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Teaching and Practices in Higher Education in Agroecology from the Interdisciplinary Viewpoint

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***Abstract*— *This article considers the origins and historical evolution of agroecology and its connection with the multi and interdisciplinarity, highlighting the main theoretical concepts and their epistemological and methodological bases built by classical and postmodernist thinkers through their formulations on the themes, where, despite the diversified views, agroecology in a hegemonic way is pointed out as a science under construction that seeks alternative and sustainable models for the socioeconomic, cultural, environmental and ethical development of the farmer with respect to the environment. It also brings the discussion of agroecology and interdisciplinarity into the academy in undergraduate and graduate courses in agroecology, highlighting the importance of continuing education for teachers and students, with a view to building new approaches that recognize the importance of cultural diversity and exchanges between scientific and popular knowledge. Women are identified here as protagonists of advances in the transition from conventional to agroecological agriculture, either for their participation or for the struggles undertaken in the consolidation of this system, which, in addition to production, constitutes a way of life and work.*

Resumo*— *Este artigo tece considerações sobre as origens e evolução histórica da agroecologia e a sua vinculação com a multi e a interdisciplinaridade, ressaltando as principais concepções teóricas e suas bases epistemológicas e metodológicas construídas por pensadores clássicos e pós-modernistas através das suas formulações sobre os temas, onde, a despeito das visões diversificadas, a agroecologia de forma hegemônica é apontada como ciência em construção que busca modelos alternativos e sustentáveis para o desenvolvimento socioeconômico, cultural, ambiental e ético do agricultor com respeito ao meio ambiente. Traz ainda a discussão da agroecologia e da interdisciplinaridade para dentro da academia nos cursos superiores de graduação e de pós-graduação em agroecologia, destacando a importância da formação continuada para os docentes e discentes, na perspectiva da construção de novas abordagens que reconheçam a importância da diversidade cultural e das trocas entre os saberes científicos e populares. As mulheres são aqui apontadas como protagonistas dos avanços na transição da agricultura convencional para a agroecológica, quer pela sua participação, quer pelas

lutas empreendidas na consolidação desse sistema, que para além da produção, constitui - se forma de vida e de trabalho.

Resumen*— Este artículo considera los orígenes y la evolución histórica de la agroecología y su conexión con la multi e interdisciplinariedad, destacando los principales conceptos teóricos y sus bases epistemológicas y metodológicas construidas por pensadores clásicos y posmodernistas a través de sus formulaciones sobre los temas, donde, a pesar de las visiones diversificadas, la agroecología de manera hegemónica se señala como una ciencia en construcción que busca modelos alternativos y sustentables para el desarrollo socioeconómico, cultural, ambiental y ético del campesino con respecto al medio ambiente. También trae la discusión de la agroecología y la interdisciplinariedad a la academia en los cursos de pregrado y posgrado en agroecología, destacando la importancia de la educación continua para profesores y estudiantes, con miras a construir nuevos enfoques que reconozcan la importancia de la diversidad cultural y los intercambios entre científicos y estudiantes. conocimiento popular. Las mujeres se identifican aquí como protagonistas de los avances en la transición de la agricultura convencional a la agroecológica, ya sea por su participación o por las luchas emprendidas en la consolidación de este sistema, que además de la producción constituye una forma de vida y de trabajo.*

I. AGROECOLOGY IN THE MAT OF TIME

Although the term Agroecology emerged as a science in the 1970s of the last century, its assumptions in defense of man's relationship with the earth are very old. In the Paleolithic period (2.5 million years to 250 thousand years a.C), the land was a provider and offered to man as hunter and extractive what it naturally produced. Already in the Neolithic period (7000 a.C to 2500 a.C), man had learned to use it and, thus, it was possible to produce what was of interest to him. In antiquity (4000 a.C), land meant power, and whoever owned the most acquired greater importance. In the Middle Ages (5th to 15th century), the land continued to be a symbol of nobility and those who did not own it were socially excluded, becoming servants or vassals of their lords. In modernity (from the 16th century onwards), with maritime and commercial expansion, land began to be overvalued not only for people, but for countries and, finally, in post-modernity (from the 18th century onwards). land becomes capital, either as a form of accumulation for speculation, in the form of exploitation of natural resources, or in the form of production and consumption.

When agriculture started to depend on the industry for the production of chemical inputs, with the objective of producing more in less time in order to meet the market logic, between the 1960s and 1970s a movement emerged in the United States and throughout Europe called "Green Revolution", being soon disseminated in other countries, including Brazil. According to Azevedo and Netto (2015: 643), it was the beginning of the problems that have been causing environmental degradation and the social exclusion of family farmers, in the logic of being inexhaustible natural resources. In parallel, alternative agricultural movements to the predatory production model emerged, based on agroecological principles and characterized by different currents of thought, in the understanding that it is possible to develop sustainable agriculture that meets human needs and is not destructive of biodiversity.

Despite being a term that emerged from the different currents of alternative agriculture, agroecology should not be understood as an agricultural practice. She is so much more. It is a science that uses different interactions in the functioning of complex agroecosystems, adopting as principles the least dependence on external inputs; conservation of natural resources; use of natural nutrients and energy, incorporating social, political, cultural, energetic, environmental and ethical issues into the production system. As Azevedo and Pelicione (2011:715) say, "Agroecology is an intersectoral strategy to promote health, sustainability and food and nutrition security." It is also important to remember that the great interest aroused by society on the subject is due to consumers who are cautious with their health and well-being, who increasingly demand healthy foods, and it is worth clarifying the difference between organic and agroecological, although in the market they can often be taken as synonyms.

In the 1920s, Rudolf Steiner (1993:18), when presenting the postulates of biodynamic agriculture and Sir Albert Howard (1947:69), when establishing the bases for organic agriculture, already emphasized the importance of soil fertility conservation for the growth of healthy plants. Britto (2020:36), contributing to the subject, clarifies that organic products are those that do not use pesticides or synthetic fertilizers, however, they are not always linked to social and fair contexts, and may even use middlemen to market their products from the perspective of higher profits and even, in some cases, disrespect labor rights.

With the expansion of the movement, the International Federation of Organic Agriculture Movements - IFOAM was created in 1972, which implemented a system to guarantee the quality of organic products for its consumers and started to establish international standards for this type of agriculture. , creating the Organic Guarantee System - OGS (IFOAM, 2016).

According to Darnhofer et al. (2010:67), several studies carried out in different parts of the world observed a tendency in organic agriculture, to give emphasis on products and not on processes, reducing it to a simple substitution of chemical inputs for organic ones, contrary to its original principles that are the appreciation of health, ecology, equity and care for the population. To correct these distortions, IFOAM adopted the PGS - Participatory Guarantee Systems, in which the organized producers themselves can create a Participatory Conformity Assessment Body - OPAC, based on social control and joint responsibility (CÉSAR, BATALHA AND PIMENTA, 2008:91).

In 2003, Law 10,831 was passed, which institutes organic agriculture in Brazil, covering different types of alternative systems – ecological, biodynamic, natural, regenerative, biological, agroecological, permaculture and others –, provided that they meet the general principles established in your art. 1, allowing direct sales without certification to family farmers inserted in their own processes of organization and social control registered with the Ministry of Agriculture, Livestock and Supply - MAPA, in order to facilitate their access to the market and insert them into the production system (BRAZIL, 2003).

The regulation of the law took place through Decree No. 6,323, of December 27, 2007, formulated with the participation of civil society, which created the only official seal of the Brazilian System of Organic Conformity Assessment (SISOrg) and the SPG, not considered in the previous regulations. (FONSECA, 2009: 77). This Decree enabled access to government purchase programs for groups of farmers who opted for SPGs, however, the Brazilian system admits three control mechanisms: certification, traditionally used throughout the world, based on external auditing; the SPGs; and the mechanisms of social control in direct sales (KARAM ET AL., 2006: 86).

In 2004, MAPA created the Organic Agriculture Development Program (Pró-orgânico), through Ordinance No., as well as promoting and promoting the production and marketing of products. (SAMBUICHI ET AL., 2012: 49).

Meanwhile, Agroecology, in addition to being concerned with economic, social, cultural, environmental, ethical issues, among other areas related to the strengthening of family farming, offers healthy food at affordable prices to the entire population. Therefore, more than a production system, it is a way of life. For Gliessman (2001:79), agroecology seeks to use the most advanced in terms of science and technology to create sustainable and high-productivity agroecosystems that present characteristics more similar to those of natural ecosystems.

Agroecology has, in its origins, Klaus Klages, a scientist who investigated and wrote about agricultural activities emphasizing the social point of view (KLAGES, 1928:16). Another scientist who dedicated many studies to the subject was the geographer Susanna Hecht, bringing the idea of political ecology, strengthening the concept of Agroecology (HECHT; COCKBURN, 1990). More recently, several authors such as Miguel Altieri, Stephen Gliessman, Eduardo Sevilla-Guzmán, Francisco Caporal and José Antônio Costabeber, among others, explain their definitions of what Agroecology is in scientific texts, each with its specific characteristics. (ALTIERI; HECHT, 1998).

The term agroecology has existed since the 1930s, however, its scientific importance dates back to the last forty years, with the deepening of theoretical reflection on the management of agroecosystems and the criticism of the agricultural development model, where it has become an important strategy for analysis of the socio-environmental impacts of production systems, interrelating the knowledge of different areas (MOREIRA E CARMO, 2004:12).

II. AGROECOLOGY IN THE VIEW OF THE MAIN THEORISTS

For Gliessman (2001:79), agroecology is derived from ecology and agronomy, with a strong influence from traditional farming systems, especially indigenous and peasants in developing countries, and seeks

to use the most advanced in terms of science and technology. to create sustainable, high-productivity agroecosystems that have characteristics more similar to those of natural ecosystems.

Sevilla-Guzmán (2006: 33), conceptualizes agroecology as the ecological management of natural resources through forms of collective social action, which presents an alternative to the current civilization crisis, including the participation of farmers, community organization and the relationship of societies. rural activities articulated at the local level.

For Altieri (1998:6), Agroecology is a science that presents principles and methodologies to study, analyze, direct, design and evaluate agroecosystems and states: "Agroecology is, therefore, a science, with a series of principles; not a practice or a system of production". In another publication, the same author describes Agroecology "as a holistic study of agroecosystems, including all environmental and human elements, with more attention to the form, dynamics and function of the interrelationships and the processes in which they are involved" (ALTIERI, 2001:56).

Primavesi (2016: 9), states that the objective of agroecology is to restore balance with the environment, producing in quantity and with quality, in a process that, consciously, is not brief. With the same vision, Caporal and Costabeber (2004:39) emphasize that one of the main axes of agroecology is the need to produce food in quantity and quality for the whole society, in an innovative and multidisciplinary perspective. Azevedo and Neto (2015:643), on the other hand, report that the strategy of agroecology is to transform a disciplinary approach into a theme "by changing the use of inputs and/or redesigning the agroecosystem, seeking technological formats that benefit social inclusion, supporting the heterogeneity of strategies for the use and management of natural resources".

Paul Wojtkowski, understands agroecology as something bigger, outside the strict domains of agronomy. For him, agroecology is the part of ecology responsible for understanding land use, with human beings as the primary governing force for this (WOJTKOWSKI, 2002:29).

As stated by Wezel et al (2009:36), the term Agroecology can be understood in several ways: as a science, as a movement and as a practice. Regardless of how it is seen, it is a proposal for socially fair, economically viable and ecologically sustainable family farming, which does not exist in isolation, as it is always integrating knowledge from other sciences, in addition to adding popular and traditional knowledge of populations. not educated (CAPORAL et al, 2006). Another important reference is the Brazilian Association of Agroecology (ABA), which in its statute, Art. 3, has the following definition:

> [...] Agroecology is understood as a scientific, theoretical, practical and methodological approach, based on several areas of knowledge, which proposes to study development processes from an ecological and sociocultural perspective and, from a systemic approach, adopting the agroecosystem as the unit of analysis, support the transition from conventional models of agriculture and Rural Development to sustainable styles of agriculture and rural development (ASSOCIAÇÃO BRASILEIRA DE AGROECOLOGIA , 2004, art.3°).

For Azevedo and Pelicione (2011:720), agroecology is a sociopolitical movement to strengthen agriculture in search of its identity and cultural roots, in addition to its autonomy, decision-making power and participation in the production process.

The importance of valuing agriculture, especially family agriculture, is that, according to the Food and Agriculture Organization of the United Nations (FAO), "family farmers produce 80% of the world's food and are important drivers of sustainable development" (FAO BRASIL:2020). In 2018, as a result of the Second International Symposium on Agroecology, held in Rome, Italy, FAO started to fight intensive agriculture, defending agroecology as a perennial food system and allied to the SDGs – Sustainable Development Goals, which aim to the realization of human rights, balancing the three dimensions

of sustainable development: economic, social and environmental (UN, Agenda 2030), breaking with the traditional paradigm of production in agriculture, due to its interdisciplinary character.

Among the principles that underlie agroecological practice is also food sovereignty, which recognizes the right of peoples and communities to define their strategies for the production and consumption of the food they need (MALUF, REIS E MAGALHÃES, 2013:71). On the subject, FAO states:

> Food security is a shared responsibility. Governments, regional economic bodies, United Nations organizations, development agencies, trade organizations, consumer and producer groups, academic and research institutions and private sector entities must work together on issues that affect us (UNITED NATIONS: FAO, 1978).

Even with the obstacles found in several areas, making it difficult to implement public policies in general, it is not possible to fail to recognize that Brazil has advanced in this food security agenda. The approval of Organic Law 11,947/2009, which deals with Food and Nutritional Security - LOSAN, regulated school meals, expanded access to all students enrolled in the public network and allocated 30% of the value to the purchase of family farming production, having as one of its guidelines the "promotion of supply and structuring of decentralized, agroecologically based and sustainable food production, extraction, processing and distribution systems" (BRASIL, 2010).

This guideline emphasizes agroecology as "a concept for designing future agricultural systems, as it is strongly rooted in both science and practice and because it has strong connections with the principles of the right to adequate food" (SCHUTTER, 2012:9). The PAA was created as a structuring action of the Zero Hunger Program and its guidelines include: encouraging family farming, promoting its economic and social inclusion through consumption and appreciation of food produced by farmers; to promote access to food for people in situations of food and nutritional insecurity; promote food supply, through government purchases and school meals; and encourage the formation of public food stocks by family farmers, their cooperatives and their associations, strengthening local and regional food marketing circuits; in addition, to promote food assistance in schools, day care centers, popular restaurants, nursing homes, hospitals and food banks, as well as for families in situations of social vulnerability (SCHMITT E GUIMARÃES, 2008). Another aspect to be highlighted in the relationship between PAA and agroecology is the acquisition and valorization of native seeds, by allowing this operation to be carried out fully with local varieties, no longer being a marginal purchase (PORTO, 2014).

Another strong component in agroecological practice is gender equity, which is based on the recognition of the relevant role that women have played in the expansion of the movement, taking care of vegetable gardens, productive backyards, raising small animals, transforming products, contributing with their work to expand the household budget, and their care for the house and family, especially children and the elderly, must also be taken into account.

III. THE IMPORTANCE OF WOMEN IN ADVANCES FOR THE CONSOLIDATION OF AGROECOLOGY

Agroecologically-based family farming gains relevance in the Brazilian scenario, from the moment it becomes recognized as a strategic sector for income redistribution, for guaranteeing the country's food sovereignty and for the construction of sustainable territorial development. Peasant women have always been related to food production, as a result of a historical and cultural situation of the sexual division of labor, which is why they acquired a vast knowledge about the agroecosystems they manage, playing an important role as administrators of the flow of biomass, conservation of biodiversity and plant domestication, a key point for the defense of family farming based on agroecology.

According to Hereda & Cintrão (2006), in the 1980s, rural women's movements contributed significantly to the construction of public policies such as the struggle for land, rural credit, the union and social security movement, aimed at reducing inequalities in gender in agriculture, mainly in northeastern Brazil. In agroecology, the organization and participation of women has expanded,

especially in experiments with alternative agriculture; in the creation of training centers for the provision of ATER – Technical Assistance and Rural Extension services; in the commercialization of products via agroecological fairs and, more recently, with the experience of agroecological books, which allow them to leave their productive invisibility, through the systematic records of their accomplishments on the property, as a strategy to force governments to make these actions public policies of the state (SILIPRANDI:2009:33).

Initially created in Minas Gerais, the use of agroecological notebooks has been expanded to other regions of the country, having already been implemented together with projects supported by IFAD – International Fund for Agricultural Development since 2019, in partnership with Projetos Dom Távora in Sergipe; Paulo Freire in Ceará; Dom Helder Câmara II in Alagoas Ceará and Pernambuco; Sustainable Development Project for Cariri, Seridó and Curimataú in Paraíba; Project Viva o Semiárido in Piauí and Project Pró-Semiárido in Bahia.

In the beginning, the agroecological booklet was created as a political-pedagogical instrument for the training of women, with the aim of empowering them by raising awareness of the importance of their work, having as a starting point their participation in production and income. familiar.

Currently, it constitutes an efficient instrument for monitoring their production, when defining their contribution to the family budget, since they are responsible for the acquisition and preparation of food for the family; those who take care of the house, children and the elderly; those who are responsible for the health of family members, taking medicines from the plants to cure diseases, in addition to encouraging agroecological practices (SILIPRANDI, 2013; LIMA et al., 2016). As the authors Mesquita and Mendes (2012) state:

> Women farmers are not only primarily responsible for the maintenance of the family nucleus, but also play a fundamental role in the work related to crops and animal husbandry. Therefore, they have a significant importance in the dynamics of the production unit, directly interfering in the different spheres of productive and reproductive performance (MESQUITA; MENDES, 2012: 2).

Agroecology requires new forms of relationships, linked to solidarity and cooperation, including the issue of gender, that is, expanding the participation of women in these processes of resistance and change. As a result, they transformed, reconfigured their personal, family and community relationships, affirming their collective identity as a political subject in the social construction of agroecology. The Political Charter of the III ENA – National Meeting of Agroecology, held in Juazeiro – Bahia, on the UNIVASF campus, recognizes that:

> (...) without feminism there is no agroecology" because they understand that the construction of agroecology is based on an ethical vision of social and environmental justice that presupposes the sharing of domestic work and care and production management, a life without violence, governed by for respect and equality. This implies guaranteeing women's right to full participation in social and political life in their communities, as well as guaranteeing their access to land, water, seeds and production and

marketing conditions with autonomy and freedom.

By organizing themselves and placing themselves on the public scene, these women remake their own history and that of the movements to which they belong, at the same time as they build themselves as new subjects, who make their voices, their desires, their subjectivities heard, the cry for their rights and the recognition of their ability to transform the earth.

As can be seen, what Agroecology provides to women as active political actors, as emphasized by Siliprandi (2013:54), is that they do not remain isolated, discussing among themselves "women's issues". On the contrary, in the agroecological movement, they assume the role of questioners of public policies and international agreements, they position themselves in relation to the problems generated by the monopolization of transgenic seeds, the use of pesticides, industrialized food, the exploitation of land in the production of commodities, among other problems that affect society as a whole.

Even with the advances that have allowed women to flourish in their insertion in the market, overcoming policies that concentrate wealth, favoring inequality and the devastation that the hegemonic model produces, requires new actions that alter the current dominant logic. It is necessary to change this paradigm focused on profit at any price, putting the care of human life and the environment in the foreground, expanding opportunities for women, historical guardians of biodiversity in their living and working spaces.

IV. THE NATIONAL POLICY OF AGROECOLOGY AND ORGANIC PRODUCTION IN BRAZIL: LIMITS AND POSSIBILITIES

The National Policy on Agroecology and Organic Production – PNAPO, was created in 2012, through Decree No. combining territorial development with the conservation of natural resources and the appreciation of the knowledge of traditional peoples and communities (BRASIL, 2012). For the construction of this public policy, representatives of the various government and civil society institutions were called for decision-making, strengthening the spaces for discussion, participation and articulation provided by the councils and commissions of social participation (IPEA, 2017).

The institution of this policy came in response to the claim made by women from the countryside and the forest during the 4th Marcha das Margaridas, held in 2011, but the struggle and mobilization that resulted in its proposal began in the 1970s, with the Ecclesiastical Communities of Base and alternative agriculture movements, as a form of resistance to the agricultural modernization model disseminated by the Green Revolution (MOURA, 2016; SAMBUICHI ET AL., 2017).

The agricultural modernization promoted by the Green Revolution, intensively promoted in Brazil since the 1960s, although it contributed to the increase in the production of commodities and to the growth of the gross domestic product - GDP, and of Brazilian exports, presenting itself as very profitable for agribusiness and the financial system, since its implementation, has had a negative impact on the well-being of society, in addition to not having promoted inclusive and fair development for rural populations. On the contrary, it favored land concentration, poverty and exodus, leaving farmers considered to have low productivity and incapable of competing in the market led by those who used the recommended technologies on the sidelines of the production process (SILVA, 1982). From then on, the rural population began to decrease, with Brazil going from a predominantly rural population to a mostly urban population, as rural people, seeking better conditions for survival, made the decision to abandon their lands, or sell them for insignificant values, starting to swell the slums and urban peripheries, giving up their lives.

Almost a decade after the enactment of Law No. 10,831 of 2003, which provided for organic agriculture, Brazil instituted a broader policy aimed at promoting the production systems covered by this law and thus making official the promotion of the agroecological transition and production organic and ecologically based as a strategy focused on sustainability, having family farmers as a priority audience, with an emphasis on women, young people and traditional peoples and communities, in the perspective that new actions could be developed in a transversal way, boosting development .

Despite the advances brought by the legislation, its fragility with regard to the topic of pesticides is notorious, which were not regulated there as expected, since Article 225 of the Federal Constitution of 1988, in § 1, item V This article provides that it is the responsibility of the public authorities to control the production, marketing and use of techniques, methods and substances that pose risks to the quality of life and the environment.

V. THE TEACHING OF AGROECOLOGY IN THE ACADEMY: AN INTERDISCIPLINARY PROPOSAL UNDER CONSTRUCTION

The theme of agroecology in the academy is recent and has gradually emerged, from the emergence of alternative agriculture that constituted the embryo for its introduction in teaching, research and extension through specific actions of some more progressive professors (ABA - Agroecology, 2013). The state and international agroecology seminars, held in Rio Grande do Sul, since 1999, played an important motivating role. Later, from 2003 onwards, the Brazilian agroecology congresses - CBA came.

A relevant fact was the creation of the ABA - Associação Brasileira de Agroecologia in the second CBA in 2003, to be a space for discussion and articulation of agroecological knowledge in the academic-scientific environment, integrating the National Articulation of Agroecology - ANA, which contributed to, from from that date, more than one hundred agroecology courses or with an agroecological focus will be created in Brazil, requiring the MEC – Ministry of Education and Culture to include training in agroecology in its high school and higher level course catalogs (LUZZI, 2007; BALLA, MASSUKADO AND PIMENTEL, 2014; CAPORAL AND PETERSEN, 2012). Government notices began to include this line in their calls and the then MDA – Ministry of Agrarian Development, now extinct, proposed to federal public universities the implementation of Agroecology Nuclei, in order to carry out studies and research in this area.

In the Framework of Reference for the construction of a new ATER policy in 2004, the PNATER – National Policy for Technical Assistance and Rural Extension proved sensitive to include the theme of agroecology as a guiding axis of its actions, with a view to rural development and the strengthening of family agriculture, aiming at improving the quality of life of the rural population (BRASIL, 2007:9). However, according to Diesel, Dias and Neumann (2015:61), it was the first time that the word agroecology appeared in a public policy for Brazilian rural extension workers, however, this ideal was not materialized, prevailing until 2010, the diffusionist approach by extension professionals. rural area, given the strong influence of the multinationals that dominated the agrochemical market here in Brazil.

Despite these advances in the educational area at technical and higher levels, agricultural science courses, with rare exceptions, continue to train professionals to meet the technological standard of conventional agriculture, following, most of the time, productivist technical models, committed to the agribusiness. Among the most progressive institutions and attuned to the demands of the new paradigm for agriculture, it is already possible to observe the internalization of the agroecological perspective in formal agroecology courses, both undergraduate and graduate, which in an attempt to overcome the dominant ideology teaching-learning process, exercises pedagogical processes based on critical-reflexive, cultural, humanistic, political, generalist training and committed to valuing family farmers and traditional populations, from the perspective of sustainability in all dimensions.

In these graduate courses, lacto and strictu sensu, there is a concern with the holistic training of educators, where new epistemological bases are discussed with them that can contribute to the construction of knowledge that presents insertion in socioeconomic and environmental realities through practices interdisciplinary, which enable the democratization of knowledge. In these public institutions, the interdisciplinary dimension of studies on agroecology involves the various areas of knowledge, such as: in the social sciences, the sustainability of agroecology is discussed (GÓMEZ et al, 2015; SANTOS et al, 2014); in the human sciences, these are constructs focused on research strategy and values (NODARI; GUERRA, 2015); in the agricultural sciences, the focus is on agroecology as a form of development in small rural properties (MEJÍA, 2011; SOUZA, 2011).

Higher education, previously structured in isolated knowledge, in a disciplinary way, over the years, has directed the gaze of professors/researchers to interdisciplinarity. For Brügger (2006), knowledge needs to recover the totality of knowledge. According to Yared (2013), interdisciplinarity means a relationship between disciplines in a cooperative and coordinated way in the teaching-learning system, involving political, technical, cultural, social, ethical, environmental dimensions, between the relationships of two or more disciplines from the point of view of from the point of view of knowledge, methods and learning. For Fazenda (2013:44), interdisciplinarity enables a new posture of knowledge in the face of the act of learning, characterized by an action in constant movement in the face of social, scientific and environmental uncertainties.

Thinking interdisciplinary, in the view of Fazenda (2013:46), consists of facing the problem with the competence of those who have knowledge about the facts, the ability to act and attitude towards the difficulties presented during the resolution. For Antiseri (1975:17), cited by Yared (2013:9), from a psychosocial point of view, interdisciplinarity will be effective when carried out

through work in groups formed by professors and students, reducing the aspect of competition and increasing the collaboration among group members through exchanges and integration between different forms of knowledge.

The interdisciplinary area of the Capes Higher Education Personnel Improvement Coordination states that:

> "interdisciplinarity is where the relationship between knowledge is made, the meeting between the theoretical and the practical, the philosophical and the scientific, science and technology, thus presenting itself as a knowledge that responds to the challenges of complex knowledge. . In this way, there is an advance beyond disciplinary boundaries, establishing bridges between the different levels of knowledge reality".

From this perspective, interdisciplinarity is an alternative, complementary and innovative proposal to the disciplinarity of knowledge, between the human, social and technological sciences, playing a mediating role between them. So much so that, since the second half of the 20th century, the Center National de la Recherche Scientifique - CNRS in France, which is a world reference on the subject, has made interdisciplinarity the main purpose of this research institution for the resolution of complex phenomena that challenge the science today. Like the CNRS in France, Capes also accepted the challenge of implementing interdisciplinary knowledge in Brazil as a way of solving complex problems.

In agroecology graduate courses, as a rule, the practice of interdisciplinary research is still more an intention than a reality, if we take its basic assumptions as a parameter: the dialogic relationships between the actors involved in the process and the exchanges between them. the various knowledge of the subjects for a better understanding of the researched object, without departing from the concepts and methods of each area.

In an interdisciplinary process, in the view of Philippi Júnior (2000:76) it is important to have participation, union, group spirit, engagement, communication and action. In the same direction, Melo; Cardoso (2011:55), state that it is necessary to work in an integrated way throughout the teaching-learning process, in order to have unity in diversity. Certainly, such a procedure is not easy, considering that both agroecology and interdisciplinarity entered the university world recently and the entire academic community is in the process of learning and adapting to the new counter-hegemonic model of teaching and learning, in the construction of knowledge. In this logic, agroecology, as well as other sciences, raises social, economic, political, cultural, environmental demands, which, when met, impact on the formation of subjects from the university, being able to develop advanced technologies, capable of solving society's problems.

When advancing into the university, agroecology faces challenges for its construction in this environment, as it demands from higher education a commitment that goes beyond the ingrained structures of teaching and research in the formation of agricultural sciences, but, for its consolidation, the determination is key.

As Costa (2010:26) highlights:

> [...] the biggest obstacle to the internalization of the precepts of Agroecology in the fields of traditional Agronomy is that the theoretical-conceptual and analytical framework adopted in Agronomy is of a Cartesian, specialist, compartmentalized nature, while Agroecology prioritizes a holistic theoretical matrix, interdisciplinary, generalist and totalizing.

As can be seen, developing education in agroecology in an interdisciplinary perspective is a challenge for all those involved in the construction of this model of agriculture, where the formation of a generation capable of understanding and equipping themselves with this new matrix of knowledge and using them is the key. expression of this challenge.

The articulation for agroecological production and interdisciplinary training in agroecology to meet this proposal that is ideal for the sustainability of the planet and the life of biodiversity, constitutes the centrality of the agenda that should guide the strategies for the training of professionals and the production of knowledge and technology necessary for their support.

Interdisciplinary approaches by presenting an integrative line of action, enable the transformation of contents into tangible objects of knowledge, as they overcome disciplinary barriers, allow reflection of contents involving theory and practice and the exchange of knowledge not only between different areas and/or disciplines within of the university, but also with society (PÉREZ POMPA, ET AL., 2017; NOVO, 2017; CAMPOS, 2019; HAMMES, ET AL., 2020).

Therefore, it is desirable to train professionals who have the ability and Skills; balance between reason and emotion; critical-reflective awareness; social and interdisciplinary awareness; in order to fit into the context of the real needs of the farmer and the environment.

VI. METHODOLOGY

For the writing of this article, a bibliographic review was carried out to analyze the publications of scientific works on agroecology and interdisciplinarity with a focus on family farming, in the databases of the Brazilian scientific field: Google Scholar; Spell - Scientific Periodicals Electronic Library; Scielo - Scientific Electronic Library Online and, as a complement, the most recent Agricultural Research Database.

The research was carried out between August 1st and September 10th, 2022, using words related to the researched topic. A publication period was not defined for analysis, therefore, a high number of articles with the themes, agroecology, family farming, interdisciplinarity, teacher training in agroecology and national policy in agroecology and organic production were found.

After a detailed analysis of the four databases, selections of articles were made that would help in the expected objective. For that, an excel spreadsheet was created with the main data of the articles such as: year of publication, keywords and qualis of the journals, with the information contained therein guiding the studies for the preparation of this text.

VII. SOME FINAL CONSIDERATIONS

Agroecology is a science for the sustainable future because, from a transdisciplinary approach, it integrates knowledge from different sciences and allows for the understanding, analysis and criticism of the current model of development and agriculture for the promotion of sustainable development. Over time, it has become the matrix for a new paradigm of knowledge, generated in different disciplines, both scientific and the knowledge of traditional populations, which recognizes the unsustainability of the current model.

The new paradigm under construction recognizes the unsustainability of capitalist agriculture, due to its dependence on externalities to agroecosystems, causing environmental destruction and promoting the social exclusion of traditional rural populations. The economic rationality of the hegemonic model of agriculture transformed food production into a business and the countryside into a sector of the economy, justifying its advances in the need to increase productivity to meet the demands of the growing human population. However, contrary to this discourse, this productive matrix only generated the loss of natural fertility of the soil and of the genetic diversity of the crops due to the excessive use of artificial inputs, also compromising the health of the consumers of the food produced in this logic.

The academy has only recently included in its undergraduate and postgraduate courses, disciplines that discuss the reality of the countryside in a contextualized way, within a global vision of the agrarian and agricultural space, in the perspective of development that transforms the life of the population. countryside population. This change, as it is a social dynamic and depends on human intervention, implies not only economic-productive rationalization, but also a change in attitudes and values of social actors in relation to the management and conservation of natural resources, hence the need to have education professionals with technical capacity in the bases of agroecology, when training students, considering that the complexity of agroecosystems does not fit in the compartment only of agronomy, which requires an interactive dialogue with social, political, cultural and environmental sciences, to the much-desired revolution brought about by agroecology.

In the field of action, Agroecology has been sown in all regions of the country through the efforts of rural social movements that appropriate their interdisciplinary approach to address issues that are

generally ignored by conventional agriculture. Here, it is worth emphasizing how sociocultural problems and gender inequality in rural areas constitute a permanent agenda of rural women, who point out the importance of Agroecology for their empowerment and financial independence, considering that they are important subjects in the discussion about sovereignty. of the peoples; the maintenance of culture and respect for life and the environment, as they are the group most affected by the weight of the current agri-food system, which increasingly makes their role in society and their contribution to development and life invisible.

The knowledge discussed here requires reflection and openness on the part of professors, researchers, farmers, apprentices, in order to overcome the paradigm of disciplinary fragmentation, which is no longer able to explain the phenomena resulting from the hegemonic model of production. Thus, the interaction of knowledge through theoretical, practical and methodological exchanges generates new concepts and methodologies, aiming to better understand complex phenomena.

Expanding the dialogue between disciplines is a task that the university cannot evade, as it is a barrier to be broken and a fundamental step towards the advancement of knowledge, whether in terms of its academic structure or in terms of the composition of their research groups, whether in new courses they offer, as a guarantee of the effectiveness of an intellectual production that is more innovative and more suited to current times.

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