



Participatory and generalist systems in agricultural and rural extension in Cuba

Los sistemas participativos y generalistas en la extensión agraria y rural en Cuba

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ABSTRACT: Agrarian Extension is subject to a wide range of interpretations, some complementary, others contradictory. An Agrarian Extension System is characterized by its approach, the objective and the place that each participant occupies in the extension practice. In addition, it conditions the work of the participatory extensionist he could be specialized or generalist, in correspondence with the participatory or vertical approach. Cuban information and experiences were reviewed, with the objective of knowing how some generalist and participatory paradigms are manifested in agricultural extension practices developed in Cuba. The analysis showed that it is currently accepted that, in order to achieve an important transformation of the agrarian and rural environment, the action of all the actors that affect agriculture must be promoted and considers this as an integral system. Despite the fact that generalist and participatory extension practices have existed, and do exist, in Cuba, at the present they are not integrally generalized in the country's agriculture system.

Key words: technology transfer, rural development, innovation, urban agriculture.

RESUMEN: La Extensión Agraria es un término que está sujeto a una amplia gama de interpretaciones, algunas complementarias, otras contradictorias. Un Sistema de Extensión Agrario se caracteriza por su enfoque, el objetivo y el lugar que ocupa cada participante en la práctica extensionista. Además, condiciona la labor del extensionista especializado o generalista y participativo, en correspondencia con el enfoque participativo o vertical. Se revisó la información de las experiencias cubanas, con el objetivo de conocer cómo se manifiestan algunos paradigmas, como generalista y participativo, en las diferentes prácticas de extensión agraria que han sido desarrolladas. El análisis mostró que, actualmente, se acepta que, para lograr una transformación importante del medio agrario y rural, se debe promover la acción de todos los actores que inciden en la agricultura y que se considere ésta, como un sistema integral. A pesar de que en Cuba han existido, y existen, diversas prácticas de extensión generalistas y participativas, actualmente, no se generalizan integralmente en todo el sistema de la agricultura del país.

Palabras clave: agricultura urbana, desarrollo rural, innovación y transferencia de tecnología.

INTRODUCTION

The recovery of the agro-food potential of the territories, local financial, technological and environmental sustainability and the increase in food consumption based on increased production in these territories, in order to make their food security systems less vulnerable, are decisive challenges in the new millennium (1).

Agricultural extension activities are an essential tool for promoting rural development. These include the acceptance by the rural population of possible, often new, ways and means of developing their economies; usually, this involves the development of agriculture, defined in its broadest sense, which includes all land uses and many directly associated productive activities and in whatever kind of intervention is attempted (2).

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According to the Food and Agriculture Organization of the United Nations (FAO) (3), agricultural extension is defined as the system that facilitates the access of farmers, their organizations and other market agents to knowledge, technologies and information, encouraging their interaction with research, education, agribusiness and other relevant institutions, and assisting in the design of technical, managerial and organizational practices and skills.

To be considered an extension system, these experiences must have three aspects: an explicit methodology for the whole process; human resources prepared for the use of this methodology and the material and financial resources for its execution. These three characteristics differentiate an extension system from the extension actions currently developed by institutions, organizations and projects, which are very specific activities carried out with producers, for example, the transfer of a particular technology, technical training in some specific aspect of the production process, among others (4).

However, even at the beginning of the 21st century, some authors consider that agricultural extension has not yet become a modern tool for promoting the formation of complex agro-ecological and commercial systems, adequate to meet the multiple demands of modern times (5).

Sustainable agriculture depends on all its components; to integrate them it is necessary to understand the organization of the agroecosystem at all levels, starting with the plants and animals as individuals in the field up to the farmer's plot, the region, the country. Within all the components are different actors, which are integrated to achieve sustainability in agriculture. Agricultural and rural extension functions within the agricultural system and therefore within the action of all these actors (6).

For this reason, it is necessary to develop programs and projects with a new conception of work, which are capable of integrating the social, psychological, economic and technological elements in the agricultural extension process, and which allow decisions to be made regarding general agricultural extension policies and strategies for increasing agricultural production and the living standards of the rural population (7).

This article analyzes how some generalist and participatory paradigms are manifested in agricultural extension practices developed in Cuba.

Agricultural extension in Cuba

In Cuba, the first forms of extension consisted of empirical knowledge being transmitted from farmer to farmer, from father to son, in a gradual learning process, without the existence of institutionalized forms of extension. For this reason, it speaks of horizontal proto-extension. This continued until the 20th century, and extension activities increased with the beginning of the Republic. These activities were informal, undertaken by the producers themselves, or by some educational entities, experimental stations or civil associations. In addition, the

first minimal actions were carried out by some bodies of the Ministry of Agriculture of that time (8). On the other hand, the National Agricultural and Commercial Development Bank trained and hired Agricultural Masters and specialists with whom it provided services to producers in terms of the introduction of new technologies, technical assistance, advice and training (9).

Transfer extension activities were carried out by commercial companies. Their objective was the promotion and sale of different products such as agricultural machinery and implements, agrochemicals in general (mainly chemical fertilizers, pesticides and seeds) (10).

With the Revolution triumph, actions were initiated to intensify agricultural production and improve the living and working conditions of farmers and their families, prioritizing the use of scientific and technical knowledge. Extension, training and communication activities were integrated into the activities of the research centers or the planning and control system of the Ministry of Agriculture administration (11).

The teaching and research centers directed actions to support farmers in the necessary change and institutional agrarian and rural extension systems were emerging, initially sponsored by these centers and the Ministry of Agriculture and later by the farmers' own organizations such as the National Association of Small Farmers (ANAP, according its acronyms in Spanish), Sub Urban and Family Urban Agriculture (AUSF), Farmer to farmer Agroecological Movement (MACaC, according its acronyms in Spanish). This allowed at the same time the creation of numerous and varied forms of agricultural extension (12).

Many of them were conceived with specialized approaches to technology transfer, with the main objective of bringing technologies or techniques and the achievements of science to producers, while some were based on generalist and participatory approaches, with a greater role for the farmers themselves (13). There was not really a unified extension system; these different systems were led by the National Institute of Agrarian Reform and later by the Ministry of Agriculture, universities, research institutes, scientific societies and farmers' organizations (12).

The situation changed with the beginning of the so-called Special Period in peacetime which was characterized mainly by the drastic decrease of inputs (fertilizers, pesticides, fuel), decentralization of production forms, (creation of the Basic Units of Cooperative Production (UBPC, according its acronyms in Spanish) on the basis of state farms, emergence of plot holders, use of alternative production of inputs (bio-pesticides, biofertilizers, application of organic matter, etc.), emergence of new forms of commercialization and emergence of the AUSF (14).

Several authors propose an extension system with a participatory and generalist approach (8,15), which strengthens the capacity of producers to improve their management as farmers, both individually and collectively, and which in turn makes it possible to offer solutions adapted to local conditions. The most recent forms of

extension are based on concepts that reinforce systemic, participatory and generalist approaches.

Generalist paradigm in agricultural extension

Extension cannot be limited to technical crop issues if it is to promote economic growth in rural areas and refers to regions where it has been observed that the only practical means of providing advice to small farms is through generalist advisors who can appreciate the needs of the whole family unit (16,17).

These additional skill areas among extension staff in front-line positions, and having subject matter specialists in key technical areas, will be important for the effectiveness of the extension system, as well as for increasing the incomes and welfare of beneficiaries (18,19).

The former professional whose objective was to increase production through the use of technologies must now focus on increasing the producer's income, production sustainability and business viability, which describes the extension professional as a generalist specialist, with a general training in agriculture (20).

These new challenges mean that extension systems have to face a variety of objectives that go beyond the transfer of new technologies (16). According to several authors, this includes the need to: to link more effectively and responsibly to national and international markets, where globalization is increasingly competitive; to reduce vulnerability and enhance the voice and empowerment of the rural poor; to promote environmental conservation; to couple technology transfer with other services related to credit, input and output markets and to enhance the role of capacity building, which includes not only training, but also strengthening innovation processes, creating linkages between farmers and other agencies, and institutional and organizational development to support the improvement of farmers' bargaining power (21).

The extensionist must insist on his role as a generalist, and not as a specialist, so that the production unit realizes that they can suggest actions related to organizational and economic aspects, in addition to technical actions (14).

To meet this new challenge, it is necessary for the rural extension professional to develop the necessary competencies to act efficiently and effectively as the new professional that the agribusiness sector requires (20). Training specialists to become generalists has proven to be difficult, but has been achieved in some countries, such as Mexico, Argentina, Bolivia, Paraguay and others (18).

Because of the agriculture complexity, in the extension process, a technician needs the support of a generalist extensionist and vice versa (14), since it is complicated when an extensionist serves different producers and crops, if he/she does not have the support of a generalist technician who is assisted by specialist advisors and, between all of them, satisfies the producer's demand for specialized services (15).

The extensionist must be willing to work in an inter- and trans-disciplinary manner, taking into account the complexity of rural realities. In this sense, in addition to being a specialist in his or her specific area of knowledge, he or she must be a generalist, both in terms of knowledge of rural areas in their different dimensions and in terms of his or her new functions (22).

A participatory extension model will require from the extensionist a wider range of skills than have been available in traditional extension systems. The new extension service will need to have skills in production, farm management, marketing and finance, since intervention in one part of the system has consequences for the other parts (15).

Although the value and need for a generalist extensionist is accepted, there are partially specialized producer regions, such as livestock. Thus, three types of extensionists are distinguished: generalist, specialized generalist and specialized. This approach is in line with the reality of agriculture, where in some extension systems there is a need for partially generalist or generalist extensionists for specific types of producers, such as those who grow fruit crops, livestock or protected crops, who can be considered specialized generalists (23).

Participatory Paradigm in Agricultural Extension

Participatory extension can be understood as the set of different activities that provide the necessary information and services demanded by farmers and other actors in the rural sector to support them in the development of their own organizational, technical and management skills and practices, in order to improve their livelihoods and well-being (21).

One of the complexities of agriculture is that it depends on human activity for its functioning and, at times, it is not possible to involve all people in the search for solutions. Therefore, extension work must encourage the participation of all the actors involved in the process (2,24).

Interest in the participatory approach stems from the relatively small positive impact of various more traditional methods of innovation and research, in which research is separated from agricultural extension and the farmer participates as a recipient of information at the end of the process (25).

In the past, extension was seen as an intermediate between science and practice. But, nowadays, extensionists are assigned other functions such as conciliation between different actors (organizations, sectors, disciplines, etc.), as well as the transmission of knowledge and information, mediation and facilitation of learning and vision of the future (18).

Accordingly, agricultural extension has moved from a top-down approach of technology transfer to a horizontal and participatory approach where farmers are seen as active subjects of their development, who must identify their problems and needs, as well as seek the most feasible solutions to solve them. Thus, participatory extension is

highly relevant because it is built on the basis of demands (26).

For his part, the extensionist has evolved and become a facilitator of the process and also ceases to be a primary source of knowledge and also becomes a facilitator for the creation of knowledge (27). A participatory approach is an excellent modality for managing producers' knowledge (local and ancestral) and combining it with external knowledge, through the participation of research and teaching entities (26).

This process of transformation of extension leads the extensionist to incorporate into his practices a new type of relationship: that of mediation, typical of local development and participatory work, and requires the use of specific participatory methods that go beyond technical expertise, as well as recognizing the participation of community actors where new forms of social interrelation with their own dynamics are manifested in the space where the innovation is developed (28).

Strengthening and broadening the participation of producers is a permanent objective of the extension process, in order to achieve adaptation of actions and efficiency in their implementation, in addition to strengthening internal cohesion in the production units and increasing the autonomy of producers, since participation implies that they strengthen their self-management capacities. To this end, it is necessary to create spaces that encourage the participation of the actors in each type of production unit and in all stages of the process, recognizing personal differences and group dynamics (14).

Extension is a process that facilitates the acquisition of knowledge and skills, rather than technology transfer; local knowledge is used, including farmers as extension agents (and also researchers, to a certain extent). Farmers are involved in the identification of problems, the establishment of priorities in the issues to be addressed, in problem solving through analysis and in the choice of alternatives. Thus, FAO states that a community development program can be more effective if the political decision has been made to decentralize and make research and extension more participatory (27).

The new collaboration between researchers, extensionists and farmers has created a mutual learning process, so that they exchange views, build new ideas and knowledge, and understand each other better (29).

Today, participatory approaches to extension consider natural resources as a necessity. They go beyond the purely economic approach, and pursue broad community participation and awareness of environmental problems (30).

Agricultural science is product-oriented rather than client-oriented, and is interpreted as designing solutions and products to be sold by extensionists, and is often not accompanied by feedback from producers. With a participatory approach it is difficult for these situations to occur, since farmers pay attention to all aspects of their production unit and normally relate to each other (5).

This approach has points of overlap with the Farmer-First-and-Last (FFL) model: farmers first and last (31). It begins with the perception and priorities of farm families (especially those with low resources), with a process of learning and understanding of the resources, needs, problems and possibilities that farm families have; and the criteria for selecting and adapting solutions is given by rigorous testing of whether the new practices proposed are extended to producers with fewer resources. However, the FFL method is sometimes aimed more at improving the efficiency of message transmission than at understanding the real needs of producers (14).

It is no longer a strictly productive conception. It refers to a methodological approach where decisions are made jointly and the effects that these decisions will have on the family economy, the social environment and the environment must be assessed (30). It is pointed out that it is not only the contact with science that prevails in the needs of today's small producers, but also the interrelation with all those social actors with whom they can, at a given moment, form strategic alliances to define and carry out viable and sustainable productive proposals (32).

Participatory extension is considered less costly; the low cost is based on trust, solidarity and voluntariness of the participants. It is therefore an excellent modality for managing the producers' knowledge (local and ancestral) and combining it with external knowledge, through the participation of research and teaching entities (26).

However, these participatory programs are very sensitive to the sources of financing. If it is governmental, it can be more sustainable, which is not the case with international cooperation. For example, in the case of Cuba, this is the case with some international collaboration projects, which are limited by the fact that when the financing and resources end, the actions are generally terminated and are not incorporated as part of the production system (27).

Currently, the Extension Services have as a common strategy the use of participatory methodologies, from the planning phase, which begins with "participatory diagnoses", to "participatory" evaluation. Likewise, the approach has shifted from a transfer-based approach to one based on rural development and educational processes. But the use of participatory methodologies alone is not sufficient; a combination of actions is needed, according to the needs of the actors involved in the process (30).

Participatory methods are still very much needed and are now widely recognized as tools which, to be effective, must be part of broader institutional structures, organizational procedures and financial mechanisms, with the participation of the users to whom extension service providers are accountable (33).

The technology transfer and human resource development approaches can be seen as two dimensions of extension work, which can reinforce each other, even though contradictory positions may currently be found that do not help their mutual enhancement and reinforcement. Therefore, whatever the approach, extension

will always try to help farmers make wise decisions about technologies by providing information and guidance (34).

In Cuba, there are several extension practices that are developed in the agricultural system, however, below, we will only refer to four of them, because they have been implemented in several provinces and have achieved satisfactory results with the use of various methods and tools: the Urban and Suburban Agriculture system, the Farmer-to-Farmer Agroecological Movement (MACaC), the Local Agricultural Innovation System (SIAL) and the Agricultural Extension System.

Urban and Sub-urban Agriculture

In order to obtain maximum production of diverse, fresh and healthy food in previously unproductive areas available in the cities, the Urban and Suburban Agriculture program was created and is present in all provinces of the country (33).

Urban Agriculture has as its central nucleus a national group formed by representatives of scientific institutions and the Ministry of Agriculture, which develops its work in a dynamic, deep, vertical and systematic style, allowing it to reach the grassroots and discuss directly with the producer, carrying a message of technical extension that provides the how to do? to obtain high yields and diversity of offers to the population. (33).

Its generalist character is materialized in the 29 subprograms, which include a wide diversity in terms of plant and animal species, as well as forms and systems of cultivation used; related to specific topics, such as the production of vegetables, medicinal plants, condiments, grains, fruits and animal husbandry (chickens, rabbits, sheep, goats, pigs, bees and fish), which are developed throughout the country. It includes the production of seeds and propagules, organic fertilizers and crop protectors that do not affect the environment (34).

Its participatory nature is manifested in that it operates through the country's popular councils, with the active participation of the so-called peasant promoters and is based on training, exchange among peasants and with agricultural specialists (35).

Due to the institutionalization of this form of extension, satisfactory results are shown throughout the country. With the introduction of this practice in Cuba, it has been possible to introduce new participation techniques, where farmers act as the main protagonists of the process; this active participation has allowed a close link between the researcher-producer and the adoption by the producers of the new research carried out.

This process involves, in addition to the producer-researchers, different actors such as: decision-makers linked to the agricultural system in each municipality and province, the people's council and consumers.

Farmer to Farmer Agro-ecological Movement (MACaC)

Sponsored by the National Association of Small Farmers (ANAP), the objective of this movement is to disseminate

the experiences and results of farmers, mainly through exchanges among them.

It is a generalist movement that brings together the practices of soil improvement and conservation, the protection and saving of water resources, the conformation of farm-level designs with greater functional integration of its components; conceptualizing and integrating the post-harvest, as an important part of the productive process, including the processing, processing and conservation of products. However, the economic evaluation of its results is still insufficient, taking into account indicators such as savings, efficiency, quality and added value, among others (15).

It also takes advantage of the fact that throughout the country there is a large number of people trained in different topics, who explain their experiences and the advantages of this production modality to the families closest to them, based on their experience on their own farms (33).

The participatory paradigm is manifested by the ability of producers to improve their management as farmers, both from the individual and collective point of view, and which in turn allows them to offer solutions adapted to local conditions (36).

This extension practice in Cuba is very popular because of the involvement of the producers in the process. It is organized by an association that brings together all the producers, which shows results throughout Cuba, especially in the use of agroecological practices that facilitate the production of healthy products and promote environmental conservation.

Local Agricultural Innovation System (SIAL)

Initiated as a Participatory Plant Breeding Project in 2001, this project has gone through three phases and is currently called the Local Agricultural Innovation System (SIAL). It is sponsored by the National Institute of Agricultural Sciences and has international support. At present, the project has an impact in 12 provinces and 75 municipalities (37).

Its main objective is, through training and learning, to help ensure that the good practices contributed by the local innovation system are implemented by municipal strategies, and that local agricultural innovation groups are consolidated as participatory spaces for the promotion of local agricultural innovation, based on participatory processes and dynamics where, as a priority, women in rural communities participate and benefit (38). The methods used are: farmer training, biodiversity fairs, field days and the promotion of peasant research groups, as a cell for the selection, exchange, conservation and multiplication of seeds of improved varieties at the local level (33).

Its participatory nature is demonstrated by the permanent, real and active participation of farmers in strengthening agricultural innovation, promoting their free access to agrobiodiversity, with a concept of sustainable agricultural production based on agroecological principles (39).

Its generalist character is manifested as an open system that makes it possible to work on all issues of interest to farmers and localities and includes all interested local stakeholders (38).

The SIAL is based on the willingness to participate in actions and for producers to make their own decisions; it also promotes the articulation of all the actors in the territory in the search for solutions with local alternatives and resources that facilitate the agricultural development of each municipality; the best results are shown in the localities where the articulation of actors is real and decision-making is collective, each one contributing his or her potential to solve the problem (37).

Agricultural Extension System (AES)

Sponsored by the Ministry of Agriculture (MINAG), its background is the Franco-Cuban project, PASEA, which was created with the objective of serving a larger number of producers and contributing to the reduction of imports by increasing production based on a more sustainable agricultural model (4,15). It consists of a formal structure in the national team of MINAG, a team at the provincial level and a municipal extensionist, with the operation of extension commissions at each level.

The Agricultural Extension System is defined as a diversified and integrated support system for producers, which values both the scientific and technical knowledge of research centers and universities, and the empirical knowledge of producers; the training and education potential existing in the country and the institutional capacities for communication to solve the concrete problems of producers with a vision of technical, economic and environmental sustainability. In addition, it is based on producer demand, the systemic approach and the protagonism of local actors (33).

The main results of this project made it possible to propose the model of MINAG's Agricultural Extension System, with the participation of all forms and actions of extension in force, and to establish an extension methodology that is at the same time generalist, participatory and systemic. This program addresses all forms of ownership, crop and animal husbandry systems, the living standards of producers and the participation of all agricultural stakeholders, respecting the leading role of farmers, accompanied by extensionists (10,33).

CONCLUSIONS

- In Cuba there have been and there are generalist and participatory extension practices, but currently, these experiences are not generalized, integrally, throughout the agricultural system of the country.
- From the agricultural extension practices evaluated in this study, those in which the participatory and generalist character is most evident are SIAL, MACaC and EAS.

BIBLIOGRAPHY

1. Castellón S. Consideraciones sobre el desarrollo de la agricultura urbana en Cuba: Balance de los resultados en el año 2001 (II PARTE) [Internet]. IPS Cuba. 2013 [cited 22/11/2022]. Available from: <https://www.ipscuba.net/ipscuba-net/hemeroteca/archivo-hemeroteca/ck1-economia-y-desarrollo/consideraciones-sobre-el-desarrollo-de-la-agricultura-urbana-en-cuba-balance-de-los-resultados-en-el-ano-2001-ii-parte/>
2. Jones GE, Garforth C. The history, development, and future of agricultural extension. FAO [Internet]. 1997; Available from: <https://www.fao.org/3/W5830E/w5830e03.htm>
3. Christoplos I. Cómo movilizar el potencial de la extensión agraria y rural [Internet]. Roma (Italy) FAO/GFRAS; 2010. Available from: <https://www.fao.org/3/i1444s/i1444s00.pdf>
4. Marzin J, Lopez-Betancourt T, Cid-Lazo G. Tendencias actuales en transferencia de tecnología y extensionismo: lecciones para la situación en Cuba. In La Habana: Editora Agroecologica; 2003 [cited 07/09/2022]. Available from: <https://agritrop.cirad.fr/571685/>
5. Engel G, Alarcón E, Cano J, Moscardi E. Facilitando el desarrollo sostenible: hacia una extensión moderna? Memorias del taller. IICA, San José (Costa Rica). Dirección de Ciencia y Tecnología, Recursos, 1997.
6. Hart RD. An ecological systems conceptual framework for agricultural research and development. In: Readings in farming systems research and development [Internet]. Costa Rica: Turrialba; 1979. p. 20. Available from: https://repositorio.catie.ac.cr/bitstream/handle/11554/281/An_ecological_systems_conceptual_framework.pdf?sequence=1&isAllowed=y
7. Lozano-Maqueira JA. El extensionismo agrícola como herramienta de trabajo en el sector agrícola rural (Cuba) (página 2) [Internet]. Monografias.com. 2021 [cited 22/11/2022]. Available from: <https://www.monografias.com/trabajos41/extensionismo-agricola/extensionismo-agricola2>
8. Marzin J, Benoit S, Betancourt TL, LAzo GC, Padilla OVP, Perez NA, et al. Herramientas metodológicas para una extensión agraria generalista, sistémica y participativa [Internet]. La Havane: Editora Agroecologica; 2014. 150 p. Available from: http://publications.cirad.fr/une_notice.php?dk=573725
9. González L. La extensión agraria en Cuba. Algunas reflexiones necesarias. Pastos y Forrajes. 2004;27(3):211.
10. Caballero-Grande R, Casanova-Morales A, Marrero-Terán A, Hernández-Chávez A, Capote-Forte J. La asistencia técnica a los productores en Cuba: concepciones y evolución. Cuadernos de Desarrollo Rural. 2000; (45):91-104.
11. Sablón A, Marzin J, Caballero R, Salguero Z, López T, Vallejo Y, et al. Memorias de los talleres nacionales de extensión agraria: Proyecto de apoyo al sistema de extensión agraria en Cuba [Internet]. 2012 [cited 22/11/2022]. Available from: <https://ideas.repec.org/p/hal/journl/hal-03051150.html>

12. Rodríguez-González N, Almaguer-Pérez N-A, García-Arias J-M. Postgraduate training in Agrarian Extension: experiences in Holguin, Cuba. *Revista iberoamericana de educación superior*. 2021;12(33):158-78.
13. Landini F. Concepción de extensión rural en 10 países latinoamericanos. *Andamios*. 2016;13(30):211-36.
14. González M, Castellanos A, Price J, González M. Testimonios: agricultura urbana en ciudad de la Habana. ACTAF: Asociación Cubana de Técnicos Agrícolas y Forestales. Editorial CIDISAV [Internet]. 2008; Available from: <https://docplayer.es/67167495-Testimonios-agricultura-urbana-en-ciudad-de-la-habana.html>
15. Greco-Lazo C, Marzin J, Lopez T, Mercoiret M. Investigación agronómica y extensión agraria en Cuba: unidad dialéctica imprescindible para lograr seguridad alimentaria. *Revista Ingeniería Agrícola*. 2017;3(3):35-8.
16. Gastélum-Escalante J. Los profesionales de la agronomía en México: intelectuales del consenso en la política agrícola. El caso del currículum de la Facultad de Agronomía de la Universidad Autónoma de Sinaloa. *Ra Ximhai*. 2009;5(2):133-53.
17. Ortiz Dardón R, Boerger V, Ceville X, Mejía FS, Preissing J, Solórzano N, et al. Buenas prácticas en el manejo de extensión en America Central [Internet]. FAO, Roma (Italia); 2011. Available from: https://www.fao.org/uploads/media/AMERICAN_CENTRALxWEB_1.pdf
18. McMahon M, Valdés A, Cahill C, Jankowska A. Análisis del extensionismo agrícola en México [Internet]. OCDE, Organization of Economic Co-operation and Development. París; 2011. 73 p. Available from: https://www.gob.mx/cms/uploads/attachment/file/345321/FINAL_Extension_Pa_per_Spanish_Version_03_Sep_2011.pdf
19. Davis K, Sulaiman R. The new extensionist: Roles and capacities to strengthen extension and advisory services. *Journal of International Agricultural and Extension Education*. 2014;21(3):6-18.
20. Méndez-Sastoque MJ. Los retos de la extensión ante una nueva y cambiante noción de lo rural. *Revista Facultad Nacional de Agronomía Medellín*. 2006;59(2):3407-23.
21. Koehnen T, Cristovao A. New Focuses on European Extension Education: The Issues. Proceedings of the European Seminar on Extension Education (10th, Vila Real, Portugal, September 1-9, 1991). In: *Ideal Types of Extension System: A Theoretical Framework for the Qualitative Analysis of Extension Organizations* [Internet]. Portugal; 1993 [cited 23/11/2022]. p. 61-96. Available from: <https://eric.ed.gov/?id=ED359328>
22. Dunn A. Returning to the complexity of agricultural problems. First, it is important to get a clear understanding of agriculture as a human system. 1993. en: Ed. Koehnen, T y Cristovao, A. Editora *New Focuses on European Extension Education: The Issues*. Proceedings of the European Seminar on Extension [Internet]. 10th, Vila Real, Portugal; 1993 [cited 23/11/2022]. 46-60 p. Available from: <https://eric.ed.gov/?id=ED359328>
23. Córdoba M, Gottret MV, Montes A, Ortega L, Perry S. Innovación participativa: experiencias con pequeños productores agrícolas en seis países de América Latina [Internet]. CEPAL; 2004 [cited 23/11/2022]. 77 p. Available from: <https://repositorio.cepal.org/handle/11362/4551>
24. FAO. Aistencia técnica y extensión rural participativa en América Latina [Internet]. Organización de las Naciones Unidas para la Alimentación y la Agricultura; 2016 p. 52. Available from: <https://s3.sa-east-1.amazonaws.com/dg-cdi/documents/b5958d7217ee91dd43adba1e06b0c07ece883fa3.pdf>
25. Norton RD. Política de desarrollo agrícola: conceptos y principios [Internet]. Roma: FAO; 2004. 591 p. (Capacitación en políticas agrícolas y alimentarias). Available from: <http://cedoc1.ciestaam.edu.mx/cgi-bin/ko/ha/opac-detail.pl?biblionumber=4479>
26. Cadena-Iñiguez P, Rendón-Medel R, Rodríguez-Vázquez H, Camacho-Villa C, Santellano-Estrada E, Guevara-Hernández F, et al. Methodological-interinstitutional proposal for a new extensionism in Mexico. *Revista mexicana de ciencias agrícolas*. 2018;9(8):1777-85. doi:10.29312/remexca.v9i8.826
27. Swanson BE, Rajalahti R. Strengthening agricultural extension and advisory systems. World Bank, Washington, DC. 2010;45:23.
28. Quirós O, Bolaños O. Metodología para la extensión agropecuaria y forestal. Ministerio de Agricultura y Ganadería, San José (Costa Rica); 2016 p. 10.
29. Chambers R, Jiggins J. Agricultural research for resource-poor farmers part II: A parsimonious paradigm. *Agricultural Administration and Extension*. 1987;27(2):109-28. doi:10.1016/0269-7475(87)90021-3
30. Chambers R, Jiggins J. Agricultural research for resource-poor farmers Part I: Transfer-of-technology and farming systems research. *Agricultural Administration and Extension*. 1987;27(1):35-52. doi:10.1016/0269-7475(87)90008-0
31. Pavón-Rosales MI. Extensionism in Cuba: case studies. *Cultivos Tropicales*. 2014;35(1):5-10.
32. Dexter E. Strategies in the transfer of agricultural technology, with reference to Northern Europe. *Investing in rural extension: strategies and goals*/edited by Gwyn E. Jones. 1986;121-7.
33. Hernández L. La agricultura urbana y caracterización de sus sistemas productivos y sociales, como vía para la seguridad alimentaria en nuestras ciudades. *Cultivos Tropicales*. 2006;27(2):13-25.
34. Borroto Á, Arencibia AC, López JL, Leyva LJ, Mazorra CA, Dopico GE, et al. Agricultura urbana en Ciego de Ávila. El caso del municipio montañoso de Florencia. *Pastos y Forrajes* [Internet]. 2006 [cited 23/11/2022];29(1). Available from: [https://payfo.ihatuey.cu/index.php?journal=pasto&page=article&op=view&path\[\]=721](https://payfo.ihatuey.cu/index.php?journal=pasto&page=article&op=view&path[]=721)
35. Funes F, Vázquez LL. Avances de la agroecología en Cuba. Ed. Estación Experimental de Pastos y Forrajes Indio Hatuey. Matanzas, Cuba. 605p. 2016;605.
36. Rosales-Jenqui PR, Martínez-Cruz M. Experiencias del Proyecto de Innovación Agropecuaria Local (PIAL) en el municipio Güines [Internet]. 2016 [cited 23/11/2022]. Available from: <https://grain.org/article/entries/5602-experiencias-del-proyecto-de-innovacion-agropecuaria-local-pial-en-el-municipio-guines>

37. Guevara-Hernández F, Ortiz-Pérez HR, Angarica-Ferrer L, Acosta-Roca R. Manual de Monitoreo y Evaluación Participativos con enfoque de Género | ISBN 978-959-7023-70-8 - Libro [Internet]. Instituto Nacional de Ciencias Agrícolas. 2014 [cited 23/11/2022]. 104 p. Available from: <https://isbn.cloud/en/9789597023708/manual-de-monitoreo-y-evaluacion-participativos-con-enfoque-de-genero/>
38. Ortiz-Pérez R, Miranda-Lorigados S, Rodríguez-Miranda O, Díaz V, Márquez-Serrano M, Guevara-Hernández F. The fairs of agrobiodiversity in the context of participatory plant breeding - Local Agricultural Innovation Program in Cuba. Meaning and impact. *Cultivos Tropicales*. 2015;36(3):124-32.
39. Romero-Sarduy MI, Ortiz-Pérez R, La O-Arias M. La gestión del conocimiento en el Sistema de Innovación Agropecuaria Local. *Revista Estudios del Desarrollo Social: Cuba y América Latina* [Internet]. 2018 [cited 23/11/2022];6(3). Available from: http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S2308-01322018000300014&lng=es&nrm=iso&tlng=es