmers, such as family peasant farmers, who also has as its protagonist the family, but does not differentiate the universe of those who decide on the management of work and have special characteristics which them is itself, either in the way of producing and community life, whether in the form of coexistence with nature (Carvalho and Costa, 2012).

Appropriate and necessary terminology, because then you can see the resistance against the "common sense" that the class of farmers is due to characteristics of family agriculture as a backward sector of economic, technological and social point of view, fundamentally geared to the production of basic food and subsistence production logic (Filho *et al.*, 2004).

However, it clarified that the concept of the term "subsistence", is present in the dominant discourse from the colonial Brazil, discriminates farmers for producing food - a subordinate task, even if necessary the social reproduction of the Brazilian social formation - well, to be opposite the dominant model (Carvalho and Costa, 2012). Since the class is not synonymous with technological backwardness and contrary to insert markets. Family farmers have every ability to enter markets and handling technologies, just that they are adequate to the model of peasant agriculture (Schneider, 2014).

To better understand these issues the construction is necessary for a new common sense among farmers and technicians, and for this to happen, it is essential that science understands the logic of the design and operation of agricultural systems of these farmers (Alves and Azevedo, 2011), knowing that the practices are brought experiences of their ancestors and these make up its cultural heritage.

3. Mandala

What we call symbol is a term, a name or even a picture that may be familiar in daily life, although it has special meaning beyond its obvious meaning and conventional (Jung, 2008). So treat the symbolic is complex considering that involves points of views, cultures, science and society, because enter in path analysis can bring problems of classification, typology and even "characterization" (Martin, 1994). However, it made clear that will be displayed only mandala definitions of the word in symbolic terms.

In recent years mandalas have attracted much interest among a wide audience. The main focus of this interest is directed to Tibetan Mandalas, whose models were included in numerous

publications. But they are found in a wide spectrum of religious traditions of South Asia, including the Jains Hindus. In addition to also be part of the Buddhist traditions of East Asia (Bühnemann *et al.*, 2003; Tuan, 2007).

In South Asia, mandalas have been mainly used in occasional services, such as paintings in marriage. In these rites, deities are invoked in mandalas with the help of mantras. The construction of a mandala is especially important in tantric initiation (dksa) rites (Bühnemann *et al.* 2003; Tuan, 2007).

In esoteric teaching, a mandala can be viewed as present in the practitioner's body, correlating the mandala of cosmic symbolism with parts of the practitioner's body. Patterns Mandala had profound influences, for example, had an impact on the ancient city-planned. Its use is documented in alchemy (Bühnemann *et al.* 2003; Tuan, 2007).

In each region where it is used spiritual presents a distinct meaning, but in some cases are similar or even have sincretismo. Overall, it was shown that the term "mandala" is on the symbology that unites beliefs and reason and are evidenced in generations culturally practice, believe and reproduce such knowledge.

4. System Agricultural Production

The text has been providing the perception of a series of intrinsic symbologies to the production system, ranging from its nomenclature the position of the beds. Which leads to question the way it comes to the farmer? There is understanding by the person receiving the technology of all this philosophy? And if there is sensitivity of technicians with farmers spending (pass) this whole situation?

In this context, there is the expansion of agriculture with the growing food demand due to increasing world population, there is also the emergence of technologies that "promise" facilitate food production. However, this is changing speech increasing the quality of food, the means of insertion of the producers and the environment.

There are different positions in the case of agricultural production models, but one that will take into account farmers have players capable of dealing with food production with environmental conservation and with the end of social inequality¹. Productive questions, there is a range, based on indigenous knowledge, in polyculture in genetic diversity, crop rotation and integration of animal-plant production (Lacerda, 2005). Attention is drawn to agriculture which occupies a prominent place in rural areas, whose importance varies between regions and natural ecosystems, can not, however, imagine that itself has not been modified in recent years (Schneider, 2003).

Modifying this regard to social situations in which individuals of a family pass to exercise a wide range of economic and productive activities.

A few years ago arrives a theoretically new production technology in the eyes of farmers, called: Mandalla system. According to Alberto Fiaschitello in an interview with the "creator" of Mandalla System, Willy Pessoa, this technology was created about thirty years, and its philosophy is based on *recapacitação* for self-sustainability of the rural, within their own conditions traditional culture, including the environment and culture. It goes on to say that "the philosophical basis of Mandalla is that the rural family produces its own food quality, productivity, social responsibility and citizenship".

The aspects of the physical structure of Mandalla system mentioned below, can be found on the Agency Mandalla DHSA site. The system covers an average area of 50 x 50 meters. It consists of nine concentric circles. Different crops are grown and animals around a water tank, which is the essential basis of the system.

Formed from circular structures of food production, with concentric circles that have in the center a water reservoir also circular, with 6 meters in diameter and 2 meters deep, can hold up to 25,000 liters of water. Then, run irrigation hoses for the nine productive circles that grow around thirty plant products and ten species of animals placed strategically in a common area, forming an interactive system where the needs of one are supplied by production of other (Souza, *et al.*, 2010).

However, the reality experienced by the man from the country who still suffers with all the pressure of the capitalist system, since the process of scientification and commodification of agriculture meant for the management of agricultural systems, role of transfer to external sectors to own universe of farmers. Many of the determined activities and processes and usually carried out under own agricultural systems have to be decided and implemented in external instances the same as the industrial sector or services¹ that makes clear horizontality imposed the arrival of any package to the field.

There are thousands of Mandallas systems in dozens of Brazilian cities and in several states, such as such as Paraíba, Pernambuco, Bahia, Alagoas, Ceará, Maranhão, Minas Gerais, Mato Grosso, Mato Grosso do Sul and Goiás (Desenvolvimento Nordeste, 2007). In the state of Ceará only from 2008 the first Mandallas were implemented and there are 163 projects, involving 489 farmers. It is emphasized that each project is three producers benefited Costa *et. al.* (2014).

According to Costa *et al.* (2014) the partnership was established with the support of the founder, Willy Pessoa, who was responsible for the transfer of technology and training of the technicians who would be the replicators for family farmers. It is emphasized that this is transfer where there is loss of collective construction of knowledge. Responsible for the implementation of the project, the Secretariat of Ceará Agricultural Development (SDA), issued throughout the state. According to information from Costa *et al.* (2014) the initiative only began in 2007, but only had the first mandalas installed the following year.

The Mandalla project initially aimed to meet the demand of family farmers, the food needs of quality and sufficient quantity, generate family employment, with the consequent generation of income through the commercialization also of production surpluses (Costa *et al.*, 2014).

Although this study analyzed the testimony of participating farmers of the project in order to explain the high level of satisfaction in terms of organization of work characteristics in mandallas, and drew attention to the inclusion of new technologies such as irrigation and agro-ecology, important to this result were the training and skills offered in the implementation (Costa *et al.*, 2014).

One aspect that is relevant and with purpose to stimulate the issues of agrarian reality in the case of these new technologies, in particular irrigation, which production system would not achieve success with an efficient irrigation system and water available?

The mandallas are present in Mulungu settlement, near the city of Tururu, Ceará, which for some years has been a source of information for scientific research. The published works on their reality were also descriptive origin, pointing mostly the benefits and the main limitation, the lack of technicians to assist in the activity. There are times when the system is highly productive noticeable to the eye, but in periods of low rainfall has been a drastic drop in production.

5. Production System Mandalla and Rural Man

Some concerns arise when combining mandalla system with the farmer and these help to foster discussion, for example, that these two realities have in common? And moreover, the influence of a reality on the other?

It is interesting here to bring the concept of "topophilia" (Tuan, 2007) which is the emotional bond between people and place or environment around them. Bring this concept to the discussion around the circular productive system that has gained ground increasingly regions of Brazil and occupying the field, it is nevertheless curious. Starting from its name that it is closely connected

with belief and symbolism to the everyday man field that is complex and rich culture and also symbols, most often unseen eyes of these.

However, the striking feature discussed by Tuan (2007) is the ability of the human mind in order and sort all that surrounds it, is a segmented or opposite way, as life and death, male-female and between them there is always something in between. An example, the intermediate planet earth heavenly and hellish forces. All this to make clear, that the mind of human beings seem to be predisposed to classify something that matches your reality (Tuan, 2007, p. 32). So take existing things, practiced for thousands of years and it is only propagated and give a nomenclature is to be asserting its existence to a company.

The field in all its complexity walks a dynamic dictated primarily by nature, given that the activity governing family life is agriculture that is influenced by weather conditions. Among agricultural activities, families are marked by culture and internal rules that the time was in charge of implementing them. Factors performing duties, such as exercise non-agricultural activities in times of water shortage, or even organize themselves into groups (association, youth, women and church) to better manage the operation of the activities in the household routine.

As we deal with symbols, we can approach such discussions, however one is closely linked in the cosmos design mainly of people from the West (Tuan, 2007) and the other with factors that happen in everyday life of families and generation after generation have signed their actions, making peculiar characteristics of a people that deals with the earth.

Another point brought by Carl Gustav Jung cited Tuan (2007, p.33) and von Franz (2008, p.208) is the circle as image archetypal, showing specifically which varies greatly according to the context in which it appears. Regarding the man of the field is necessary to assume the consequences to differentiate them in order not to reduce them to one single category, using family labor. In other words, it is essential to take into account the context in which they are inserted (Filho *et al.*, 2004). This usually does not happen because of the tax policies that are imposed model for the field, always in a horizontal way, where the subjects are far beneficiaries of the production process and almost never contribute and opine on deployment.

Although there is a beneficial proposal, to what extent the person who receives the project is aware of such improvements? How far experienced agrarian reality or has a sensitivity to understand it that someone who creates / or projects for the country man? Where the farmer is recognized? In technology or in their clearings packages? To crave a social technology to facilitate its production, as this technology is approaching its reality? What does a widespread technology to farmers where the concept discussed in the field is different from that brought by

literature? These are questions that feed the debate and deepen further the theme about the complex reality of the field and the human mind.

CONCLUSIONS

In all studies reviewed realize that are brought elements that try to make the system mandalla a difference in the lives of men in the field, but the point is that every independent production system which is, especially that practiced by the ancestors and kept until today plus an improvement and especially ensuring water has a great chance to ensure the sustainability of the peasants, even as they are practices pertaining to their culture. The question is not discount innovative technologies to the field, but to make the subject beneficiaries to participate minimally in this decision to make this closer to its reality technology.

REFERENCES

- Agência Mandalla DHSA. *Mandalla*. 2003. Available in:
<<https://desenvolvimentonordestino.wordpress.com/category/ongs-e-institutos/page/18/>>. Access: 07 jun 2015.
- Alves H.S. and Azevedo R.A.B. 2011. Caracterização do manejo utilizado na classificação de solos por agricultores da região da Morraria – Cáceres/MT. *Revista de Biologia e Ciências da Terra*, 11(2), 15-22.
- Berzin A. *A Simbologia da Mandalla: O Significado e o Uso de Uma Mandala*. Available in:
<http://www.berzinarchives.com/web/pt/archives/advanced/tantra/level1_getting_started/meaning_use_mandala.html>. Access: 4 mar 2015.
- Buhemann G. Brunner H. Mcister M.W. Padoux A. Rastelli M. and Torzsok J. 2003. *Mandalas And Yantras In The Hindu Traditions* Gudrun, Brill, Leiden, Boston, 209p.
- Carvalho H.M. (org.) 2003. *Sementes: Patrimônio do povo a serviço da humanidade*, Expressão Popular, 135p.
- Carvalho H.M. and Costa F.A. 2012. *Agricultura Camponesa*. In: Caldart, R.S. Pereira, I.B. Alentejano P. and Frigotto G. (Org). *Dicionário da Educação do Campo*. Rio de Janeiro, São Paulo: Escola Politécnica de Saúde Joaquim Venâncio, Expressão Popular, 788p.

Conterato M.A. 2008. *Dinâmicas regionais do desenvolvimento rural e estilos da agricultura familiar: uma análise a partir do Rio Grande do Sul*. Tese de Doutorado, Universidade Federal do Rio Grande do Sul, Desenvolvimento Rural, Porto Alegre, 275p.

Costa J.S. Maia A.B.G.R. Correia-Lima B.C. Cabral A.C.A. Santos S.M. and Filho J.C.L.S. 2014. Tecnologia Social à Luz da Teoria Sociotécnica: O Caso do Projeto Mandalla no Ceará. *Revista Interdisciplinar de Gestão Social*. 3(3), 35-56. Available in: <www.rigs.ufba.br/pdfs/RIGS_v3_n3_art2.pdf>. Access: 30 mai 2015.

Desenvolvimento Nordeste. 2007. *Mandalla*. Available in: <<https://desenvolvimentonordestino.wordpress.com/2007/07/30/mandala/>>. Access: 07 jun 2015.

Ferreira C.B. Mury F.T. Santos F.I.O. Costa R.N.M. and Rojas M.O.A.I. 2012. *Reaplicação Do Projeto Mandalla Na Comunidade Livramento Da Cit., Município De Codó-Ma*. In: Anais, VII Congresso Norte-Nordeste de Pesquisa e Inovação. 2012. Available in: <<http://propi.ifto.edu.br/ocs/index.php/connepi/vii/paper/viewFile/5406/1920>>. Access: 30 mai 2015.

Filho H.M.S. Buainain A.M. Guanziroli C. and Batalha M.O. 2004. *Agricultura Familiar e Tecnologia no Brasil: características, desafios e obstáculos*. Available in: <www.sober.org.br/palestra/12/09O442.pdf>. Access: 04 nov 2014.

Fontoura L.F.M. Verdum R. and Silveira C.T. 2003. *Análise De Sistemas De Produção E Leitura Da Paisagem*. X Simpósio de Geografia Física Aplicada, 2003. Available in: <<http://www.ufrgs.br/pgdr/arquivos/675.pdf>>. Access: 04 nov 2014.

Holmgren D. and Mollison B. 1983. *Permacultura Um: Uma Agricultura Permanente nas Comunidades em Geral*. Ed. Ground LTDA., São Paulo, 149p.

Jung C.G. 2008. *A Importância dos Sonhos*. In: Jung C.G. O Homem e seus Símbolos. 6ª Ed. Especial Brasileira, Tradução de Maria Lúcia Pinho, Editora Nova Fronteira, Rio de Janeiro.

Lima L.C. Morais J.O. and Souza M.J.N. 2000. *Compartimentação Territorial e Gestão Regional do Ceará*. Fortaleza: FUNECE.

Martin, D. 1994. *Mandala cosmogony: human body good thought and the revelation of the secret mother tantras of Bom*, Wiesbaden : Harrassowitz, (Asiatische Forschungen ; Bd. 124).

Martins R.K. Silva N.S. Fernandes M.O. and Borsato J.M.L.S. 2012. *O Sistema Mandala de Produção de Alimentos: Uma Estratégia para o Desenvolvimento da Agricultura Familiar*. In: Anais. XXI Congresso Nacional de Geografia Agrária. 2012. Available in: <http://www.lagea.ig.ufu.br/xx1enga/anais_enga_2012/eixos/1397_1.pdf>. Access: 30 mai 2015.

Mazoyer M. and Roudart L. 2010. *História das agriculturas no mundo: do neolítico à crise contemporânea*. Tradução de Cláudia F. Falluh; Balduino Ferreira, São Paulo, Editora UNESP, Brasília, DF: NEAD, 568p.

Medeiros L.R. Silva N.L. Barbosa M.S. Nascimento W.L. Lima A.A.N. and Reis A.A. *Sistema integrado de produção agrícola em forma de mandalas: um estudo de caso da Associação dos Produtores e Produtoras Rurais da Agricultura Familiar do Município de Tomé-Açu (APRAFAMTA)*. In: Anais, VII Congresso Norte-Nordeste de Pesquisa e Inovação. 2012. Available in: <<http://propi.iftto.edu.br/ocs/index.php/connepi/vii/paper/viewFile/4449/1932>>. Access: 30 mai 2015.

Mesiano A. and Dias R. 2008. *A Tecnologia Social como estratégia para o desenvolvimento sustentável : o caso da Mandalla*. In: VII ESOCITE. Jornadas Latino-Americanas de Estudos Sociais das Ciências e das Tecnologias, Available in: <<http://www.necso.ufrj.br/esocite2008/resumos/36047.htm>>. Access: 07 jun 2015.

Moreira R.J. 2000. Críticas ambientalistas à revolução verde. *Revista de Estudos sociedade e agricultura*, 39-52p.

Oliveira A.S. Emídio L.M.S. Costa C.S. Araújo M.S. Cunha G.L. Silva I.P. Mendonça M.L. Jesus V.E. Maia I.T. Neto O.C.O. and Amâncio A.L.L. *Implantação de Mandallas em Comunidades Rurais de Bananeiras-Pb*. In: Anais. X Encontro de Extensão. 2008. Available in: <http://www.prac.ufpb.br/anais/xenex_xienid/x_enex/ANAIS/Area7/7CFTDAOUT01.pdf>. Access: 28 mai 2015.

Pereira I.C.M. Almeida T.S. Cunha L.M.V. Oliveira R.G. Andrade Junior I.O. and Santos M. P. 2013. *Projeto Mandalla- Estratégias Ecológicas para o Desenvolvimento da Agricultura Familiar*. In: VII Fórum de Ensino, Pesquisa, Extensão e Gestão, Montes Claros/MG.

Roseno A.M.S. Lima M.S.F. and Ikeda K.F. 2011. *Mulungu e Nova Ladeira: retalhos de uma história resgatando memórias vivas*. In: Anais. I Encontro de Pesquisas e Práticas em Educação

do Campo da Paraíba, 2011. Available in: <ieppepcb2011.xpg.uol.com.br/conteudo/GTs/GT%20-%2008/20.pdf>. Access: 04 abr 2015.

Schneider S. 2014. *Qual o futuro da agricultura familiar no Brasil e América Latina?* X Congresso da Sociedade Brasileira de Sistema de Produção, Foz do Iguaçu.

Schneider S. 2003. Teoria social, agricultura familiar e pluriatividade. *Revista da Sociedade e Desenvolvimento Rural*, 18(51), 99-121.

Sidersky P.R. 2008. Gestão de recursos hídricos e sistemas produtivos: um estudo sobre inovações técnicas e sociais em assentamentos do alto sertão da Paraíba. *Revista da Sociedade e Desenvolvimento Rural*, 2(1), 1-24.

Sousa M.O. Moreira M.L.S. Zimmermann R.C.; Mendonça J.C. and Rodrigues M.S. 2014. Sistema Mandalla e o Desenvolvimento Sustentável: O caso do Assentamento Mulungú-Ce. *Cadernos de Agroecologia*, 9(4), 1-5.

Souza A.C.F. Rodrigues F.G.S. and Lima A.S. 2008. *Plano de Desenvolvimento do Assentamento Mulungu*. Convênio Acace, Incra e Sebrae. Itapipoca.

Souza L.S. Porto D.L. Paulino R.D. and Vasconcelos C.R.P. 2015. *Mandalla: Estratégia de Desenvolvimento Ambiental e Sustentável na Universidade Federal Da Paraíba*. Available in: <http://www.cchsa.ufpb.br/portalantigo/index.php?option=com_docman&task=doc_download&gid=151&Itemid=28>. Access: 04 abr 2015.

Toledo V.M. and Barrera-Bassols N. 2008. *La Memoria Biocultural*. Ed. Icaria, Barcelona, 232p.

Tuan, Y. *Topofilia. Un Estudio De Las Percepciones, Actitudes Y Valores Sobre El Entorno*. 2007. Traducción de Flor Durán de Zapa, Editorial Melusina, España.

Von Franz M.L. 2008. *O Processo de Individuação*. In: Jung C.G. O Homem e seus Símbolos. 6ª Ed. Especial Brasileira, Tradução de Maria Lúcia Pinho, Editora Nova Fronteira, Rio de Janeiro,