

# USING AGRO-ECOLOGICAL TECHNIQUES TO ENHANCE RICE CULTIVATION

**The Agricultural Council of Tanzania implements System of Rice Intensification (SRI) to boost productivity and improve livelihoods in Tanzania**



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ECONOMIC  
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## Introduction

System of Rice Intensification (SRI) is an agro-ecological methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water, and nutrients. Its methodology is based on early, quick, and healthy plant establishment, reduced plant density, improved soil conditions through enrichment with organic matter and reduced and controlled water application.

Based on these principles, farmers can adapt recommended SRI practices to respond to their agroecological and socioeconomic conditions. For example, adaptations are often undertaken to accommodate changing weather patterns, soil conditions, labor availability, water control, access to organic inputs, and the decision whether to practice fully organic agriculture or not.

In Africa, SRI was initially developed in Madagascar and later introduced in Tanzania in 2006. IFAD has been facilitating its dissemination to several countries throughout Eastern and Southern Africa since 1997. In the case of Tanzania, it was previously promoted by several development initiatives, but adoption was not widespread and outcomes not always successful. Limited adoption was partly because only a limited number of farmers were introduced to the technology, and it was not common to share knowledge and best practices among farmers.

### The Tanzanian context

Rice is the second food and commercial crop in Tanzania after maize and comprises about 18% of total cultivated area in the country. As part of activities under the Farmers' Organization for Africa, Caribbean, and the Pacific (FO4ACP) Programme, the Agricultural Council of Tanzania (ACT) has been implementing the SRI initiative which is currently conducted in the Mvomero District, Morogoro region in Eastern Tanzania. More specifically, it is being implemented in two irrigation schemes: Mkindo and Dakawa.

Prior to the introduction of SRI, farmers in Dakawa and Mkindo irrigation schemes needed a lot of water to produce rice. Poor water management meant many farmers downstream did not have sufficient water for them to produce sufficiently. Rice production was also suboptimal for farmers upstream using traditional farming methods with yields only amounting to 15-18 bags per acre, with one bag containing 100kg of rice. To mitigate these challenges, SRI methodology was introduced to reduce the amount of inputs used to grow rice including the quantity of water and thereby increase productivity while reducing water use conflicts.



©ACT/Preparation of a farm plot

### SRI Principles

SRI principles and practices are supported by scientific research and adapted to suit local conditions. In Dakawa and Mkindo, ACT outlined a nine-step process to be followed for optimum yields:

#### Preparation

- Seed preparation: for one (1) acre, farmers prepare 3-4kg of seed to ensure that all seedlings grow well.
- Land preparation: To ensure proper water management and healthy rice plants, the SRI farm field is leveled to avoid waterlogging and ensure water that enters the farm spreads uniformly across the field.

## Cultivation

- **Planting:** In the SRI technique, seedlings are transplanted when they're 8-14 days old. This is considered among the success factors of producing healthy rice plants through strong root development.
- **Weed management (mechanical or chemical):** farmers in the project area use three methods for weeding: hands (which is more labor intensive), push-weeder, and the application of herbicides which helps farmers use less time at a lower cost.
- **Pest Management:** Under SRI farmers are advised to survey their farms often and seek the advice of agronomists to apply the recommended pesticides or insecticides
- **Fertilizer application:** farmers are advised to use organic fertilizer under SRI since it gives better results.
- **Nursery management:** To grow seedlings, nurseries are prepared two weeks before planting seeds.

## Harvesting

- **Timely harvest:** under SRI, farmers harvest immediately when plant matures
- **Post-harvest Management:** Farmers are advised to use combined harvesters and not the threshing method which leads to higher post-harvest losses.

Unlike the previous model of introducing SRI, where only few selected families were introduced to the technology and received technical support from research institutions, ACT implemented a participatory and inclusive approach. Participation was open to all who were interested, and a farmer-to-farmers (F2Fs) extension approach was used.

With the farmer-to-farmers extension approach, ACT organized meetings at the village level to select lead farmers who would train other fellow farmers. Lead farmers were trusted individuals who were willing to be trained in SRI techniques and in turn share their knowledge with other farmers.

Before implementing SRI, ACT built the capacity of staff that would provide technical support. Two field officers were trained in the two local communities where the project would be implemented. The first round of training was given to selected lead farmers and focused on the theoretical foundations of SRI. Then a practical training on the 9 steps of SRI was organized.

Afterwards, lead farmers were tested on the topics learned to assess their mastery of the content. Finally, to sharpen farmers' skills even further through refresher trainings were continuously provided.

## Trageted populations

When SRI was introduced by ACT, the target group were smallholder farmers, including women and youth. An initial goal of 40% women and 30% youth was set. The project exceeded this figure with women making up over 50% of participants.

Women and youth were attracted to SRI because it explored different aspects of the value chain, some of which they had already overseen. For example, spraying crops as part of weed management was already dominated by youth. On the other hand, women were particularly drawn by the entrepreneurial focus which was used as the way of emphasizing farming as business. This entailed different trainings related to small and medium business management; Value chain development, and linkages to financial institutions and markets with women and youth given more priority. Through these linkages created by entrepreneurial component, women have been able to access financial services, diversify to other income generating agricultural activities such as poultry, obtain good quality produce and improve bargaining power of their produce, and therefore improve their income and livelihood at large.

ACT also provided gender sensibilization trainings to promote awareness of gender related issues. The aim was for farmers to understand the concept of gender and its complexities in line with the overall development of the rice value chain.



©ACT/Practicing the plantation of seedlings



©ACT/Youth are providing services with machinery

## Promising Results

Farmers who adopted the SRI method witnessed an exponential increase in their rice yield. Where the majority once averaged 8-12 bags per acre, many tripled their yield after one season while others especially those whose farms are upstream, reached an optimum yield of 45 bags per acre.

These bumper harvests have increased incomes by more than 50% and enhanced standards of living. Farmers are now food secure, and many have been able to build decent homes and diversify their livelihoods to include ventures like chicken farming, fish farming, cattle keeping, commercial seed multiplication, and other businesses.

Mrs. Veronica Anaely Urio 'Mama Vero', a 59-year-old farmer who is also a lead farmer, planted 12 acres of rice following SRI technology. In her first year, the harvest increased from 15-18 bags per acre to 37. "I am a rich woman to be because of this project." Due to her success, her husband and daughter have joined her in adopting SRI technology and she has moved into a new house with corrugated iron sheets.



©ACT/Mama Vero (Veronica Urio)

Through SRI, farmers have built socio-economic capital. Many have formed groups of 25-30 that work together to solve problems, source inputs, and sell their produce. Some farmers are also taking steps to formalise these groups and establish regulations to govern their operations. The farmers expressed their hope to continue operating after the completion of the FO4ACP Programme.

In addition, the farmer-to-farmer extension approach proved to be highly beneficial at the community and District level. Due to its utilization in introducing SRI, farmers have developed good working relationships among each other, to the extent of working together on each other's farms, plot-by-plot during planting, weeding and harvest seasons.

Furthermore, there are agro-ecological benefits to SRI, for example, it improves soil fertility through the use of organic fertilizer, saves water usage by more than 50% and is resilient to the damages caused by high rainfall as well as drought. In addition, the reduction in the use of artificial fertilizer recommended by SRI principles helps to reduce the emission of greenhouse gases. Research has demonstrated that SRI helps reduce the emission of greenhouse gases by 40-70%.

## Success Factors

In retrospect, various factors contributed to the success of SRI some of which are:

- The use of the farmer-to-farmers (F2Fs) extension approach in implementing the practice
- Close monitoring of the implementation of the nine (9) SRI steps by farmers that adopted the practice. In many cases varying levels of success among farmers were attributed to adherence to 9 SRI steps mentioned.
- Initial training and refresher training for the lead farmers and extension officers who provide technical support to farmers
- Adaptation of SRI practices to the local context in the implementation sites.
- Women's contribution due to leadership in adopting, tackling, and adjusting to new realities and challenges in their families and community at large. Through effective communications, hardworking and loyalty, teamwork, compassion and empathy, women guaranteed the project's success.

The success of this project also drew the attention of the Government of Tanzania. SRI has now been added to the five-year National Agriculture Research Agenda (NARA) for large-scale producers. ACT has signed a Memorandum of Understanding with the government to provide advice on the methodology.

## Limitations and Constraints

While the total costs for inputs are low when using SRI practices, initial investments are still needed. For the time being most of the capital obtained by farmers has been acquired through loans from banks, which may have unfavourable terms. To get around borrowing expensive loans, ACT is currently implementing financial literacy training where farmers are taught to save a portion of their income to re-invest in their farms. In addition, farmers also faced other challenges such as unpredictable weather, pests, decrease in the price of rice due to COVID-19 measures.

## Sustainability

Based on this experience, there are many indicators that demonstrate the technology's potential to sustain itself in the long run based on the following:

- The success of SRI farmers has attracted other partners and new opportunities. The Tanzania Agricultural Research Institute (TARI) has contracted some farmers to participate in seed multiplication, providing them with an additional source of income
- Engagement of farmers with multiple players in the rice value chain has helped build social capital among them. Different players in the rice value chain, such as agro-dealers and mechanical service providers, have developed a good working relationship with farmers and realize that everyone benefits if they work in harmony. For example, farmers have joined forces with providers to combine harvesters for hire. The service providers have expanded their customer base while farmers have been able to reduce post-harvest losses from 40% to 5%
- SRI embeds several practices that help to conserve the environment such as reducing water usage and reduction of indiscriminate use of pesticides and herbicides which are a danger to the environment
- Based on positive results of the project many more farmers are eager to adopt the practice.



## Recommendations

This practice has already been successfully replicated by farmers outside the target group within the Mkindo and Dakawa areas.

However, if the application of SRI in the rice sector is to be replicated at scale it is recommended that communication materials such as posters and flyers are distributed to raise awareness of the good agro-ecological practice and information materials be available and disseminated in the form of manuals, booklets and videos; and a policy document be created for decision makers on the required investments on their part along the rice value chain.

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## The Agricultural Council of Tanzania (ACT)

The Agricultural Council of Tanzania (ACT) is the umbrella Private Sector Organization advocating and lobbying on behalf of its members at a national and local level on policy and business environment issues impacting the agricultural sector.

ACT is a member of the regional farmers' organization SACAU, one of the direct recipients of the FO4ACP Programme.

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