International Journal Semiarid

INSTALLATION OF LOW-COST MICRO-SPRINKLER IN A SUSTAINABLE PRODUCTION SYSTEM IN THE SERTÃO MICROREGION OF QUIXERAMOBIM, CEARÁ.

INSTALAÇÃO DE MICROASPERSORES DE BAIXO CUSTO EM SISTEMA DE PRODUÇÃO SUSTENTÁVEL NA MICRORREGIÃO DO SERTÃO DE QUIXERAMOBIM, CEARÁ

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ABSTRACT

The semi-arid region is characterized, in terms of the socio-economic context, by profound social inequalities. Therefore, exploring processes to encourage the use of innovative and low-cost technologies in rural areas is crucial, especially for the rational use of water. In recent years, the Government of the State of Ceará has invested in Rural Extension Projects that benefit rural inhabitants. In this regard, during a training session for the implementation of an agroecological system in the municipality of Madalena, Ceará, in 2022, approximately 25 family farmers learned to make micro-sprinklers using lollipop sticks for incorporation into an irrigation system. After the manufacturing process, the sprinklers were inserted into tertiary hoses with the help of a rudimentary tool made from a piece of wood and a nail, and the irrigation system was turned on for 15 minutes to check its functionality. Farmers realized that the effort was worthwhile and were impressed by the efficiency of the homemade sprinklers. Some mentioned that they would use the micro-sprinklers not only in Madalena but throughout their irrigated production, as they found that they could reduce irrigation system costs by replacing commercially bought sprinklers

with lollipop stick alternatives.In conclusion, rural extension is fundamental in the process of rural development and agricultural activities. Additionally, the acceptance of efficient and low-cost technology by farmers in Ceará suggests that such measures should be widely disseminated as a simplified and appropriate solution, especially for the water deficit in the region.
Keywords: Photointerpretation; Environmental Impact; Shrimp Farming.

RESUMO

A região semiárida é caracterizada, em termos de contexto socioeconómico, por profundas desigualdades sociais. Portanto, explorar processos que incentivem o uso de tecnologias inovadoras e de baixo custo nas áreas rurais é crucial, especialmente para o uso racional da água. Nos últimos anos, o Governo do Estado do Ceará tem investido em Projetos de Extensão Rural que beneficiam os moradores rurais. Nesse sentido, durante uma capacitação para implantação de sistema agroecológico no município de Madalena, no Ceará, em 2022, aproximadamente 25 agricultores familiares aprenderam a confeccionar microaspersores utilizando palitos de pirulito para incorporação em sistema de irrigação. Após o processo de fabricação, os aspersores foram inseridos em mangueiras terciárias com o auxílio de uma ferramenta rudimentar feita de um pedaço de madeira e um prego, e o sistema de irrigação foi ligado por 15 minutos para verificação de seu funcionamento. Os agricultores perceberam que o esforço valia a pena e ficaram impressionados com a eficiência dos aspersores caseiros. Alguns mencionaram que utilizariam os microaspersores não só na Madalena, mas em toda a sua produção irrigada, pois descobriram que poderiam reduzir os custos do sistema de irrigação, substituindo os aspersores comprados comercialmente por alternativas em palitos de pirulito. do desenvolvimento rural e das actividades agrícolas. Além disso, a aceitação de tecnologia eficiente e de baixo custo pelos agricultores cearenses sugere que tais medidas devem ser amplamente divulgadas como uma solução simplificada e adequada, especialmente para o déficit hídrico da região.
Palavras-chave: Fotointerpretação; Impacto ambiental; Cultivo de Camarão.

INTRODUCTION

The need to address sustainability issues in family farming is becoming increasingly evident, especially in regions marked by water scarcity (Borges et al., 2020). In this context, adopting efficient and economically accessible agricultural practices drives the research and development of innovative solutions.

By using micro-sprinklers in the context of sustainable production, the aim is to mitigate the challenges faced by local farmers related to water scarcity, as well as to promote an approach that respects the fundamental principles of sustainability and economic conditions. Silveira et al. (2020) highlight the relevance of accessible technologies to

ensure not only economic viability but also the environmental sustainability of agriculture, particularly in areas characterized by adverse climatic conditions.

In light of this, the present study aimed to evaluate the participation of family farmers during the implementation of low-cost micro-sprinklers, as well as the environmental perception regarding installation, use, and management as an integral and strategic element in a sustainable production system in the micro-region of Sertão de Quixeramobim, Ceará.

MATERIALS AND METHODS

The study area comprised the São Joaquim Settlement, also known as 25 de Maio. The settlement is located in the central backlands region of the state of Ceará, spanning parts of the municipalities of Madalena and Quixeramobim, 210 km away from the city of Fortaleza. The region's climate is classified as hot semi-arid tropical, falling under the Köppen climate classification as BSw'h'. The average annual precipitation is 707.7 mm, with an average annual temperature ranging from 26° to 28°C (Silva et al., 2013).

The communities within the Settlement developed along the roadsides, with the main ones being Nova Vida I and II, Logradouro, São Nicolau, Quieto, Caiçara, Mel, Pau dos Ferros, and Paus Branco. These communities have access to electricity, and access is provided via gravel or dirt roads. In terms of housing, the houses are made of masonry. Additionally, according to residents, there are twelve reservoirs in the Settlement, varying in size from small to medium, which are part of the Banabuiú River Basin.

The irrigation system was installed during a training session for the implementation of an agroecological system of sustainable production, also known as Mandalla, organized by the Government of the State of Ceará, with the involvement of technicians from the Secretariat of Agricultural Development (SDA) and the Rural Technical Assistance Company - EMATERCE.

The system involves a production model that integrates various productive activities, ranging from fish farming and poultry farming to the production of vegetables, grains, and fruit trees. The technique also emphasizes the importance of rational use of water resources, as it is based on intelligent water use. Irrigation contributes to increased plant production because the water source is the fish breeding reservoir. The water is organically enriched

by fish excrement, feed, and green algae, thereby contributing to soil fertility (Costa et al., 2014).

The irrigation network was formed by a 1 hp/single-phase centrifugal pump, with distribution connections in each delta segment, which serve to feed the main lines of the Mandalla irrigation system. The pump motor was installed on a support structure next to the reservoir entrance door. Installation began from the motor, with the placement of the crosspiece and adapters or connections. Subsequently, the supply pipeline was installed with a check valve to prevent the suction line from emptying.

A light was installed in the middle of the reservoir. Besides illumination, the light serves to attract insects that serve as food for the fish. Since it is fixed about 20 cm from the water, wasps fall and are digested by the fish. Then, a small trench was opened, where the primary pipeline was buried. After the installation of the connections from which the secondary pipelines emerge, composing the main lines for water distribution.

The micro-sprinklers were made from low-cost materials, using lollipop sticks. To achieve this, one end of the stick was heated until slightly softened with the aid of a lamp. Then, using pliers, the softened end of the stick was pressed until sealed. Leakage was tested by blowing into the still-open end. Finally, a thin wire was inserted into the lollipop stick until it touched the sealed part, and then a transversal cut was made near the sealed end, touching the wire. This wire served to standardize the cut made in the material. Ultimately, the micro-sprinklers were installed in the irrigation lines, and the system was activated.

During the training, questions were also asked about water use by farmers in the community for agricultural production through a questionnaire and semi-structured interviews. This assessment was descriptive and qualitative, aiming to observe, describe, and reflect on the participants' interactions. Additionally, photographic records and field notes were taken.

In total, about 25 family farmers participated in the interviews, with the head of the family, whether male or female, responsible for answering the questionnaires and representing the family nucleus in the training.

RESULTS AND DISCUSSION

All participants had the opportunity to manufacture the sprinklers, that is, to carry out the practice following the recommended steps. This moment was important for the farmers to grasp the way to perform the cutting, sealing, and leakage testing, as well as to perceive the use of a simple material, turning it into a useful tool for the irrigation system (Figure 1).

Figure 1. Farmers making micro sprinklers

Source: Author (2022).

Farmers realized that the effort was worth it and were satisfied with the efficiency of the homemade sprinklers. Some commented that they would use the method for all the production that would be irrigated on their property, as they found they could reduce irrigation system costs by replacing store-bought sprinklers with lollipop sticks.

Regarding responses to inquiries about water usage, access to water was the main difficulty mentioned by farmers for agricultural production, followed by a lack of credit. In livestock production, the main difficulty mentioned was prolonged droughts, as there is a need for food production for the animals, as well as reliance on rainfall to meet crop water needs.

During prolonged dry spells, the need to sell animals was mentioned since the cost of feed increases, thus increasing production costs.

Furthermore, according to the farmers, the main method of watering plants is through the use of buckets and hoses. This method constitutes the most common use of water for irrigation employed by small farmers in the Ceará backlands, mainly used in the irrigation of fruit trees and vegetables.

CONCLUSION

In conclusion, rural extension is fundamental in the process of rural development and agricultural activities in the state of Ceará. Furthermore, the acceptance of efficient and low-cost technologies by farmers suggests that such measures should be widely promoted as a simplified and appropriate solution, especially in the face of water deficits in the region, as the use of a low-cost irrigation system benefits farmers and aids in agricultural production, as well as monthly income.

ACKNOWLEDGMENTS

To the Government of the State of Ceará, which made the training possible, to the Secretariat of Agricultural Development and the Rural Technical Assistance and Extension Company of the State of Ceará for their technical support. Additionally, thanks to the agricultural technicians of the Municipal Government of Madalena.

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