PROFILE OF IRRIGATION PRACTICE IN THE JACARÉ-CURITUBA PUBLIC IRRIGATION PROJECT

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ABSTRACT: Irrigated agriculture plays a fundamental role in regional development, and is an activity that is only profitable and sustainable when conducted properly, using techniques that promote the efficient use of land and water resources. Therefore, it is essential to understand how irrigation is being implemented in irrigated areas. Therefore, this study aimed to gather information on irrigation practices in different plots of land within the Jacaré-Curituba Public Irrigation Project, aiming to profile this activity in the region and identify potential operational flaws. To this end, technical visits were conducted to 16 irrigated plots, distributed across three different sectors of the project. During the visits, a specific questionnaire was administered to collect data on irrigation practices, in addition to recording images of the systems used in the field. The results indicated that, although irrigators use localized irrigation systems, there is a clear lack of technical expertise required for their proper operation. A lack of regular system assessments and management practices were also observed, which can exacerbate problems such as soil salinization. These findings highlight the lack of technical guidance and specialized assistance for producers.

KEYWORDS: Localized irrigation, Irrigated Perimeter, Irrigated Agriculture.

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PERFIL DA PRÁTICA DA IRRIGAÇÃO NO PROJETO PÚBLICO DE IRRIGAÇÃO JACARÉ-CURITUBA

RESUMO: A agricultura irrigada desempenha um papel fundamental no desenvolvimento regional, sendo uma atividade que somente se mostra rentável e sustentável quando conduzida de forma adequada, por meio de técnicas que promovam o uso eficiente da terra e dos recursos hídricos. Nesse sentido, torna-se essencial compreender como a prática da irrigação está sendo conduzida em áreas irrigadas. Diante disso, o presente estudo teve como objetivo reunir informações sobre a prática da irrigação em diferentes lotes do Projeto Público de Irrigação Jacaré-Curituba, com o intuito de traçar o perfil dessa atividade na região e identificar possíveis falhas operacionais. Para tanto, foram realizadas visitas técnicas a 16 lotes irrigados, distribuídos em três diferentes setores do referido projeto. Durante as visitas, aplicou-se um questionário específico para a coleta de dados referentes à condução da irrigação, além do registro de imagens dos sistemas utilizados em campo. Os resultados indicaram que, embora os irrigantes utilizem sistemas de irrigação localizada, há uma clara deficiência no domínio técnico necessário para sua operação adequada. Observou-se ainda a ausência de avaliações periódicas dos sistemas e a inexistência de práticas de manejo, o que pode agravar problemas como a salinização do solo. Esses achados evidenciam a carência de orientação técnica e assistência especializada aos produtores.
PALAVRAS-CHAVE: Irrigação localizada, Perímetro Irrigado, Agricultura Irrigada.

INTRODUCTION

According to Carvalho & Aguiar Netto (2025), irrigation offers several advantages, notably the ability to ensure production stability even during periods of drought or irregular rainfall. Irrigation guarantees that plants receive the necessary amount of water throughout their development, resulting in more abundant and higher-quality harvests.

Irrigated agriculture is a fundamental strategy for optimizing food production, promoting sustainable development in rural areas, and contributing to job and income generation (Valnir Júnior et al., 2016).

On the other hand, the availability of water, especially in the Northeast region of Brazil, has become progressively more limited, requiring careful and precise use. This approach should not only aim at maximizing productivity and improving the quality of agricultural products but also at the rational use of water resources. To achieve this, it is essential to properly quantify the water needs of crops through efficient irrigation management and the correct application of irrigation system operation techniques (Bernardo et al., 2006; Martins et al., 2013; Valnir Júnior et al., 2016; Valnir Júnior et al., 2022).

Irrigated agriculture plays a significant role in regional development, being an activity that becomes profitable and sustainable only when conducted properly, through techniques that maximize the efficiency in the use of water and soil resources.

In this context, this study aimed to gather information about the irrigation practices in different plots of the Jacaré-Curituba Public Irrigation Project, with the goal of outlining the profile of this activity in the area and identifying possible operational failures.

MATERIALS AND METHODS

The study was conducted in November 2024, in the Jacaré-Curituba Irrigation Perimeter, located in the northwest of the state of Sergipe, between the municipalities of Canindé de São Francisco and Poço Redondo, in the semi-arid region of the Alto Sertão Sergipano (Figure 1).

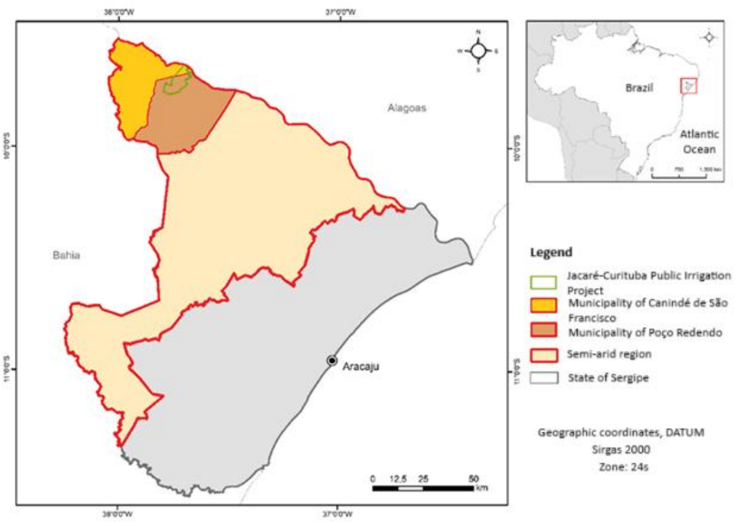

Figure 1. Location of the study area in the state of Sergipe, Brazil. Source: Lucas et al. (2021).

According to Menezes et al. (2015), the total irrigated area of the irrigation perimeter is 1,860 ha, distributed across 630 plots, with each plot ranging in size from 2.5 to 3 ha. This makes it the largest irrigated perimeter in Latin America dedicated to family farming, benefiting approximately 700 families. The predominant irrigation systems are micro-sprinkler and drip irrigation, and the main crops grown include okra, beans, corn, cassava, fruits, and vegetables in general.

The irrigation perimeter is divided into 4 sectors numbered from 0 to 3, with these sectors designated for irrigation and livestock (Figure 2). This study aimed to select irrigation plots from the areas within sectors 1, 2, and 3, as in sector 0, although irrigated, the area did not rely on pump stations but instead on gravity for the operation of the irrigation systems.

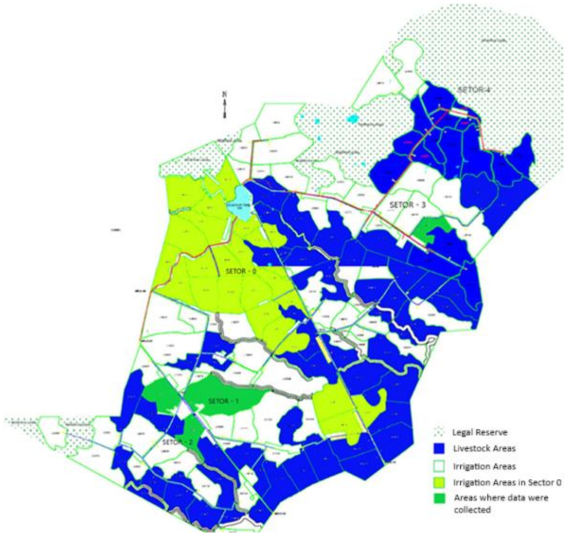

Figure 2. General Layout of the Jacaré-Curituba Public Irrigation Project.

The study considered 16 different plots distributed across the various sectors of the Jacaré-Curituba Public Irrigation Project, belonging to different irrigators and without apparent salinization issues in the soil. During the visit to the selected plots, information about irrigation practices was collected using a specific form, including: system age, frequency of irrigation system evaluations, adopted irrigation management, irrigation duration, irrigation frequency, and the existence of technical assistance for irrigation and fertilization management.

RESULTS AND DISCUSSION

The results related to general information about the irrigation practices in the evaluated plots are presented in Table 1.

Table 1. General information on irrigation and crops cultivated in the evaluated plots.

Lot	SI	Id	Cult	Ater	Per	MI	TI	TR
L_1	micro-sprinkler	9 years	pumpkin	no	none	none	4 hours	alternate days
L_2	micro-sprinkler	9 years	cassava	no	none	none	4 hours	alternate days
L_3	micro-sprinkler	9 years	okra	no	none	none	4 hours	alternate days
L_4	micro-sprinkler	9 years	grass/pasture	no	none	none	4 hours	alternate days
L_5	micro-sprinkler	9 years	okra	no	none	none	4 hours	alternate days
L_6	micro-sprinkler	13 years	acerola	no	none	none	4 hours	alternate days
L_7	micro-sprinkler	13 years	cassava	no	none	none	6 hours	alternate days
L_8	micro-sprinkler	5 months	banana	no	none	none	2 hours	daily
L_9	micro-sprinkler	13 years	beans	no	none	none	2 hours	alternate days
L_{10}	micro-sprinkler	11 years	beans	no	none	none	2 hours	alternate days
L_{11}	micro-sprinkler	11 years	corn	no	none	none	3 hours	twice a week
L_{12}	micro-sprinkler	1 year	banana	no	none	none	3 hours	alternate days
L_{13}	micro-sprinkler	13 years	okra	no	none	none	9 hours	every three days
L_{14}	micro-sprinkler	13 years	corn	no	none	none	8 hours	alternate days
L_{15}	micro-sprinkler	11 years	grass/pasture	no	none	none	8 hours	alternate days
L_{16}	micro-sprinkler	11 years	pepper	no	none	none	2 hours	daily

Lot – evaluated lots; SI – irrigation system used; Id – age of the irrigation system; Cult – crop cultivated in the evaluated lot; Ater – existence of technical assistance for irrigation and fertilization management; Per – frequency of irrigation system evaluation; MI – adopted irrigation management; TI – adopted irrigation duration; and TR – adopted irrigation shift.

It was observed that all the evaluated plots of the irrigators in the Jacaré-Curituba Irrigation Perimeter used the micro-sprinkler localized irrigation system. In these plots, various crops were cultivated, such as pumpkin, acerola, banana, grass, beans, cassava, corn, okra, and chili. These results are consistent with the data presented by Meneses et al. (2015).

It was also observed that 87.5% of the evaluated plots use irrigation systems that are over eight years old, without, however, conducting periodic evaluations of these systems. It is emphasized that the evaluation of localized irrigation systems should be carried out both during the design phase and during operation, with frequent performance checks recommended. Annual maintenance and the determination of water distribution uniformity are essential for diagnosing system performance and correcting potential operational failures (Keller & Bliesner, 1990; Silva et al., 1997; Moura, 2005; Silva & Silva, 2005; Carvalho et al., 2006; Alves et al., 2008; Calgaro & Braga, 2008; Cunha et al., 2008; Benício et al., 2009; Nascimento et al., 2009; Valnir Júnior et al., 2011; Santos et al., 2013; Meneses et al., 2015; Andrade et al., 2021; Silva et al., 2023).

The need to evaluate the water emission uniformity becomes more relevant as the usage time of the equipment increases, since prolonged use raises the susceptibility to emitter clogging. Such impairment negatively affects the uniformity of water distribution, which can result in reduced crop yields or production inconsistencies (Nascimento et al., 2009).

However, the evaluation of irrigation system performance in cultivated areas is still a neglected practice by many farmers (Valnir Júnior et al., 2016). One possible factor contributing to this reality is the lack of technical knowledge among producers, even when using modern and efficient systems, such as micro-sprinkler localized irrigation. This limitation hinders the understanding of the importance of periodic system evaluation and the benefits this practice can bring to productivity and the sustainability of agricultural activities.

According to Moura (2005), it is unlikely that producers will use irrigation equipment properly without a full understanding of its operation, the benefits it can provide, and its limitations. As a result of this lack of understanding, preventive maintenance tends to be neglected, which can accelerate system wear and compromise its operational efficiency.

In practice, inadequate and inefficient irrigation is often observed, especially in terms of water and energy conservation. There is frequently no control over the water application rate, nor the necessary attention given to correcting visible leaks in the cultivated area (Figure 1).

A – Leak at the end of the line caused by improper closure; B – Failure to replace the emitter in the cultivated area, with a simple interruption of water flow in the microtube; C – Leak in a faulty line valve; D – Leak in a lateral line covered by stones; E – Leak at the connection between the lateral line and the microtube of the micro-sprinkler; F – Leak resulting from a cut in the lateral line; G – Total clogging of the micro-sprinkler with easily visible causes; H – Total clogging of the micro-sprinkler with no apparent visible causes.

Figure 1. Recurring examples of failures observed in the evaluated plots that compromise the performance of the irrigation systems, contributing to water, energy, and operational efficiency losses.

Part of the responsibility for the lack of information among producers is related to the absence of technical assistance focused on irrigation operation and management. This condition is evidenced by the data in Table 1, where it is observed that 100% of the producers of the evaluated plots in the public irrigation project reported not receiving any technical assistance and not adopting irrigation management practices.

In addition, other limiting factors include the irrigation duration and shift, which do not follow technical criteria (Table 1). In practice, water and fertilizer application occurs empirically, without the support of agronomic recommendations, which can result in productivity losses and negative impacts on soil quality, such as salinization.

Excessive water application often leads to soil degradation through water erosion and nutrient leaching, in addition to causing drainage problems and salt accumulation, especially in arid and semi-arid regions (Barreto et al., 2004).

According to Lucas et al. (2019), salinization is a growing risk in the irrigated areas of the Jacaré-Curituba Perimeter, intensifying as inadequate irrigation practices persist. This increase in salinity compromises soil quality, potentially leading to toxicity and, consequently, negatively affecting the development of irrigated crops.

CONCLUSIONS

Although they use the localized irrigation system, the irrigators lack the technical knowledge necessary for its proper operation, which results in a lack of concern for the periodic evaluation of the system.

The irrigation carried out in the area of this study follows no management criteria, resulting in the indiscriminate application of water, which may further aggravate the problem of soil salinization, highlighting the lack of adequate technical assistance to the irrigators.

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