

Can System of Rice Intensification Boost Smallholders' Rice Production in Rainfed, Lowland Areas of Tanzania?

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Abstract

Based on challenges identified and approaches proposed, the paper builds a case for boosting rice production in rainfed lowland areas of Tanzania. The proposed initiative is designed as an action in the field of development cooperation. Despite its complex nature, the initiative aims at an intensification of the prevailing rice production system in rainfed areas, whereby improving the availability of suitable rice seeds and adopting elements from systems of rice intensification (SRI) are proposed as the main agronomic components, which shall be supported by respective research. Further elements to be considered are the management of land and water in these rainfed areas, which are seasonally used for rice production, while the rest of the year they remain fallow, as well as the economics of the production system, which at present is critical and may remain a stumbling block for intensification, also due to the threat from more competitive local production in irrigated areas and cheap imports.

Keywords: Tanzania, rice production, system of rice intensification, development cooperation

Introduction

In Tanzania, rice is the second most important food crop after maize (Bucheyeki *et al.*, 2011), and is a major source of employment, of income and for food security. Rice is grown by over 1 million farmers on the (Tanzania) Mainland, mostly in the regions of Morogoro, Shinyanga, Mbeya, Mwanza, Tabora, Kilimanjaro and Rukwa, and by 72,000 farmers on (the Islands of) Zanzibar (The World Bank, 2021; TARI, 2021). Despite the increasing importance of rice in Tanzania, the mean yield of the crop is 1.5 tons/ha, which is far below the yield averages reported in Sub-Saharan Africa (4.4 tons/ha), Asia (4.6 tons/ha) and South America (5.2 tons/ha) (Atera *et al.*, 2018). In fact, average rice yields stagnated at about 1.2 to 2 tons/ha against a demonstrated on-farm potential of 6 to 8 tons/ha. This was due to limited improved seed availability, with only 15 percent of paddy farmers growing improved varieties, less than 1 percent exposed to improved technologies including System of Rice Intensification (SRI) and farmers only growing one cropping season due to poor irrigation infrastructure and water management (The World Bank, 2021). Yet, The World Bank (2021) concluded that, the rice subsector was and remains a strategic priority for agricultural development in Tanzania.

The fastest growing demand for rice in the world has been noted in Africa, owing to the rapid population growth of

about 4 % per annum (URT, 2019). In Tanzania (...) rice consumption increased from 818,699 tons in 2011/12 to 976,925 tons in 2015/16 (Msafiri, 2021). Rice consumers in Tanzania have strong preference for rice varieties grown locally in comparison to imported rice due to their aromatic attribute.

To ensure sustainable rice production and productivity, research institutions have been working in collaboration with various research projects such as; (i) Piloting quality management systems in rice production (Rikolto East Africa), (ii) Expanding rice productivity project (ERPP), Fast tracking Delivery and scaling of agricultural technologies in Tanzania (AfricaRISING), (iii) Capacity Development and experience sharing for rice value chains through South-South and Triangle Cooperation (FAO).

In support of the rice sector and the rice farmers, various development initiatives have been implemented such as the WB/GASFSP project in Morogoro and Zanzibar (2015 – 2021) or the EU funded rice initiative in Morogoro and Iringa regions (2017 – 2021) which was implemented by FAO, the Aga Khan Foundation and Helvetas. In 2019, the Government of the United Republic of Tanzania (URT) revised and updated its National Rice Development Strategy - NRDS II (URT, 2019).

However, in Tanzania, most initiatives have been favouring boosting rice production in irrigated areas, with



little emphasis on the much larger rainfed areas in the lowlands and partly uplands. Despite the fact that farmers producing rice under rainfed conditions outnumber by far the farmers with developed irrigation systems, there was in the past (too) little attention on this producer group and their production context. There needs to be even urgency in turning towards rice production under rainfed conditions in lowland areas of Tanzania, as these farmers are increasingly impacted by other and partly new key issues such as climate resilience in rice production, quality management, postharvest losses, commodity value addition, labour saving technologies and innovations in processing, and utilization of rice by-products.

This paper looks at the challenges rice producers in rainfed lowland areas of Tanzania face and suggests entry points for tackling these challenges.

Advocating for the stakeholders in Tanzania, Helvetas together with rice producers and relevant public and private actors along the rice value chain would like to embark on a sizeable comprehensive pilot in selected regions of Tanzania with focus on quality inputs and good agronomic practices, including system of rice intensification (SRI), to boost smallholders' rice production in rainfed, lowland areas of Tanzania. Hence, with this paper Helvetas and its partners seek exchange and feedback from the research community on the proposed action as well as invite potential donors to support this initiative.

Method

This paper is not based on any empirical research. It rather summarizes insights on rice production in rainfed lowland areas of Tanzania and on the rice value chain in general, which have been obtained from secondary literature, from discussions with rice farming communities as well as public and private institutions involved in the rice sector, and from experiences of Helvetas while implementing rice projects in Tanzania and Asia (India, Myanmar).

The identified challenges and potential approaches as outlined are the results from the study of secondary literature, as well as from focus group discussions with rice farmers and exchanges with relevant value chain actors, namely:

- The Ministry of Agriculture (MoA), United Republic of Tanzania, Dodoma
- Various agricultural offices in the regions of Rukwa, Katavi, Tabora and Shinyanga

- The Tanzania Agricultural Research Institute (TARI), Dodoma Head Office
- TARI Dakawa, the rice research centre of TARI
- The Sokoine University of Agriculture (SUA), Morogoro
- The Tanzania Official Seed Certification Institute (TOSCI)
- The Agricultural Seed Agency (ASA), Morogoro
- The Rice Council of Tanzania (RCT), Dar es Salaam
- MW Rice Millers, Morogoro

However, please note, the information provided in the following chapters 3 to 5, i.e., potential approaches, the proposed logframe and the conclusions drawn are of some preliminary nature. The farmers and the various further stakeholders consulted may differ on how some of the issues are to be approached, on where emphasis for solutions should be put, and on the conclusions drawn.

Therefore, even though the paper reflects and summarizes to a large extent the view and ideas of the various rice sector stakeholders, the responsibility for the paper's content lies entirely and solely with Helvetas Tanzania.

Results

Identified challenges and potential approaches

i) Land

Challenges: The typical rainfed rice fields are flooded and often submerged during the rainy season. However, during the dry season they look quite abandoned, though they are often grazed by livestock. Ownership, access to land, leasing of land, etc. mostly follow customary law, which may not always be entirely clear, and sometimes discriminatory towards women. In the end, such land issues become a hindrance for farmers to invest into their rainfed rice fields.

Approaches: Create clarity and transparency on ownership, access to land, and user rights. With such security created, farmers are better prepared to invest into the land, investing in improved land preparation (levelling), including mechanization.

ii) Irrigation and water management

Challenges: Characteristics of a rainfed area under rice cultivation may differ considerably, in terms of inflow of water from neighbouring areas and outflow/

runoff. But in general, there is hardly any proper water regulation/management, even if in some areas some small, crude, seasonal water channels might be there, which are poorly maintained, often damaged during dry season.

Approaches: Objective should be to minimise the risk of crop failure in rainfed lowland areas, which could be achieved where feasible through small complementary water structures such as check dams or percolation dams together with irrigation channels to regulate water in- and outflow in a better way. The structures should be set up in an unbureaucratic way by the local administration and be managed by the respective water users themselves through water stewardship committees or water user associations.

iii) Seeds

Challenges: The seed challenge is demonstrated with an example: Saro 5 is the name of a high yielding variety released in Tanzania more than 20 years ago. Yet, today, less than 10% of farmers are using it, despite the researchers say Saro 5 produces five times more than local varieties. Do we have the right variety but unfortunately the wrong farmers? Unfortunately, Saro 5 is not suitable under rainfed conditions, as it has been developed for high potential areas with good, permanent water availability. Furthermore, Saro 5 is also not the most desired variety, since farmers as well as consumers in Tanzania prefer aromatic rice, while the aroma often disappears in new high yielding varieties.

Approaches: Concerning seeds a participatory approach between researchers'/plant breeders and farmers shall be followed to identify more suitable, drought-resistant rice varieties. Though it is to be mentioned, that the Tanzania Agricultural Research Institute (TARI) is on the job, while seed multiplication is done by the Agricultural Seed Agency (ASA) with the Tanzania Official Seed Certification Institute (TOSCI) being the respective certification agency. TOSCI has also developed a seed multiplication programme directly involving farmers who produce quality declared seeds (QDS).

iv) Good agronomic practices, including SRI

Challenges: Apart from challenges related to land and irrigation, poor agronomic practices hinder production and productivity. However, one should not attribute the

poor practices alone to a lack of farmer's knowledge about rice cultivation. The way many farmers still grow rice in rainfed areas is also an expression as well as indicator of the risks involved. The low input – low output approach is a risk minimising strategy, in which farmers keep their investments low.

Approaches: One is often quite quick in asking for more capacity building and training of farmers on good agricultural practices (GAP), though training on GAP alone may not do the trick. Can the promotion of system of rice intensification (SRI) make a difference in such a context? Helvetas and its partners in Tanzania would like to answer this question with "yes" and take it up as a hypothesis for a proposed pilot on rice production in rainfed lowland areas of Tanzania, by developing location specific production protocols for SRI.

v) Postharvest management and storage

Challenges: Post-harvest losses (PHL) are generally high in Tanzania with estimations in cereals of up to 40% (URT, 2017). PHL challenges in rice occur during threshing, and later due to insufficient drying and poor storage of the crop.

Approaches: The increased use of threshing machines and even (mini) combine harvesters contributes to reduced losses while threshing. The construction of proper warehouses can be a way out of storing the crop under unsuitable conditions at the farm level. In addition, central storage of crops by a farmer group or cooperative may also allow the introduction of a warehouse receipt system, which can support farmers in accessing credits for farm inputs.

vi) Processing and marketing

Challenges: Rice millers in Tanzania also complain about the low milling quality of high yielding varieties and therefore prefer local varieties, which in addition, as mentioned earlier, face a higher demand in the local market. In fact, the market, i.e., own/home consumption, local markets versus export markets, is a key factor which determines farmers' choices and decisions when it comes to rice production. From the consumers' side there is a big demand for rice, but with increasing prices and inflation all around, consumers' preferences increasingly go towards cheaper rice, which is less/not aromatic and often imported.

Approaches: Development of new varieties, apart



from farmers' preferences and considering specific cultivation aspects, should also consider the preferences of rice millers and particularly of the consumers. To which extent the local production which faces high production costs should be protected against cheaper imports, is a policy issue which needs careful assessment of the producers' and the consumers' interest. However, with more than half of its population still living in rural areas and directly linked to farming, Tanzania must keep in mind that by serving the producers it also serves at the same time more than 50% of its consumers.

Transversal issues

vii) Gender and social equity

Challenges: Women are well involved in the rice production, though mostly with specific tasks which are seen as women's work. Participating in farming decisions however is less.

Approaches: Promoting an inclusive approach concerning gender and social equity, when it comes to rice farming in rainfed areas, would in particular mean, involving women in aspects related to land (ownership, access, user rights) as well as in the planning and decision making concerning land improvement and irrigation structures. Furthermore, it is paramount to have women attending trainings on good rice production practices and SRI.

viii) Climate change

Challenges: Changed rainfall patterns and increased temperatures are threats for cropping which is done under rainfed conditions.

Approaches: There are several approaches and actions one can take to respond to climate change, which can be summarised as building climate resilience among farm households and consists of climate smart agricultural practices. At the same time, on the research side, climate resilient rice varieties may be bred or improved, climate adapted practices may be researched, including aspects related to water management.

ix) Environmental and social sustainability

Challenges: Rainfed lowland rice production is seen as a risky business. It is for that reason, that farmers

with low-risk handling capacity turn to low input – low output farming and often also to unsustainable production practices.

Approaches: Integrate rainfed lowland rice production into the prevailing farming system, which could mean using the areas for other crops like production of vegetable with the residual moisture after harvest or growing a crop as green manure or for fodder. Even using crop residues (rice straw) as fodder or planting trees on bounds could be part of a local farming system. In the end, such areas become part of a regenerative production landscape.

x) Economics

Challenges: Tanzania's local wholesale prices for rice are relatively higher than the world market prices. (...) domestic wholesale prices increased from 701 USD per ton in 2018 to 762 USD per ton in 2019, while world market prices declined slightly from 421 USD per ton in 2018 to 418 USD per ton in 2019. Tanzania's domestic rice prices are higher than imported rice. This is more likely attributed to higher transaction costs, transport costs and the quality (Msafiri, 2021).

Approaches: More favourable economic returns are more likely to be achieved through an intensification of the system with improved seeds and improved agronomic practices based on more favourable frame conditions regarding land and water, rather than continuing with a low-risk low input - low output approach. Intensification of the rice production in rainfed lowland areas of Tanzania not necessarily means going big, but opting for a feasible, viable and sustainable way.

Discussion

A potential result framework for a pilot

Table 1 shows the result framework for a potential development initiative with rice farmers in rainfed lowland areas of Tanzania. It somehow summarises the challenges and considers the approaches outlined. Nevertheless, this result framework is work in progress; as such it is more of an entry point which needs to be further scrutinised by the concerned actors and stakeholders.

Table 1: Result framework for a rice initiative in rainfed lowland areas of Tanzania

Goal: Improved and strengthened rice production in rainfed lowland areas of Tanzania provides a feasible, sustainable and viable livelihoods, food security and income opportunity for smallholder farmers					
Outcome 1: Improved land and water management increase the value of rainfed lowland areas		Outcome 2: Appropriate seed systems and the adoption of SRI boost rainfed rice production (in combination with improved water management)		Outcome 3: Rice produced in the rainfed lowland areas of Tanzania has become an attractive, viable crop with its own niche in the national and international markets	
Output 1.1 Improved access to and secured use of land increase farmers' willingness to invest in rainfed seasonal arable land	Output 1.2 Increased water availability and improved irrigation reduce the risk of crop failure and increase crop production	Output 2.1 Suitable seed varieties are produced, which then are locally multiplied by the farmers as QDS	Output 2.2 SRI is adapted to location specific rainfed conditions and introduced to rice farmers through training and production protocols	Output 3.1 Due to its aroma, preferred by consumers, rice mills and traders promote local rainfed rice as specialty rice	Output 3.2 Concerned stakeholders monitor the viability of rainfed rice on a regular base

Conclusion

After a brief introduction to the rice sector in Tanzania, this paper lists challenges faced by the sector as well as approaches to address and overcome these challenges, which result in a framework for a potential comprehensive initiative to boost rice production in rainfed lowland areas of Tanzania.

Talking about system of crop/rice intensification, the scope for research is with the proposed *Outcome 2: Appropriate seed systems and the adoption of SRI boost rainfed rice production (in combination with improved water management)*, where it would be interesting to see to which extent and how fast suitable varieties can be identified and multiplied, and to which extent SRI provides interesting and feasible options to tackle the challenges faced by smallholder farmers in the rainfed lowland areas of Tanzania.

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