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Status of Micro Irrigation Technology in Andhra Pradesh

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Introduction

Andhra Pradesh, among several other Indian states with significant agricultural landscapes, plays a prominent role in the adoption of Micro Irrigation Technology (MIT). When we compare MIT adoption in Andhra Pradesh with other major states like Maharashtra, Karnataka, and Gujarat, we discover a range of approaches and regional factors that influence MIT's success in India. Andhra Pradesh has made substantial progress in MIT adoption, thanks to government initiatives like the Andhra Pradesh Micro-Irrigation Project (APMIP). The latest data from the Ministry of Agriculture and Farmers Welfare indicates that Andhra Pradesh has effectively integrated MIT into its agricultural practices. Approximately 2.20 lakh hectares are now under micro-irrigation in the state, resulting in improved crop yields and enhanced water use efficiency. The APMIP has been instrumental in driving this achievement (MOA&FW, 2022). Maharashtra, another agricultural powerhouse, has embraced MIT, especially in regions facing water scarcity. Government support and incentives have encouraged farmers to adopt MIT, leading to increased crop productivity and water conservation. The Maharashtra Agriculture Department reports that over 7.5 lakh hectares of land have adopted micro-irrigation, demonstrating the state's commitment to water-efficient farming (Maharashtra Agriculture Department, 2022). In Karnataka, known for its diverse agro-climatic zones, the potential of MIT in ensuring sustainable agriculture has been recognized. The state's efforts have focused on implementing drip and sprinkler irrigation systems to reduce water wastage and boost crop yields. According to data from the Karnataka State Department of Agriculture, over 3.5 lakh hectares of land in the state now use micro-irrigation, underscoring the growing importance of this technology (Karnataka State Department of Agriculture, 2022). These states' experiences illustrate how MIT adoption positively impacts agricultural sustainability, water resource management, and crop productivity in various agro-climatic conditions across India. The research paper thoroughly investigates the adoption of Micro Irrigation Technology (MIT) in Andhra Pradesh, providing a comprehensive analysis of its impact on agricultural practices. While the study effectively explores the positive outcomes, including enhanced crop yields, improved water use efficiency, and economic benefits, a potential research gap lies in the need for a more profound

understanding of the challenges farmers face in maintaining micro-irrigation systems over the long term. The paper's primary objective is to assess the overall impact of MIT adoption, encompassing various dimensions such as crop productivity, water and electricity consumption, and economic implications for different farmer categories. To enhance the study, suggested objectives include evaluating the long-term sustainability and challenges associated with micro-irrigation systems, analyzing the role of extension services, exploring the impact on crop diversification, and assessing the economic viability beyond subsidies. These additions could contribute valuable insights, addressing potential gaps and providing a more nuanced understanding of MIT adoption in Andhra Pradesh.

The collection of research papers provides a comprehensive exploration of Micro Irrigation Technology (MIT) adoption in various facets of agriculture. The first paper focuses on the positive impact of MIT on water use efficiency and environmental sustainability in Andhra Pradesh, offering valuable insights while suggesting a need for further exploration of potential trade-offs. The second paper conducts a comparative analysis of drip and sprinkler systems in Karnataka, addressing benefits and challenges but highlighting a gap in understanding farmer perspectives. The third paper examines the role of government policies in MIT adoption across three Indian states, emphasizing the correlation between supportive policies and technology uptake. The fourth paper delves into the economic analysis of MIT adoption among smallholder farmers in southern India, contributing significantly to agricultural economics. The fifth paper assesses the socio-economic impacts of MIT adoption in rural India, shedding light on positive outcomes for marginalized communities but suggesting a need for deeper exploration of cultural factors. The final paper scrutinizes the long-term sustainability and maintenance challenges of Micro Irrigation Systems in western Maharashtra, emphasizing economic viability and proposing avenues for further technological advancements. Collectively, these papers provide a multifaceted understanding of MIT adoption, contributing valuable insights to environmental management, technology innovation, policy-making, economic analysis, and sustainable agricultural practices.

Methodology

This research study utilized a combination of quantitative and qualitative research methods to investigate the impact of sustainable agricultural practices, particularly the adoption of Micro Irrigation System (MIS), in the state of Andhra Pradesh, India. The data collection process encompassed household surveys, in-depth interviews, on-site visits, and field observations. Secondary data from government sources and academic journals supplemented the primary data. The research employed a multi-stage stratified random sampling approach for the selection of districts, villages, and respondents, with a specific emphasis on identifying both MIS adopters and non-adopters. The study encompassed a total of 810 farm households, including 660 adopters and 150 non-adopters. The sample was stratified based on the size of operational land holdings, ensuring representation across various categories, ranging from marginal to large-scale farmers.

Results and discussion:

In the study area, many positive effects in a sustainable way were expected from micro-irrigation technology. Out of the total sample of MIS adopters, approximately 90 percent strongly agreed that micro-irrigation systems had improved and boosted crop yields. The mean score for yield increase was recorded at 4.7 for the total sample, which was higher in both small and large farming categories compared to other farming categories. Nearly 91 percent of the total sample of farmers mentioned that micro-irrigation systems had significantly contributed to improving crop quality. About 92 percent of the farmers believed that the adoption of micro-irrigation systems had led to a reduction in water consumption and electricity consumption for pumping water onto the field, constituting approximately 83 percent. Farmers found that overall farming became easier with the adoption of micro-irrigation technology, with 65 percent of the total sample agreeing. They also believed that weed risk had decreased, with 50 percent of the total sample in agreement. Furthermore, about 71 percent of the sample farmers believed that there was no need for sophisticated labor to operate the micro-irrigation system in the field. Almost 64 percent and 78 percent agreed with the opinion that irrigation would be easier, and farmers would rely more on borewells. Farmers had a moderate opinion on whether a reservoir was necessary at the turning point. Finally, most of the farmers disagreed (disagreed + strongly disagreed) with the opinion that the adoption of micro-irrigation systems had led to a reduction in the risk of insecticide damage. Regarding fungal diseases, 92 percent and 92.52 percent of farmers disagreed and strongly disagreed, respectively. Most of the sample farmers agreed that visits by agricultural extension agents to the farms would be more effective in encouraging other farms to adopt micro-irrigation systems, with 76 percent of the total in agreement. Nearly 68 percent of the farmers believed that showing extension films in the village would also influence other farmers to adopt micro-irrigation systems. Additionally, 58 percent of the farmers thought that personal contact with farmers made by extension agents in the village would influence other farmers to adopt micro-irrigation systems in the study area. There was no positive association or impact on fertilizer, seed, and pesticide quantity. However, about 44.24 percent of the total sample of farmers believed that micro-irrigation systems had reduced the use of fertilizer and quantity. Furthermore, 95 percent of the farmers believed there was an income gap, 80 percent reported an increase in consumption, and 77.87 percent saw an increase in living standards due to micro-irrigation technology. Almost all farmers of BC, SC, and ST categories received a subsidy amount above 50,000 on average, which was 97.3 percent, 100 percent, and 100 percent, respectively. Nearly 85 percent of the sample farmers received a subsidy amount above 50,000 to purchase a micro-irrigation system. Out of the total sample, 70 percent of SC respondent farmers had no self-expenditure, and the rest of the farmers had an expenditure in the range of 10,000 to 25,000. Almost all of the marginal farmers had expenditures in the range of below 10,000 to 50,000. Most of the medium farmers had expenditures in the range of 25,000 to 50,000, and 50 percent of large farmers had expenditures in the range of 50,000 to 100,000, with the other 50 percent having expenditures above 100,000. The majority of the General caste category farmers had expenditures in the range of 25,000 to 50,000, which was 45 percent of their total. However, the proportion of expenditure increased with farm size, with slight fluctuations in subsidies. The total expenditure made by marginal farmers was found to be high to install micro-

irrigation systems on their farms. The percentage proportion of own funds was zero in the ST caste category, whereas it was 4.18 percent in the SC caste category. The percentage of own funds was high in the general category, with 36 percent, and 27.67 percent in the BC caste category to install micro-irrigation systems. Micro-irrigation systems consisted of three types: Sprinkler Irrigation System, Drip Irrigation, and Microtubes. Information about the type of MIS adopted by farmers was presented in table-4.1. Out of the total sample of 642 respondents, 97.5 percent of the farmers were cultivating with drip irrigation technology, while only 2.5 percent were using sprinkler irrigation technology. Most of the sprinkler irrigation users belonged to the medium farming category, which was 9.9 percent of their respective total of 16 farmers. The remaining sprinklers were used by small farmers only, accounting for 2.1 percent of their total. Farmers who adopted drip irrigation technology accounted for 100 percent in the Marginal, Semi-Medium, and large farming categories. Similarly, 97.9 percent of Small and 89.9 percent of Medium farmers used drip irrigation technology. Relatively, the percentage of respondents using drip technology was lower in the medium farming category, at 91.9 percent of their respective total. The remaining farmers in the medium farming category used sprinkler irrigation technology, which required high maintenance and cost per acre. However, about 10.7 percent of the sample respondents adopted MIS technology only in the current year's crop season. Data clearly revealed that 93.6 percent of the farms were under irrigation before the adoption of micro-irrigation technology. Most of them were facilitated with borewell and tubewell, accounting for 92.5 percent of the total. Only 7.5 percent of the respondent farms were cultivated under canal irrigation, with a portion of land irrigated by borewell. Out of the total sample, 93.8 percent of the respondent's micro-irrigation systems were installed by company dealers, and only 6.2 percent of the respondent's micro-irrigation systems were installed by farmers themselves with the help of experienced farmers or neighbor farmers. Data clearly showed that 93 percent of the respondent farmers were able to operate their micro-irrigation systems alone, with only 7 percent relying on others to operate micro-irrigation systems in the farms. It was observed in the study area that most of the farmers expressed that Jain Company was the leading one and supplied high-quality equipment and materials. Nearly 58 percent of the respondent farmers resorted to and installed Jain Company micro-irrigation systems. Farmers themselves selected their micro-irrigation systems without any other influence, accounting for 80 percent of the total sample respondents. Extension agents also influenced the decision of 5 percent of the farmers while selecting the company for micro-irrigation systems. About 12 percent of the respondent farmers decided on the type of company with the interference of company agents. Nearly 59 percent of the respondent farmers believed that their micro-irrigation systems were working in excellent and good condition. However, about 36 percent of the farmers stated that their micro-irrigation systems on the farm were in moderate condition, and the remaining 5 percent mentioned that the micro-irrigation systems they selected were working poorly and facing many problems. In the study area, most of

Summery

The study area examined the impact of micro-irrigation technology on farming practices and found positive outcomes. Approximately 90% of micro-irrigation system (MIS) adopters agreed that MIS enhanced crop yields. Yield increase averaged 4.7, notably higher in small and large farms. The technology also contributed to

crop quality and reduced water and electricity consumption for pumping. Farmers reported that overall farming became easier, with reduced weed risk. Additionally, 71% felt no need for sophisticated labor to operate MIS. Adoption of MIS did not impact fertilizer, seed, and pesticide quantity significantly, but around 44% believed it reduced fertilizer usage. Economic benefits were substantial, with improved income, consumption, and living standards. Subsidies were crucial for adoption, especially for BC, SC, and ST farmers, with 95% of them receiving subsidies. Drip irrigation was the preferred MIS type, with 97.5% adoption. The study showed that effective extension services could further promote MIS adoption. Although challenges such as water scarcity and system maintenance existed, overall, MIS had a positive impact on agriculture in the region.

Suggestions:

For Andhra Pradesh, policies should focus on promoting micro-irrigation with subsidies and training for farmers, especially those from marginalized communities. Strengthening extension services is crucial for effective guidance. Financial support through low-interest loans and equitable subsidy distribution is needed. Research and development should target region-specific, cost-effective technologies. Monitoring and evaluating the impact is essential. Efficient water resource management and promoting crop diversification can maximize benefits. Public-private partnerships can improve equipment access and services. Encouraging farmer cooperatives and enhancing water use efficiency are key strategies. These measures aim to boost agricultural productivity, conserve water, and enhance farmers' livelihoods in Andhra Pradesh. In the context of Andhra Pradesh, prioritizing policies is crucial. The state should actively promote micro-irrigation with subsidies and farmer training, focusing on marginalized communities. Extension services need strengthening to provide effective guidance. Access to affordable credit and equitable subsidies must be ensured. Research and development should concentrate on region-specific, cost-effective technologies. A robust monitoring and evaluation system is necessary to assess the impact. Efficient water resource management and crop diversification should be promoted. Public-private partnerships can improve equipment access and services. Farmer cooperatives and water use efficiency measures should be encouraged to enhance agricultural productivity, conserve water, and improve the livelihoods of Andhra Pradesh's farmers.

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