

Perspective

Rice development in sub-Saharan Africa

LOCAL RICE VERSUS IMPORTED RICE

It is ironic that in West Africa – the rice belt of sub-Saharan Africa (SSA) – although 20 million farmers are engaged in rice farming and about 100 million people depend on it directly for their livelihood, almost all the cities of the region are flooded with imported rice sold in bags labeled Thai rice, Indian rice, Uncle Ben's rice – everything except local rice.

Why doesn't local rice find its way to the local markets? Is it because there isn't enough local production? If so, why? Is there a lack of technology or is the right technology not reaching farmers? Or does the unavailability of local rice in the market mean that imported rice is cheaper and local rice cannot compete with it?

Studies by the Africa Rice Center (WARDA) show that the issue of rice availability in SSA is complex and should be viewed from a deeper perspective that takes account of technology, policy, and socio-economics factors within a purely African context.

STRATEGIC IMPORTANCE OF RICE IN SSA

Although rice is generally associated with Asia, it is a commodity of strategic significance and the fastest-growing food source in Africa, where it has been cultivated for centuries. It is now grown and consumed in more than 40 countries in the African continent. In several African states, rice availability and rice prices have become a major determinant of the welfare of the poorest segments of consumers who are least food secure. Rice is therefore on the front line in the fight against hunger and poverty in SSA.

Rice production in SSA increased more than four times between 1961 and 2003, from about 3 Mt to more than 13 Mt, much of which can be attributed to the expansion of the area under rice cultivation. Nigeria's case is particularly noteworthy. Its rice production increased seven-fold between 1975 and 1994, from around 0.5 Mt to more than 3.8 Mt!

But this remarkable increase in SSA's rice production has not been able to keep pace with the surge in its demand for rice. Since the mid 1970s the consumption of rice in West Africa – and to a lesser extent in SSA as a whole – has increased dramatically. Demand for rice in the sub-region is growing at a rate of about 6% per annum – faster than anywhere else in the world. The growth is largely the result of changing consumer preferences. To bridge the growing gap between consumption and production,

Africa spends about US \$1.5 billion annually on rice imports.

Although in the short term rice imports may serve to bridge the gap in rice supply, their increasing market share (around 40–45% of the total rice supply) shows the high dependency of the region on external supply for one of its staple foods. This situation is particularly worrying because the international rice market is relatively small, accounting for only about 6% of the total rice produced globally. Specifically, the ongoing Asian agricultural transformation (induced by the diversification of consumption patterns and the continuous growth of total rice consumption) may affect the volume of exportable, surplus rice (as have policy shifts, and political and environmental events in the past).

In addition, there is some evidence that the rate of yield increase of irrigated rice in tropical Asia has stagnated, and the gap between potential and actual farmers' yields has narrowed. But the biggest concern is that the importation of rice is placing an increasingly heavy demand on scarce foreign currency reserves of the countries of this region, which are among the most impoverished in the world.

DOES SSA HAVE THE POTENTIAL TO SUBSTANTIALLY REDUCE ITS RICE IMPORTS?

It is true that rice production in SSA is dominated by subsistence, smallholder farmers who have limited access to markets, no equipment other than hand-held tools and very limited use of inputs. The average rice yield in the sub-continent is the lowest in the world: 1.4 t ha⁻¹ compared to Asia's average of 4 t (more than 6 t in China).

But it is also true that rice is successfully and economically produced in a wide range of agro-ecologies in SSA. For example, rice yield in the Office du Niger project in Mali has been steadily increasing. In Madagascar, where the per capita rice consumption is among the highest in the world, most of the rice consumed is homegrown. Nigeria, which has all the agro-ecological zones suitable for rice cultivation, has the potential to become a major rice granary.

In West Africa, the high-impact lowland rice ecology represents about 20–50 Mha. If only 2 Mha of this area can be used to grow rice, producing an average yield of 3 t ha⁻¹, West Africa could easily stop its costly rice imports. Technologies to achieve this potential are already available and are now reaching SSA farmers.

CONTRIBUTION OF SSA'S RICE RESEARCH

Formal rice research and development activities in SSA began during the colonial period. Some of the big schemes relating to irrigated rice, such as the Office du Niger in Mali and ORTAL in Senegal, were established by France during that period. The Federal Rice Station in Badeggi, now the headquarters of the National Cereals Research Institute (NCRI) in Nigeria, the Rokupr Rice Research Station in Sierra Leone, and the Mwabagole Research Station in Tanzania, initiated rice research in the 1930s. Even before the establishment of the international research centers, national programs in SSA had begun incorporating advances in rice improvement into their programs.

Over the past 30 years, international agricultural research organizations, including the Africa Rice Center (WARDA), the International Institute of Tropical Agriculture (IITA) and the International Rice Research Institute (IRRI), have made valuable contributions to rice development in SSA.

A study by Dalton and Guei¹ in seven major rice-producing countries of West Africa found that, despite limited investments in rice research, about 200 improved rice varieties were released over the past 25 years. This led to significant producer surplus gains (\$360 million in 1998 alone), thanks largely to the catalytic effect of the International Network for the Genetic Evaluation of Rice (INGER)-Africa, hosted by the Africa Rice Center (WARDA).

PROMISE OF THE NEW RICE FOR AFRICA (NERICA)

During the course of their research, WARDA scientists found that the Green Revolution rice technologies were proving difficult to transfer to SSA because they were not adapted to African conditions. Such varieties performed well on the research station, with high inputs, but flopped in farmers' fields. In response to this failure, WARDA took up the challenge to create a new plant type – high-yielding and resistant to local stresses – designed specifically for smallholder farming conditions in SSA.

As part of their short-term strategy, WARDA scientists first focused their attention on the upland or dryland ecology, as it represents about 40% of the total area under rice cultivation in West Africa and employs about 70% of the region's rice farmers, many of whom are women.

In the early 1990s the WARDA research team, led by Dr Monty Jones, decided to combine the toughness of *Oryza glaberrima* (African rice) with the productivity of *Oryza sativa* (Asian rice). This was a formidable scientific challenge because the two species have evolved separately over millennia and are so different that many previous attempts to cross them have failed. Using conventional breeding, as well as advanced scientific tools (anther culture), the WARDA scientists, in association with an array

of partners from around the world, succeeded in overcoming hybrid sterility – the main problem in crossing the species. The fruit of this effort was NERICA.

NERICA's advantage over other varieties lies in its combined characteristics of higher yields (by 50% without fertilizer and by more than 200% with fertilizer); earlier maturity (by 30–50 days); resistance to local stresses and good taste. For this pioneering work, Dr Monty Jones was awarded the 2004 World Food Prize.

To speed up the NERICA technology transfer to rice growers, WARDA and its partners used farmer-participatory approaches like participatory varietal selection and community-based seed production systems, designed for African conditions. Today, NERICA has become a symbol of hope for millions of poor African farmers and consumers. Currently, upland NERICAs are estimated to be planted on more than 100 000 ha across Africa, including about 70 000 ha in Guinea and more than 10 000 ha in Uganda.

The NERICA development and dissemination success can be mostly attributed to five factors:

1. African-led collaborative research;
2. technologies that fit the environment, unlike the Green Revolution technologies that require costly inputs;
3. use of indigenous genetic resources and farmer-participatory approaches;
4. political commitment at the highest level; and
5. sustained funding from donors, primarily some of the key members of the Consultative Group on International Agricultural Research (CGIAR). The CGIAR is one of the largest alliances of countries, private foundations, organizations and international research centers that mobilize science to benefit the poor.

The demand for upland NERICA varieties, as well as the other rice technologies developed by WARDA for more high-impact ecologies (lowland and irrigated), continues to grow across the continent and improved rice technologies are reaching farmers thanks to the support of rice-based networks hosted by WARDA and its many partners. These technologies are quietly revolutionizing the rice scenario across SSA and are increasing food availability and farmers' incomes, lifting rural households out of poverty.

Research by WARDA and its partners is also focusing on the development of integrated strategies for managing constraints relating to soil fertility, water, diseases and pests as part of long-term sustainable rice production in SSA.

INTEGRATING RICE R&D WITHIN A COMMODITY-CHAIN APPROACH

WARDA recognizes that even the best of technologies cannot lift SSA farmers out of their poverty trap on

their own. The technologies need to be integrated within a commodity-chain approach, including farm production, processing, marketing, favorable policy and fair trade. This brings us back to our initial question of why local rice is not reaching the local market.

It is evident that rice subsidized by Asian countries and the USA which is sold at cheaper price in African cities is making the local rice uncompetitive and undermining the livelihoods of the poor African farmers and traders. What is worse is that the availability of cheap imported food for urban populations has provided a rationale for many SSA governments to neglect domestic rice farming. As a result, there is a dangerously high level of dependence on food aid and imports.

Policy research by WARDA and its partners has shown that rice quality, in addition to the price, is a major determinant for African consumers' preference for imported rice. A study of the Nigerian rice sector revealed that the relatively poor quality of Nigerian rice is the primary constraint to further development of the domestic rice sector. Increasing numbers of consumers are ready to pay for quality. Local rice can be made competitive by improving the efficiency of operators at the production, processing, and marketing levels through a comprehensive approach. Recent efforts by several African Governments, like Nigeria, to levy high taxations on imported rice are commendable, but they should be matched by reliable and consistent policies and incentives that will encourage the competitiveness of the domestic market.

In the medium to long term, any significant increase in rice production in SSA depends on how much progress is made in solving the farm-level, market and policy constraints that make local rice production uncompetitive. At national levels, this could be achieved with comprehensive rice sector development programs.

If African countries cannot achieve political and social stability; favorable agricultural policies; removal of unfair subsidies; better infrastructure; active involvement of the private sector; price incentives for quality products; access of farmers to credit, seed and fertilizers; massive promotion of local products; competitive local and regional markets; and political commitment at the highest level to agriculture and agricultural research, they will never be able capture the full benefits of breakthroughs, like NERICA.

REFERENCE

- 1 Dalton TJ and Guei RG, Productivity gains from rice genetic enhancements in West Africa: countries and ecologies. *World Dev* 31:359–374 (2003).

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