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► **To cite this version:**

Carlos Magri Ferreira. OVERCOMING TECHNICAL DESPOTISM IN THE UPLAND RICE PRODUCTIVE CHAIN. Emilie COUDEL, Hubert DEVAUTOUR, Christophe-Toussaint SOULARD, Bernard HUBERT. ISDA 2010, Jun 2010, Montpellier, France. Cirad-Inra-SupAgro, 9 p., 2010. <hal-00539782>

HAL Id: hal-00539782

<https://hal.archives-ouvertes.fr/hal-00539782>

Submitted on 25 Nov 2010

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OVERCOMING TECHNICAL DESPOTISM IN THE UPLAND RICE PRODUCTIVE CHAIN

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Abstract — This paper presents an experiment aimed at developing sustainable rice production in the State of Mato Grosso (Brazil). It shows results from the Perception Method of Upland Rice Cropping System' Sustainability (MPSAT), which is a tool for joint analysis of technicians and stakeholders considering sustainability of upland rice productive chain within a region. It highlights the relevance of this method to overcome some undesirable practices and attitudes of many technicians in conducting research and diffusion of innovation which reduce the effectiveness and expected results.

Key words : Sustainable development, *Oryza sativa* L., sustainability indicators, agricultural sustainability

Résumé — Ce travail présente une expérience visant le développement durable de la production de riz dans l'État du Mato Grosso (Brésil). Il montre des résultats à partir de la Méthode de Perception de la Durabilité des Systèmes de production de Riz Pluvial (MPSAT), qui est un outil permettant une analyse conjointe entre techniciens et acteurs de la durabilité d'une filière au sein d'un territoire. On met en évidence la pertinence de cette méthode pour permettre de surmonter certaines pratiques et attitudes indésirables que beaucoup techniciens effectuent dans des projets de recherche et de vulgarisation sur l'innovation et qui réduisent l'efficacité des résultats prévus.

Mots clés : développement durable, *Oryza sativa* L., riz pluvial, indicateurs de durabilité, l'agriculture durable

INTRODUCTION

Debate on sustainable development is growing and it is present in societies of both developed and developing countries. The issue of sustainability is no longer a secondary aspect and an argument of a minority and has become the point of reflection of various social groups. This situation puts new challenges for agricultural research because, in the past, the role of agriculture was basically the production of raw materials and foods generating jobs and income. Today agriculture has other roles that must include environmental services. These changes demand rapid adaptation of research institutions and new approaches of the stakeholders of the productive chains.

Knowledge exists for an agriculture on a sustainable basis. However, the transition is still in its infancy. So there are still many technical and behaviour barriers to be addressed by the stakeholders of the productive chains.

In Brazil, there are several important production chains in the economy, but the preference for having selected the production chain of upland rice is justified by the following aspects: a) upland rice is found in both large and small farmholdings with little technological diversification, but with technical difficulties, b) commercialization, which is an obstacle of the system occurs on the local, regional, national and international levels. Often suffers threat of imported rice; c) staple food for the Brazilian population; d) The processing is undertaken both locally and far from the production site; e) varying processing machines ranging from simple to sophisticated equipments, f) by-products are widely used, g) production models undergo technological difficulties; h) stigmatized as a pioneer crop after conversion of forest into agriculture as regarded as a deforestation driver; i) annual rainfed crop dragging attention and with potential for expansion, j) upland rice is a challenging crop system and representative of various problems and advantages found in other agricultural activities. The State of Mato Grosso was selected because it is the largest producer of upland rice in the country.

1. OUTLOOK OF BRAZILIAN RICE PRODUCTION AND ITS RELATIONS WITH SOME OF THE CHALLENGES TO THE SUSTAINABILITY OF PRODUCTION SYSTEMS

1.1. Panorama of Brazilian rice production

Globally, Brazil is the tenth largest producer of rice (FAO, 2010). In 2009, Brazil produced 12.6 million tons (paddy rice) and exported 602.1 thousand tons of milled rice (CONAB, 2010). The average consumption per capita over the past five years has remained around 45 kg / capita / year (milled rice). In Brazil, rice is grown under two ecosystems known as irrigated and upland rainfed system. The irrigated system covers 40% of the total area under cultivation and accounts for 60% of production. Upland rice occupies 60% of the area and produces 40% of the total production.

In the period 1985 to 2009, the country's total production increased from 8.7 to 11.9 million metric tons. In the same period, production of lowland rice had a slight increase, doubled the quantity produced, whereas upland rice was reduced by 50% of production.

Rice is grown in all regions of the country. In the period 1990 to 2002, 86% of production was concentrated in the States of Rio Grande do Sul (46.7%), Mato Grosso (10.1%), Santa Catarina (7.1%), Maranhão (6.8 %), Minas Gerais (4.4%), Goiás (3.3%) and Pará (3.2%). As shown in Figures 1 and 2, production concentrated in the southernmost States of Rio Grande

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do Sul and Santa Catarina. The current quantity of rice production in Brazil fully meets the demands on the quality and quantity, including the possibility of becoming a rice exporter.

Figure 1. Distribution of rice production in Brazilian microregions in 1985.



Source ; IBGE (2010), adapted by the author.

• Concentration of production

Figure 2. Distribution of rice production in Brazilian microregions in 2008.



Source ; IBGE (2010), adapted by the author.

• Concentration of production

Only the States of Rondônia, Roraima, Tocantins, Maranhão, Santa Catarina, Rio Grande do Sul, Mato Grosso do Sul and Mato Grosso produce more than needed locally within the State. Surplus of that amount, about 82% comes from the irrigation system and 18% from the rainfed upland system.

Taking into account the precautionary measures, the reduction in rice production in several States of Brazil is a concern. Despite being a marginal production, it still has an important role, especially by enabling poor families to have access to the product. This role is most significant in distant places away from the production and distribution centers. The upland rice production is also an alternative source of income for many farmers.

Some other issues are raised by rice production matrix under the aegis of sustainable development: a) vulnerability if systematic biological or climatic events happen leading to large reduction in rice production in the South, b) costs and negative impacts of rice distribution nationwide. Therefore, to ensure food security and sustainable production and consumption of rice in Brazil is important that the rice culture to be uniformly distributed across the country. Considering restrictions for irrigated rice expansion there is need to promote the development of upland rainfed rice systems.

1.2. Technical challenges to the upland rice production in Brazil

The problems of upland rice production, which resulted in the decrease of production in regions are as follows: a) the increase in soybean cultivation, mainly in the Brazilian savanas; b) sensitivity to drought, especially summer dry spells in the critical phase of plant development. c) preference of Brazilian consumers by the long-slender rice produced in the South, d) strong competitiveness of irrigated rice, both in price and in quality, and; e) more recently, another aspect that contributes to discredit the upland rice was its association with forest conversion into agriculture, where it is grown for two years and then replaced by grass pasture. Hence, a connection was established between rice and the occupation of the Amazon biome. The conjunction of these facts associated with others not mentioned, inhibited addressing the challenges faced by the system of upland rice.

Based on this, research findings have already made proposals to overcome some technical limitations, such as upland rice cultivars with grain quality to compete with the irrigated rice. There are studies indicating zoning areas with less likelihood to occur production losses caused by drought. There are also land management techniques for rice cultivation in rotation with other annual crops, including zero tillage and crop-livestock integrated system.

The challenge is not only to address the technical issues of upland rice, but also adapt their production to market demands and particularly to create favourable conditions to encourage the adoption and use of best management practices consistent with the desires advocated by the sustainable development. As reported by HALL et al (2006), the agricultural sector recognizes the need for agricultural research, but it alone is not sufficient to create a dynamic innovation capacity.

1.3. Main obstacles that limit the relationship between researchers and stakeholders

In agricultural research, it is important to have a balance between the work that aim to generate new knowledge for the advancement of science and the work that aim to generate technologies that improve the performance of a production chain. In this study there are scientists with personal agendas performing work in isolation, however, there are other transforming and adapting the available knowledge on practical innovations.

The generation of technologies for sustainable development should not be based on fragile background. In this case fragile background relates to fragmented knowledge, not holistic. technologies with this profile may even solve a problem, but can cause effects in both physical and social environment. Moreover, technology is mostly linked to the reality of the scientist or decision makers and spread in an authoritarian and arrogant way. Thus, technology is hardly adopted by endusers at the desired intensity. To solve this problem it is essential that all stakeholders master the technology and see their applicability to their daily problems.

Many of the issues previously mentioned are well known in academia, but little attention has been given by research projects and technology transference. Thus many of the projects do not reach the expected results. Among the various issues that hinder the adequacy of knowledge to promote the necessary change there are the following examples: a) the failure in the relationships between the technicians and the stakeholders; b) the imposition of behaviors and answers which fits the concepts used; c) the imposition of values and needs correlated to the goal of the project; d) local knowledge are not aggregated to the theoretical knowledge, creating different perceptions about the problem raised; e) lack of time for the stakeholders to adapt themselves in a way that lead them to interact with the problem more consciously decisions; f) the technicians communicate technical and theoretical terms without connection to the reality of the stakeholders; g) many organizations demand the

creation of committees without concern for collective action and governance; h) the project become "property" of the technicians; i) not all demanded innovations by stakeholders are what the researchers have as objectives; j) limiting factors are not promptly assessed by technicians; k) lack of actions to allow the stakeholders to coexist with the "riders", which are those that do not take part in process but will get benefit from the results.; l) the belief that the role of the technicians is to convince stakeholders to demand for new norms and public policies; m) fragile institutional cooperation, many partnerships built do not have a feature of complementing each other's competencies; n) it is common to start from pilot projects, however sometimes the adaptations are so strong that do not lead to the transference of the experience to other situations; o) since very beginning the technicians try to incorporate and bring all kinds of situations and implications that may occur, thus confusing and discouragement stakeholders. In summary we can say that some attitudes despots are related with relationship, institutional, the existence of many complex situations in different places, and different expectations. The results of a work between technicians and stakeholders could become productive if there is mutual trust. It is up to the technicians to have awareness and the tools to find balance between motivating the stakeholders to move from their state of inertia and having the persistence to continuously face the challenges as they come.

Noting the issues raised in the previous paragraph it seems that they rely on the despot attitude of the technicians, underestimating the knowledge and values of stakeholders. The tacit knowledge of stakeholders is not taken into account by the codified knowledge of the technicians. This position is inconsistent with the view that construction and operation of a system of sustainable agricultural production is important to use a participatory approach and seek governance. The participatory approach aims to establish and facilitate dialogue between all stakeholders, and to gain information and their commitment to the necessary changes. In this case governance is as a mechanism that addresses the involvement of actors in the conduct of collective business and the need to engage different disciplines in the management of local socioeconomic activities.

From these positions it is then possible: a) to identify which factors triggers to start to development of the sector; b) who are the main players and what are their characteristics, c) how has the sector to evolved over time; d) what the main dynamics took place in the sector (HALL et al 2006; FERREIRA, 2008a). A good governance is essential to innovation towards the sustainable intensification of agriculture, demanding improved scientific knowledge.

2. SAME INFORMATION ABOUT THE METHOD OF THE PERCEPTION OF THE SUSTAINABILITY OF THE UPLAND RICE PRODUCTION SYSTEM

During the fieldwork, we used the Perception Method of Upland Rice Cropping System' Sustainability (MPSAT). This method was developed considering the historical researches done in the period between 2001 and 2004 (FERREIRA, et al 2005) It was conducted in partnership with Embrapa Rice and Beans and Cirad, which studied the dynamics of rice production in the State of Mato Grosso. Previously to this study, the research and extension service believed that rice cultivation was part of the rotation systems, especially with soybeans. The study revealed that the premise was false, enlightening one of the motives why the research results and technological transference did not have the expected effect in the rice production chain.

We used the Perception Method of Upland Rice Cropping System' Sustainability (MPSAT) to achieve the goal. It is a tool structured in matrixes analysis on Excel platform. It analyses observed data about management practices adoped along the chain of upland rice.

The MPSAT is a tool that enables to understand and assess the impacts of rice production in the environment, society and economy (FERREIRA, 2007). The MPSAT is structured in analysis matrixes on Excel platform, establishing a flow of issues affecting the sustainability of a system of grain production. These issues were selected based on technical criteria, from a literature review on the theoretical framework of sustainable development, and incorporated only those issues accepted by most of the authors. To ensure the acceptability of such criteria, validation meetings were held with the stakeholders.

The structure analysis method considers the environmental, sociocultural, economic and territorial aspects. The analysis is based on a set of data about management practices that run along the production chain of upland rice in the region bounded by the study. Data are collected and the results are discussed in a participatory manner, allowing capture and confront the optics of technicians and actors in the production chain. The methodology provides responses organized to give an idea of the level of sustainability and easy viewing, fostering understanding, reflection and prioritization of critical points.

This theoretical framework is orderly and based on components, called elements of the structure, which are: questions, attributes, key variables, mentors and tutors primary side. The hierarchical structure of MPSAT was created assuming that the subdivision facilitates the interpretation, understanding and reflection about the sustainability of the actors, because it allows follow step by step process of analysis. The elements considered are adopted as crucial to achieving sustainable development of agriculture in the study. Each element of the structure of MPSAT concentrates different descriptive / analytical abilities and do not form static categories. In contrast, it leads to grouping forming a logical flow of information generating form and content to the categories of analysis. The real strength of the analytical method relies on the interaction of all these categories (FERREIRA, 2008b).

MPSAT suggests as critical points for a good relationship between technicians and stakeholders: a) knowledge of reality; b) awareness and mobilization of stakeholders; c) technology transfer; d) capacity of stakeholders; c) establishment of local governance. However, the most difficult phase is to achieve local governance. In this case, They have achieved success with elaboration approval of the project "Development of technologies for upland rice chain in Mato Grosso". Local partners have taken this decision because Embrapa and Sebrae put as essential condition for continued action, the local partners were able to develop a project involving other state institutions.

3. RESULTS AND DISCUSSION

The use of MPSAT revealed a series of capabilities, weaknesses and the nature of the technological innovation needed to change the rice production system in south of State of Mato Grosso (Brazil). The main issues threatening the sustainability of rice production in the region are as follows: low motivation to promote behavioral changes to protect nature, lack of communication between rice culture and society, the low contribution of rice production to improve the socioeconomic conditions of workers and their families, the low organization of rice production chain, the reduced state involvement in the activity and the weak interaction of the system with other socioeconomic activities. We also found positive aspects. For example, the compliance of the production model of rice with the ecological conditions of the region.

From these results we developed a series of activities based on the concepts of collective action. Governance was put into practice, in partnership with Brazilian Service to Support Micro and Small Enterprises (Sebrae-MT), Union of Food Industries of the South of Mato Grosso (Siar-Sul) and Embrapa Rice and Beans.

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The method succeeded in promoting the individual and collective action of stakeholders, bringing them into emerging issues and showing the need for broader intervention in long-term results. In other words, an exercise with stakeholders in building skills that promote change. MPSAT was able to gather the diverse knowledge about sustainable development and participatory approach enabled adaptation for local use. The MPSAT, as assumed in the scope of the methodology, identified and prompted the leadership of a sector in the supply chain to drive the process. In this case, the Siar-Sul was the very sector.

The participatory involvement of stakeholders was crucial to standardize the understanding of sustainability, being able to more clearly identify and prioritize the constraints of the system. This understanding and interest in MPSAT are explained by the fact that the system is based on analysis of socioeconomic and environmental data known to the stakeholders and the sustainability indicators are associated with the management practices carried out along the production chain. These characteristics enable a self-assessment. Stakeholders felt that the solution of certain problems depend only on personal attitude, for example to prevent their properties from illegal practices. In this case, the comments made by the stakeholders during the meeting showed a willingness to modify certain behaviors immediately. Furthermore, they noted that the solution of some problems depends on partnerships and involvement of private or public institutions or arrangements along the production chain. That is, the need for governance seeking to expand institutional involvement to sustainability.

The use of MPSAT has set up the concepts of collective and of territory. The actors were able to identify important socioeconomic relations between them that were disregarded. For example, the role of smallholder rice farmers and small agribusinesses in the region was evident. On the other hand, they showed the need to start processes to demonstrate the role and function of socioeconomic rice production in the region, collectively and seek proposals for the sustainable management of the system in the territory. These positions were formalized in a plan drawn up by the actors' Development of Rice Processing Industries of the Southern Region of Mato Grosso - 2007 to 2009. " The plan was to profile the search for solutions that goes along with the collective land management and approximation of industries with producers, retailers and the local society.

The results confirmed the assumption that the time and intensity of response are not homogeneous among the actors of a system. The results did not impact producers in the same intensity that impacted the business of the rice industry. However, farmers requested that research institutions and extension service should be active in the region to demonstrate sustainable land management for rice production. This confirms another important point, such as the need for a transition period to achieve more sustainable production systems.

Compared to other methods of sustainability approach (FERREIRA, 2007), the main difference of MPSAT is not to promote discussions in an abstract manner, *ie* the mechanism used allowed the actors to gradually increase the understanding of problems and potentials following the steps of the method. Perhaps this interest has happened because MPSAT provides links to the daily analysis of the production system. The achievement of these points is obtained due to three characteristics of MPSAT: a) The process is undertaken in a participatory manner, promoting the involvement and pro-action removing obstacles in the relationship between actors and technicians, b) information database based on actions and behaviours by stakeholders along the production chain, c) structure of the method allows the location of practices or behaviors that cause problems to sustainability. These factors, in addition to making the straightforward method, avoiding the debates based on positions and views on pre-established bases primarily ideological or doctrinal, motivates and facilitates contextualization of the actors in the discussion. Noteworthy mentioning also the advantage that the data used are obtained by means of simple procedures for implementation, at lower

cost compared to the methods that require censuses or structures and more sophisticated equipment (FERREIRA, 2008c).

Therefore, the MPSAT option is an alternative method to evaluate sustainability in grain production. It is a contribution, whose merit is not found in the intrinsic values to assess the sustainability indicators used, because these values are supported in a subjective scale, but the power to show the results illustratively, the ability to place in an orderly group of issues that affect the sustainability of a system of grain production, offering, the organization of the stakeholders wishes, despite the complexity of the subject .

The MPSAT is a tool that enables to understand and assess the impacts of rice production in the environment, society and economy. The method is enable to: a) understand the origin of problems of productive chain, because the MPSAT indicators are associated with practices that are made in the production chain. It facilitates to indicate the points and practices that should be change to correct problems identified; b) respect local knowledge, c) allow effective participation; d) encourage of idea eco Park (synergy); e) Involve intermediary organizations; f) encourage integrated actions of institutions; g) it is a flexible approach to respect the reaction timeframe of the stakeholders. On the other hand, MPSAT allow to establish a dialog on concrete facts between stakeholders and technicians.

The concrete improvements were seen in Upland rice productive chain after using the methodology, personal attitudes to change practices that depends only of personal actions. Stakeholders understands need partnerships and involvement of private or public institution. For example, personal actions, they adopted rice cultivars with features more suited to market requirements. According to the entrepreneurs in the industry of rice last year, customer complaints decreased by approximately 70%. example being how the collective actions, we can cite the travel industry entrepreneurs to learn details of the rice markets in other regions, aiming to expand business. It is an innovation, because they never they had never done it.

4. CONCLUSION

Among technicians is common to hear and see too much concern with methods to address the sustainability of agricultural activities. Using a method is essential to address sustainability of an agricultural activity, because it allows us to understand the real problems and establishes the theoretical reference, but practical and effective results for the stakeholders depends a lot on the way that the method is applied to them.

We get concrete and effective changes in supply chains only happen if no errors are made in relationship between technical and stakeholders, if correct technology is selected, if the wishes and the speed of change, desired by the stakeholders, are respected, if local governance is established.

Perception Method of Upland Rice Cropping System' Sustainability (MPSAT) applied in the southern State of Mato Grosso has overcome many technical despot positions who typically adopt when addressing the sustainability issue with stakeholders of a production chain. Experience also suggests that the results achieved are due to the fact that the MPSAT: a) points out gaps and problems of sustainability from the activities performed in the productive chain in a concrete way, ie it indicates the origin of problems, making it easier to propose actions to correct them, b) recognizes and appreciates the local knowledge, c) creates opportunities for actors to have effective participation and maintain the focus of the work, d) highlights the priority areas of innovation activities, which means, indications of concrete practices and actions to be taken with a view to sustainability; e) considers the synergy of rice production with other economic activities in the region f) involves intermediary organizations in the production chain, g) encourages the implementation of integrated

actions of institutions with the mission appropriate for purposes of sustainability, h) it is a flexible approach to reaction rate of the actors.

Stakeholders felt that the social evolution and environmental development are not necessarily antagonistic to economic competitiveness, but they are essential elements for the global economy and that it is possible to transform challenges into opportunities.

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APPENDIX

ACKNOWLEDGEMENTS

I sincerely thanks, Teachers and researchers, Hervé Thery, Jean-Pierre Bertrand, Neli Aparecida de Mello, Vincent Dubreil and Patricio Mendez del Villar, who were members of a committee co-supervisors of the PhD thesis that led to the MPSAT. Colleagues from Embrapa National Rice and Bean Research Center, Ivan Sergio de Freire de Sousa, Luís Fernando Stone, Pedro Luiz Oliveira de Almeida Machado, Nand Kumar Fagaria for giving valuable suggestions in improving the text and the Center for International Cooperation in Agronomic Research for Development (CIRAD) for providing necessary facilities to work on this project.