

Status of the interaction of ATER's technical-scientific knowledge and the traditional knowledge of family farmers

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Abstract

The agricultural modernization, initiated after the Green Revolution, established the agricultural homogenization, helping to transfer technical and scientific knowledge, while neglecting the traditional practices of family farmers. This study aimed to analyze the knowledge interaction between ATER agents and family farmers to identify the valorization status of local or traditional knowledge in the practices developed by those farmers. The methods used in the study are characterized as exploratory, qualitative and case study. The research population was formed by family farmers in the municipality of Cascavel/PR, based on data provided by Emater, and 248 family farmers' properties involved in various projects aimed at enhancing local activities were identified. For data collection, 30 families from five different districts were interviewed. The choice criteria was by convenience. The collected data was analyzed according to the following criteria: Positive, Intermediate, and Negative Status. As a result of the factors evaluated, there was a predominance of intermediate status. Thus, it can be seen that the knowledge interaction between family farmers and ATER needs to be improved.

Keywords: Family farming; ATER; traditional knowledge; knowledge management; agricultural modernization; sustainable rural development.

Status da interação de conhecimentos técnico-científicos da ATER e o conhecimento tradicional dos agricultores familiares

Resumo

A modernização agrícola iniciada a partir da Revolução Verde estabeleceu o processo de homogeneização da agricultura facilitando com isso, a transferência dos conhecimentos técnicos-científicos, ao mesmo tempo, negligenciou-se as práticas tradicionais dos agricultores familiares. O objetivo desse estudo foi analisar a interação do conhecimento dos agentes da ATER com os conhecimentos dos agricultores familiares visando identificar o status da valorização dos conhecimentos locais ou tradicionais nas práticas desenvolvidas pelos agricultores familiares. Os métodos utilizados no estudo caracterizam-se como exploratório, qualitativo e estudo de caso. A população da pesquisa foi formada pelos

agricultores familiares do município de Cascavel/PR, a partir dos dados fornecidos pela Emater, identificou-se total de 248 propriedades de agricultores familiares envolvidas em diversos projetos visando a potencialização de atividades locais. Para levantamento dos dados foram entrevistadas 30 famílias, pertencentes a cinco Distritos. O critério de escolha dos entrevistados foi por conveniência. Os dados coletados foram analisados segundo os seguintes critérios: Status positivo, intermediário e negativo. Como resultado dos fatores avaliados houve a predominância do Status intermediário. Com isso, verifica-se que a interação de conhecimentos entre os agricultores familiares e a ATER necessita ser aprimorada.

Palavras-chaves: Agricultura familiar; ATER; conhecimento tradicional; gestão do conhecimento; modernização agrícola; desenvolvimento rural sustentável.

Situación de la interacción entre los conocimientos técnico-científicos de ATER y los conocimientos tradicionales de los agricultores familiares

Resumen

La modernización agrícola iniciada después de la Revolución Verde estableció el proceso de homogeneización de la agricultura, facilitando así la transferencia de conocimientos técnicos y científicos, pero al mismo tiempo descuidando las prácticas tradicionales de los agricultores familiares. El objetivo de este estudio fue analizar la interacción del conocimiento de los agentes del ATER con el conocimiento de los agricultores familiares para identificar el estado de la valorización del conocimiento local o tradicional en las prácticas desarrolladas por los agricultores familiares. Los métodos utilizados en el estudio se caracterizan por ser exploratorios, cualitativos y de estudio de caso. La población de investigación estuvo conformada por agricultores familiares del municipio de Cascavel / PR, con base en los datos proporcionados por Emater, se identificaron un total de 248 propiedades de agricultores familiares, involucradas en varios proyectos encaminados a potenciar las actividades locales. Para la recolección de datos, se entrevistaron 30 familias, pertenecientes a cinco Distritos. Los criterios de elección de los entrevistados fueron por conveniencia. Los datos recogidos se analizaron según los siguientes criterios: Estado positivo, intermedio y negativo. Como resultado de los factores evaluados, hubo un predominio del estatus intermedio. Por lo tanto, parece que es necesario mejorar la interacción de conocimientos entre los agricultores familiares y la ATER.

Palabras-clave: Agricultura familiar; ATER; conocimientos tradicionales; gestión del conocimiento; modernización agrícola; desarrollo rural sostenible.

Introduction

The study of the process of sharing technical and scientific knowledge for activities carried out by rural populations requires a prior analysis of the agricultural modernization process started after the Green Revolution.

According to Carneiro da Cunha (2012), the Green Revolution, which began in Mexico and was disseminated worldwide since 1960, benefited the increase in world food production, but the homogenization of production resulted in large environmental liabilities, considering the need for intensive use of fertilizers and pesticides.

The technology transfer model adopted by the Green Revolution neglected the knowledge of family farmers. In this regard, sustainable rural development projects demand

the creation of conditions for the interaction between technical scientific and traditional knowledge to occur, as they are both important to develop new practices compatible with the local reality of each territory. This process of knowledge interaction in rural areas is mostly carried out by ATER – Technical assistance and rural extension (Assistência técnica e extensão rural), since they are the ones in contact with farmers.

Rural populations still maintain a lot of family tradition knowledge from generation to generation. To prevent this knowledge from being subjugated by the conventional agriculture model, the new rural development policies need to consider the territorial division, aiming at the local and regional heterogeneities, so that it will not be unilaterally imposed by experts and the knowledge of rural communities neglected.

The importance of family farming practices for sustainable rural development lies on the functionality of tacit knowledge from experience and passed on from generation to generation in the harmonious relationship that most farmers establish with nature. The traditional knowledge, ecological locations, among others, originate from the direct contact with nature in agricultural and non-agricultural activities. They are passed on generation to generation and become a framework of reliable knowledge replicated by the family group.

Therefore, this study aimed to analyze the knowledge interaction between ATER agents and family farmers to identify the valorization status of local or traditional knowledge in the practices developed by family farmers.

Agricultural modernization and family farming

Scholars agree on two aspects inherent to family farming: its diversity and heterogeneity. Peasant agriculture characteristics are also maintained incorporating traces of capitalism in their activities, since, in a family economy, production is not restricted to self-consumption and part of it is commercialized. Still, family members perform other non-agricultural activities, because of the small amount of land (SCHNEIDER; CASSOL, 2017).

For Abramovay (1998), the definition of family farming is not unanimous. However, regardless of their representation for practical use by different social sectors, three characteristics form the family farming's core: management, property and family work, that is, activities developed in family farming are carried out in small land properties by family members and are managed by the family itself, without external intervention.

According to Navarro (2010), the denomination of family farming in Brazil emerged in the 1990s. Previously, farmers belonging to this group received different names, such as: subsistence farmers, small producers and small landowners. In the

1970s, they were called low-income farmers. In general, according to the author, in the academic literature or not, the reference to this group was related to small production. In documents and newspapers they were called peasants, having the pejorative meaning, for the urban population, as a class with a low level of knowledge.

According to Ploeg (2014), the complexity of family farming is controversy. Its characteristics are not in line with industrial standards and do not respond to bureaucratic and formalized rules in the industrial society. In this sense, and due to the difficulty of inserting itself into economic patterns, family farming is seen by society as a social group resistant to changes. Thus, it can be associated with lack of development. For the author, the difficulty in standardizing its activities is what makes family farming attractive. In this regard, it has many more qualities than the two aspects generally mentioned in its definitions:

Oliveira, Almeida and Santos Silva (2011) present the transformation of agriculture in a natural way of caring to the soil for conventional agriculture, which represented a technological revolution in agriculture — the Green Revolution. According to the authors, the natural way to maintain soil fertility was carried out based on the knowledge acquired by farmers on local knowledge practices, passed on from generation to generation. Initially, to maintain soil fertility, when farmers identified its decrease, this area was no longer used for planting, leaving it for a certain period of rest and covered by native vegetation.

Also according to the authors, in the second moment — also called the First Agricultural Revolution, occurred in Europe in the 18th and 19th centuries — the alternation of land occupation was replaced by animal husbandry in the same cultivation areas aiming at its renewal, and the plant species served as food for animals. This practice provided the formation of fertilization from the composting of animal and vegetable raw material.

According to the authors, with technological advances, interventions in the soil started to come from the fertilizer and chemical input industries. In this new context, it was necessary to speed up the process of soil renewal considering the increasing demand for food. In this sense, scale production, based on monoculture, the incentive to research and innovation for all planting phases predominate, from input to the soil to machinery and equipment for planting and harvesting. With this new perspective, the internal or local processes of farmers who, based on experience, used natural alternatives for soil preservation are abandoned. Once again, there is a separation of agricultural activities from livestock, which are no longer complementary activities and begin to compete for space. This period was called the Second Agricultural Revolution.

The new pattern, called conventional, classical or modern agriculture, was brought to the paroxysm, mainly from the end of the 1960s, with the Green Revolution. Despite the positive results obtained in some countries, regarding the increase in food production, the adoption of this modern agriculture also meant the adoption of an extremely aggressive system to the environment. The search to improve its living conditions and satisfy its needs led modern society to treat the environment as an obstacle to be overcome, since it hindered the achievement of its objectives. The relationship established with nature was antagonistic (free translation) (OLIVEIRA; ALMEIDA, SANTOS, 2011, p. 66).

In this brief history of agricultural evolution, it appears that the emergence of new needs meant to break a cycle, always driven by the increase in production. As a result, external factors began to interfere with traditional forms of soil care, which were characterized from an endogenous perspective. The new direction establishes the rupture in the relationship between man and nature. There is a distance and the human being increasingly imposes a dominant relationship, which indiscriminately interferes with the dynamics of ecosystems.

Industrial development transforms the reality of agriculture and is driven to meet a growing demand for agricultural products and, as a way of increasing productivity, alternatives to solve these new needs were developed in line with the industries, where solutions were developed artificially and disconnected from nature. Thus, the natural process of ecosystem development was affected, generating socio-environmental imbalances.

Local or traditional knowledge of rural populations

For Santilli (2012), the industrial agricultural model defined boundaries in the relationship between the activities developed by scientific research and the knowledge of farmers in relation to the various management practices and interactions with the environment. Researchers carried out studies on genetic improvement of seeds, aiming to make them more resistant and adaptable to regional heterogeneities, mischaracterizing local culture and neglecting the (...) “role of farmers as innovators and holders of fundamental knowledge and practices for agricultural systems and for maintaining agrobiodiversity in the field.” (free translation) (SANTILLI, 2012, p. 461).

According to Guivant (1997), the erosion of farmers' knowledge was a consequence of the agricultural modernization model adopted worldwide. The new technologies were prepared in restricted environments, developing innovations applied in a vertical and horizontal manner, without the participation of farmers and aiming at the homogenization of agricultural activities.

In this sense, according to Fleury and Almeida (2007, p. 3), "if one intends to use the traditional way of life as a conservation strategy, it is necessary to offer the democratic bases so that the balance with the natural environment persists." (free translation). Also according to the authors, when looking at rural development, one must analyze, in a specific way, how these populations are inserted in the environment, their dependence on natural resources and their intervention in it, that is, if there is a balance or exploitation of the environment.

According to Diegues (2010), in traditional knowledge, biodiversity is defined within a place or territory, where no one can be excluded, be it animals, vegetables or humans, as everything helps building the knowledge of these populations. Thus, it is possible to classify them and assign related names. Nothing can be fragmented. In science, when systemic reality is removed and parts of nature are analyzed in a segmented way to identify certain functions, so as to mechanically identify parts of reality, then everything needs to be reconnected, without considering cultural factors.

For Armitage et al (2011),

This perspective leads to the realm of knowledge co-production, which we definitize as the collaborative process of bringing together a plurality of knowledge sources and types to address a defined problem and build an integrated or systems-oriented understanding of that problem.

Thus, the relationship between the different types of knowledge must be analyzed based on methodologies that enable their interaction. Within this perspective, there are several ways to interact with the actors involved, depending on the level of depth required and the context in which the researcher is involved.

The interaction of knowledge from pluri, inter and transdisciplinary research

In the 1950s the prefixes Pluri, Inter and Trans were added to the word disciplinary, to broaden its meaning. Systematic research in ecology contributed to this new perspective of knowledge analysis. This approach emerged as a reaction to the reductionist and mechanistic view, which had as a premise, for the investigation, the decomposition of the parts with the objective of simplification.

The systemic perspective presents a vision of interconnection between the parts. In this sense, reality cannot be segmented into parts, because systems are complex and present connections that allow us to understand their functionality only as a whole. It is impossible to understand reality from its fragmentation. The representation of the systems approach is similar to the functioning of ecosystems, whose interactions

between different plant, animal and unicellular beings establish a relationship of mutual dependence (SOMMERMAN, 2011).

According to Nicolescu (2007), in the mid-twentieth century, the need arose to associate the various disciplines and thus the concepts of multidisciplinary and interdisciplinarity emerged. Pluridisciplinarity means several disciplines that analyze a theme or problem. It consists in the analysis of an object under the perception of several points of view, thus, the object of the discipline is deepened and acquires contributions that enrich knowledge.

For Pombo (2005), the definition of interdisciplinarity is established from the concept of discipline, because multi, pluri, inter and transdisciplinarity vary according to the level of connection between the disciplines. The prefixes multi and pluri establish a relationship of proximity, being next to each other, in which several disciplines come together without any dialogue between them. Inter- and trans-disciplinarity, on the other hand, means that the disciplines communicate and establish an interrelationship to a lesser or greater degree. Transdisciplinarity is at a higher level than interdisciplinarity, for besides interacting with various disciplines, it transcends the context of disciplinary approaches and opens itself to a dialogue with various realities that go beyond the disciplinary specificities by including different types of knowledge in the analysis of the facts.

According to Nicolescu (2007), the prefix "Trans" already indicates that the perspective of the study goes beyond the disciplines and concomitantly also studies what is between disciplines. The goal is to seek solutions to problems that affect people's daily lives.

For Leff (2000), transdisciplinarity emerges as a new perspective that goes beyond the junction of fragmented knowledge, because it goes beyond the boundaries of the disciplines. It seeks to break with the rationality that established science is responsible for producing the only and true knowledge, subjugating the various knowledges.

For Japiassu (2016), interdisciplinary analysis does not propose to transgress the limits of the disciplines. It intends to be unifying and deal with different perspectives, that is, it is in search of solutions to the fragmentation of knowledge established by specialization. It seeks a method to understand the complexity of reality from the dialog between the various disciplines that are involved in the analysis of a given reality, and in its historical and cultural context. The interdisciplinary approach has the function of breaking away from the assumptions established by the disciplinary vision that transforms research into a fragmented view of reality. In it, the specialists become owners of a fragmented knowledge, often disconnected from the local reality.

According to Raynaut (2014), to be able to exercise interdisciplinarity, a learning process that allows individuals to develop knowledge that encourages interaction and dialogue with other disciplines, without losing the skills developed from the knowledge acquired in professional training, is fundamental. It is in this aspect, that according to the author, there may be an "intellectual dream", that is, to imagine that interdisciplinarity is the way that makes individuals have knowledge about many disciplines. Interdisciplinarity does not seek to train people with a range of knowledge from several areas, capable of developing systematized models to explain and solve concrete problems.

In a comparative analysis between disciplinary, multidisciplinary, interdisciplinary and transdisciplinary types of research, the author points out that there is a dependency between the various types of research. All types of research depend on disciplinary research. What differentiates them is their degree of comprehensiveness and the connection between the parts.

According to the authors, disciplinary research is interested in a single level of reality; transdisciplinary research, on the other hand, is involved in several realities, but depends on the disciplinary knowledge of individuals. Therefore, they are distinct disciplines, but not antagonistic.

In summary, "disciplinarity, multidisciplinary, interdisciplinarity and transdisciplinarity are the four arrows of the same bow: the bow of knowledge" (NICOLESCU, 2007, p. 3).

Technical assistance and rural extension and family farming

For Pinheiro (2000), most of the time, projects aimed at educational processes in agricultural practices are disconnected from the local reality. They start from a reductionist vision, characteristic of the Green Revolution, in which new technologies were developed without any connection with the specificities of the different regions and were inserted in agricultural activities without the participation of farmers, disregarding the local reality. Still, according to the author, the actions applied in rural areas are the result of a disciplinary approach, where each specialist applies their knowledge without analyzing the interdependencies with other areas. As a result, the farmer faces conflicting orientations from the technicians themselves from different institutions. The result is that the farmer does not adopt the new technologies proposed.

For Siliprandi (2002, p. 39),

Understanding the way social groups with which rural extension deals in their productive activities in community life, in their relationship with public authorities, in various spheres of daily life, are presuppositions that should

guide the general work of extension. Without this assumption, any action that is intended to be dialogical loses its meaning.

Also according to the author, the changes in the extension workers' way of acting in Brazil started with the country's democratization. They are driven by social movements, by the crisis of the hegemonic model adopted since the Green Revolution, considering the many socio-environmental problems caused by the development based only on economic aspects.

The rural extension was structured according to the social and political characteristics of the historical context. So, its performance was not always adequate to local demands, considering that its construction was not the result of a participatory process that involved interested entities. The communication process has been used in a unidirectional manner, with no interaction between the tacit knowledge of family farmers and the explicit knowledge of ATER agents.

For Kreutz, Pinheiro and Cazella (2005), rural extension, in its relationship with farmers, from the mid-1950s, went through three phases, considering the pedagogical processes adopted and aiming to tend to the hegemonic interests of companies.

At first, education had the function of creating needs for farmers to prepare the ground for the work of extension agents who, linked to the interests of companies, could present solutions to the existing demands from the supply of inputs.

The second phase, which started in the late-1960s, is characterized by diffusionism, a period marked by industrial development, based on the principles of Fordism to increase production from the creation of a work system aimed at large-scale production in order to standardize processes and people. This production model was spread to rural areas as a result of agricultural modernization, preached by the Green Revolution. Considering this, education becomes a process of transferring scientific knowledge, with extension workers passing on the new principles to farmers. These farmers became mere recipients of knowledge developed in laboratories. Therefore, the specificities of family farming were not considered, as they are considerably heterogeneous.

The third phase, which started in the 1980s, is an attempt to adopt a more participatory education. In business organizations, structures tend to become less hierarchical, considering the need to increasingly approach people from different functions. The cognitive issue is also valued; in this sense, the organization of work becomes less mechanistic and more human. Again, the influences of business organizations are adopted as a reference for rural activities. As a result, the hegemonic stance adopted in the previous period loses strength, and teaching pedagogies seeking to bring together the various actors involved in productive activities are being adopted.

Still, according to the authors, the new context turns to the local reality, where education must provide subsidies so that the local actors together with the extension workers who, in a dialogical and participatory way, act in all phases of the construction of knowledge. Consequently, the pedagogical process of the institutions of ATER starts to be based on a constructivist education, which slowly begins to be incorporated in the practices of extension workers. However, those workers have difficulties in implementing this new methodology, because of the traditional training of ATER agents.

The effective participation of farmers in creating processes and sharing new knowledge allow us to know that they act as “collaborators and encouraging people” who interact and rescue the knowledge of family farmers and other populations in rural areas. Therefore, the effective participation of farmers who were then transforming their environment is opposed to the traditional view in which extension workers' role was carrying out the “technology transfer” process.

To meet these challenges, ATER public services (provided by state and non-state entities) should be carried out using participatory methodologies, and its agents should play an educational role, acting as animators and facilitators of sustainable rural development processes. At the same time, ATER's actions should privilege the endogenous potential of communities and territories, rescue and interact with the knowledge of family farmers and other people who live and work in the countryside under a family economy regime, and stimulate the sustainable use of local resources. Unlike conventional extensionist practice, structured to transfer technological packages, the new public Ater should act based on the knowledge and analysis of agro-ecosystems and aquatic ecosystems, adopting a holistic and integrative approach to development strategies, as well as a systemic approach capable of prioritizing the search for equity and social inclusion, and the adoption of technological bases that bring production processes closer to ecological dynamics (MDA, 2004, p. 6).

Freire (1983) critically analyzes the role of extensionists in their work with peasants. Within the author's conception of a reflexive and liberating education that effectively involves students in the learning process, Freire points out that the extensionist, when addressing his target audience, intends to transform reality according to a worldview totally different from the peasants' reality. Such a form of education oppresses the students, considering them to be inferior; therefore, it becomes a process of domestication, transposing a worldview that denies the peasants' reality. This type of relationship between extensionists and farmers is unidirectional. Intervention in reality occurs only under the focus of one of the parties, forcing peasants to accept technical knowledge without questioning the concepts of reality, with historical and cultural assumptions that are different from those of the agents that are disseminating the new knowledge.

Still, according to Freire (1983, p. 11),

From this analysis we learn that the concept of extension does not correspond to a liberating educational what-to-do. As a result, we do not want to deny the agronomist, who works in this sector, the right to be an educator-student, with the peasants, student-educators. On the contrary, precisely because we are convinced that this is their duty, that this is their task of educating and educating themselves, we cannot accept that their work is labeled by a concept that denies it.

The educational extension, for Freire (1983), requires an associative field to be created in which both the student and the educator have their knowledge “suspended” so that they are confronted with the parties involved with transformation for both parties. The peasants with their contributions improve some practices and the extension workers make their conception of the world more flexible based on technical assumptions to incorporate their reflection within each analyzed reality, observing the values, cultures and the way of life of the families.

In this regard, it can be said that, from Freire's perspective, extension workers must respect the knowledge of the peasants, it is up to them, from a participatory process, to mediate knowledge, organized according to the local reality, but above all that the result of the new practices is based on an orientation process and not on manipulation as is done in a research laboratory environment.

The field of interaction between peasants must be created according to each family, social group, and community, respecting the territorial aspects and considering the productive practices and cultural values resulting from the tradition of different ethnic groups.

Methodological procedures

The methods used for the research are characterized as exploratory, qualitative and case study. For exploratory research, primary data were sought through interviews and informal conversations with farmers in the municipality of Cascavel-PR.

The research is characterized as a case study and, according to Fachin (2003), this method is characterized as an intensive study and considers, mainly, the understanding of the investigated subject. All aspects of the case are investigated. Because it is an intensive study, relationships that might otherwise not be discovered may appear.

For Yin (2001, p. 19),

In general, case studies represent the strategy referred to when asking questions such as "how" and "why", when the researcher has little control over events and when the focus is on contemporary phenomena inserted in some real life context.

As for the approach, the research is characterized as qualitative, since according to Creswell (2014), qualitative research is applied when it is intended to explore a problem or a research question that aims to unveil variables of a certain group or populations that have measurement difficulties or are hidden. Therefore, it is necessary to go to these populations to hear their stories, understand details about the events and seek to understand the context in which the populations under study are regarding the variables being analyzed.

We conduct qualitative research when we want to empower individuals to share their stories, hear their voices and minimize the power relationships that often exist between a researcher and the study's participants [...]. We conduct qualitative research because we want to understand the context or environments in which study participants address a problem or issue. We cannot always separate what people say from where they say it — whether in the context of their home, family or work (CRESWELL, 2014, p. 52)

The research population was composed of 248 properties of family farmers contained in the database of Emater de Cascavel. The districts that were part of the research are: Barreiro, Bom Retiro, Colônia Esperança, Gramadinho, Rio 47, Sapucaia and São Salvador.

The interviews were conducted between November and December 2018. Thirty families of farmers selected for convenience were interviewed from the register obtained at EMATER in Cascavel. The interviews were directed exclusively to the owners, who, when not found in their homes, had their interview reschedule for another date. Then, information was obtained about the next residence on the list obtained from EMATER and, successively in other properties, the same procedure was adopted.

In the properties where the owners were available to answer the interview, the objectives of the work were explained and, promptly, the farmers were willing to allow time to hold a conversation, which was conducted by the interviewer based on a preestablished script. In addition, all conversations were recorded for later analysis of the content.

Results

In the presentation of the Table, to highlight the Status of the evaluated categories, three colors were determined: red, for the factors that presented negative status; yellow, for intermediate status (when within the same category there are positive and negative factors or the positions are equidistant); and green, for positive status.

In the analysis of the table, a comparison was made between the empirical and theoretical data, comparing the results obtained in the research with those of the literature researched in the systematic review, considering convergence or divergence analysis.

Status of knowledge interaction between family farmers and ATER

Table 1 shows the status of the categories related to the interaction between the explicit knowledge of technicians and extension workers and the tacit knowledge of family farmers.

Table 01: Interaction of knowledge between family farmers and ATER agents

Analysis of the categories	Results
a) Assimilation of the contents transferred by ATER - Understanding of the new content transmitted by technicians and extension workers.	
b) Autonomy - Farmers' autonomy to decide the type of production on the properties.	
c) Knowledge sharing between farmers and ATER - Ways of sharing knowledge (individual, community or both); - Encouraging technicians and extension workers so that farmers can share their knowledge with other members of the community.	
c) Interaction between technical scientific and traditional or local knowledge (tacit x explicit) - Relationship between farmers and extension workers; - Farmers' perception of how extension technicians treat farmers' knowledge in the process of creating new knowledge;	
- Comparison on the predominance of knowledge between farmers and technicians and extension workers regarding agricultural practices; - Perception of farmers considering the existence or not of prejudice against the family farmer's profession.	
e) Assistance on property resilience - ATER guidelines for resilience in properties.	
f) Assistance on preserving the environment - Encouraging the use of natural resources; - ATER's position regarding the use of chemical and pesticide inputs; - ATER's position in relation to environmental issues; - ATER's concern with the preservation of natural resources.	
g) Assistance from ATER for the development of potential in the properties - Stimulating agroecological production; - Stimulating organic production.	
h) Phases of the knowledge creation process - Whether the orientation of technical assistance and rural extension services involves all stages of production.	
i) Concept for ATER's performance - What is the concept that farmers attribute to the services of technicians and extension workers.	

Source: Prepared by the authors.

Positive status



Intermediate status



Negative status



In Table 01, an attempt was made to analyze how academic, technical-scientific knowledge (explicit knowledge) and the traditional knowledge of family farmers (tacit knowledge) interact, since they come from experience, becoming reference for the practices developed in the properties.

Positive status

a) Assimilation of the contents transferred by ATER – the way the contents are shared by ATER agents is easy for farmers to understand. The communication process between ATER agents and farmers must be intermediated with the help of methodologies that allow farmers to build their own images of the reality being analyzed. In knowledge management, the importance of using tools that assist in this process is emphasized, such as figures of languages, metaphors, and analogies that make the receiver associate the new content with the image of their knowledge and then, they manage to develop a new concept with the same shapes and characteristics of the object used to assist in understanding the contents.

b) Farmers 'autonomy – the power of decision on the choice of activities to be developed on the properties is under the farmers' domain. Freedom of choice about activities allows farmers — within each region or territory — to develop activities that are part of the family tradition, which, therefore, have an identification with the region, becoming a potential when it comes to production with cultural identification, adding value to local products.

Intermediate Status

a) Knowledge sharing between farmers and ATER - the way that knowledge is shared (individual, community and both) is included in this category, which has the predominance of responses to individual and group guidance. However, group sharing is more restricted to lectures and stops using other forms of more participatory interaction that could make the process of learning and incorporating new knowledge easier.

Still within the category of knowledge sharing, the stimulus made by agents for farmers to share their knowledge is not presented in an “institutionalized” way, that is, it is not part of an effective knowledge management process, as part of the policies developed with farmers. On the contrary, as analyzed in Table 2, it appears that the process of sharing knowledge among farmers is a common practice, and part of the culture of farmers is the exchange of information about their practices during informal conversations with neighbors, relatives and other people in the community. The use of this practice in an “institutionalized” way, by ATER agents, could help disseminate new knowledge and present successful cases

to other farmers in the community, where the flow of information is constant from the interactions they establish in their daily lives and in the community meetings they participate in.

b) Interaction between technical scientific and traditional knowledge (tacit x explicit) – as a member of the relationship between farmers and extension workers, we observed a favorable interaction field for the knowledge sharing process. Therefore, it is crucial in the process of sharing knowledge based on divergent paradigms, that both parties seek to socialize this knowledge without ignoring what was already known, because the interaction is effective as far as all the knowledge involved contributes to the development of the new concept.

Another issue in this category refers to farmers' perceptions regarding how extension workers treat their knowledge about the activities carried out on the properties. The valorization of local knowledge is the starting point for any intervention process in the properties. As analyzed in the literature and in the principles of PNATER 2003 and 2010, family farming must be treated according to local specificities defined within certain territories, and from a guiding line for policies aimed at family farming policies, with activities that integrate economic and socio-environmental development. All of this considering what was highlighted in the literature and in the discussions, since the rural environment must be treated within a holistic view, that is, associating the material and immaterial.

The valorization of local knowledge is a fundamental part of a knowledge management process. However, this predominance cannot be a factor that makes it difficult to incorporate new approaches to agricultural practices. The fact that some farmers emphasize that their practices have greater relevance than technical knowledge cannot be attributed to the posture that may hinder the entry of innovations in family farming. As already mentioned, all of this is the result of an imposing approach by ATER agents, who still use methodologies from the Green Revolution period. During this period, there was no dialogue between ATER and the farmer protects himself from alleged invaders who intend to deny their values and culture transmitted by family tradition, which are inserted in the knowledge about agricultural practices.

Within the category, the perception of farmers regarding the existence or not of prejudice against the family farmer's profession stood out as an intermediary. Therefore, it appears that, in the process of knowledge interaction, there is still a feeling by the farmers that, in the presence of ATER agents, farmers are considered inferior and need an education focused on the new paradigm of production. This feeling is the result of historical conditions that have been perpetuated for several decades, not only by extension agencies, but also originated from public policies that proposed to innovate agriculture within hegemonic precepts without considering the tradition and peculiarities inherent in each territory.

c) Assistance on preserving the environment - stimulated use of natural resources was classified as an intermediary, because of the division between the opinion of public agents who seek to encourage the development of sustainable agriculture and, at the same time, technicians of private organizations that try to address this issue in another direction due to the type of production they provide assistance to, related to the intensive use of chemical and pesticide inputs. Associated with this item, part of the responses of farmers regarding ATER's position on the use of chemical and pesticide inputs indicates a predominance neutral alternative by the technicians about the topic, and another part highlighted the concern of the extension workers to develop environmental awareness. Therefore, the results are consistent with the two ways in which the extension workers acted on the properties. Thus, on the one hand, technicians from public agencies also try to develop a more sustainable farmer or do not provide guidance on sustainability and, on the other hand, representatives of private organizations that seek to sell their technological packages of pesticides are still in force resulting from the paradigm of the Green Revolution.

In the same category, ATER's concern with the preservation of natural resources was considered to be intermediate, as it appears that incentives are not part of programs aimed at education focused on environmental issues. There is only superficial information in order to comply with environmental standards. As seen, the opinion of farmers shows that, in most cases, they have their own initiatives for preservation, without determinations of government policies and programs represented by technicians, who are more focused on the preservation needs of the natural resources of their properties. The actions are carried out to protect the greater good of these farmers, their land, which has an inseparable economic and symbolic value. In this sense, the property not only represents a means of obtaining material resources for subsistence, but also the living space where social relations are established.

The questioning about how ATER agents position themselves regarding environmental issues showed the neutrality of private technical assistance and, on the other hand, the attempt to develop an environmental education among farmers preached by public officials. Again, there is a dichotomy between the two views mentioned above.

d) Phases of the knowledge creation process – the predominance of responses highlights that the performance of ATER agents is present in all phases of the production process. However, the reports show that this monitoring is more focused on the assistance of agents representing private companies. Once again, we enter the paradigm of the policy of adopting technological packages that aim to tie production to industries that supply all necessary resources for farmers to develop their production processes.

e) Concept of ATER's performance – most respondents attributed a good concept to the services provided by ATER. Therefore, the procedures adopted to search for new alternatives that can provide the sustainability of family farmers' rural properties need to be

evaluated. This study provides information on one of the fundamental factors for maintaining the values and culture of farmers, which is knowledge. For this reason, knowledge management consists of strategically addressing added value to farmers' practices through existing tacit knowledge that not identified by external agents due to a paradigm still in force, which neglects the importance of local population knowledge for sustainable rural development.

Negative Status

a) Assistance on property resilience – as highlighted in Table 1, farmers are not concerned about how to proceed in case of need for quick emergency decision making. In this sense, we identified that ATER does not disseminate information on this topic. The importance of developing resilience in properties becomes more and more urgent in the current context, because of the increasing occurrence of catastrophes in regions that used to be safe.

b) Assistance from ATER for the development of potential on the properties – as a reflection of farmers opinion, as shown in Table 1, about the potential and viability of new enterprises, the results show that little knowledge and lack of incentives for investment in agroecology production can be associated with the lack of incentive by ATER. Most farmers replied that this is not mentioned by extension workers, especially public bodies that are governed by PNATER policies, which emphasize agroecological production as an alternative for sustainable rural development.

Final Considerations

This study was developed from the interdisciplinary and transdisciplinary view about knowledge. We presented a critique on the technicist paradigm of agricultural modernization that established a learning process based on diffusionism, which preached the insertion of new technologies in rural areas without considering local peculiarities, neglecting the traditional knowledge of family farmers.

With the creation of PNATER (2003), there was a redirection in the process of spreading new knowledge, carried out by ATER, to rural populations. The methodology used becomes participatory and thus establishes a dialogical relationship, focused on the reality of the family farmer and the valorization of their knowledge, values, and local culture with the prioritization of agricultural activities based on agroecology.

Regarding the knowledge interaction process between farmers and ATER, the study shows that the predominant result was the intermediate status. Thus, there is a need to improve the knowledge interaction between family farmers and ATER.

For a paradigm shift, public ATER needs to be more active and more projects and practices must be adapted according to PNATER (2003). This Program was developed based on a broad debate with many entities of workers' classes and, later, reorganized in 2010. In addition, it establishes agroecology as the most suitable type of production for family farming, as it makes economic and knowledge potential compatible with it and rescues the positive interaction with the environment.

Regarding the interaction of knowledge, it is up to ATER to develop works more directed to the reality of each community and to establish practical activities, individually or in groups of farmers. It is expected that they will be encouraged to externalize their tacit knowledge, in addition to the promotion and involvement of the young population in these activities, so they can multiply this knowledge. As a result, it is possible to preserve the local identity and the process of internalizing the new knowledge, considering the similarity of perceptions and mental models. It also becomes an incentive for young people to stay in activities developed by the family.

The active participation of young people in rural development projects is important for their permanence in agriculture, thereby minimizing one of the biggest dilemmas in family farming today: family succession. In addition, the permanence of young people in family activities is essential for cultural preservation, since knowledge about most of the practices developed on the properties is tacit and can only be perpetuated through the interaction between family members and the community.

The search for valuing the knowledge of family farmers is essential so that the tacit knowledge is not lost, considering the decrease in family properties and with a decreasing trend in the coming decades. In this sense, the tacit knowledge, which comes from the experiences accumulated over several generations, to be shared needs to be socialized between those who intend to transmit new knowledge and the apprentices, based on the "learn by doing" practice.

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