

on crops and agroecologies for which they maintain higher or more unique needs.

- A second corollary of these findings is the justification for regional, as opposed to national, variety release. Regional releases allow the prospect of rapidly delivering new varieties to large numbers of farmers. Multiple rounds of variety testing across national borders can be replaced with a single round that covers a wider region.
- A third result is the potential opening of regional seed markets.
- Commercial incentives are limited for the multiplication of most open- and self-pollinated varieties.
- National markets are too small to justify any scale of investment. However, regional seed markets offer the prospects of larger, and perhaps steadier, investment returns. In fact, much of the multiplication of open- and self-pollinated varieties currently being pursued in southern Africa is aimed toward the regional market for flood and drought-relief seed.
- The regionalization of variety release would simply strengthen the justification for investments in these seed markets.
- The SADC Seed Committee has agreed to examine the case for the regionalization of releases for sorghum and pearl millet

## Reference

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## Programs

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Each year, up to 10,000 t of maize (*Zea mays* L.) are being used in primary school feeding programs in the Dodoma and Singida Regions of central Tanzania under an initiative supported by the World Food Programme (WFP) of the United Nations. This encourages the consumption of maize in areas where sorghum [*Sorghum bicolor* (L.) Moench] is the main staple food. These programs also reinforce the perception that maize is a high-quality, modern food, whereas sorghum is a poor man's traditional food.

Tanzania's school feeding program also biases domestic grain markets. In most years the maize used in the program is derived from domestic grain stocks. Much of it is purchased in high rainfall regions of the country. But when rains are favorable, maize supplies are also obtained from small-scale farmers in such low rainfall areas as Dodoma and Singida. As a result, farmers are being encouraged to plant more maize, and traders are being encouraged to amass this product. In contrast, more drought-tolerant crops like sorghum are relegated to the status of subsistence crops.

ICRISAT and a local miller, Power Foods Ltd., approached the WFP to determine whether locally produced sorghum could replace a portion of the maize used in these school-feeding programs. We determined that the immediate constraint was skepticism about the acceptability of sorghum among school children. ICRISAT then asked the Tanzania Food and Nutrition Centre (TFNC) to implement an independent set of sensory taste trials to evaluate the acceptability of sorghum in breakfast porridge (*uji*) and stiff porridge (*ugali*) used for lunches. Power Foods agreed to provide the sorghum meal for these tests.

Three schools currently receiving maize for their feeding programs were nominated by Dodoma's regional authorities to participate in the taste trials. A sample of 106 students participated in the trials. Each student received soft sorghum porridge (*uji*) made from both dehulled and unde-hulled grain. On a different day, each

received stiff sorghum porridge (*ugali*) made from dehulled and unde-hulled sorghum grain. These samples were served as regular meals.

Almost 98% of the students found the sorghum acceptable as a replacement to maize in breakfast and lunch meals. These students rated the overall acceptability of the *uji* made from dehulled sorghum meal approximately equal to the version made from unde-hulled grain. But if offered a choice, most would select the breakfast porridge made from dehulled grain, because of the whiter color of this product.

If the sorghum is to be made into *ugali*, as that is commonly eaten for lunch, the survey results suggest this grain be dehulled. There is a strong and statistically significant preference for the dehulled sorghum flour, that is said to be smoother and whiter than the product made from unde-hulled flour.

SMIP's recent market surveys indicate that in favorable rainfall years, sorghum can readily be purchased on the local market for such school-feeding programs. More importantly, the introduction of this product would significantly stimulate domestic sorghum production. And such a program would encourage farmers to invest in adopting better varieties and management technologies.

The development of the market for sorghum would reduce incentives to grow maize in drought-prone regions. If a consistent market for sorghum is created, this will also benefit industry. More competitive sorghum purchases will reduce grain assembly and transport costs. Sorghum will be more readily available to millers and the animal feeds industry at favorable prices.

If Tanzania experiences drought, it would be easy to replace the domestic grain supply with imports of sorghum grain. In 1992 the United States provided sorghum to Zimbabwe for use in food aid programs. This grain was marginally cheaper than maize and just as acceptable to consumers. African sorghum exporters include the Republic of South Africa and the Sudan. Alternatively, the school feeding program could readily shift back to 100% maize, at least until domestic sorghum supplies recover.

SMIP is now encouraging the WFP to substitute at least 10% of the maize currently destined for Tanzania's school-feeding program with sorghum. It is hoped this will increase to 50% substitution in the sorghum-growing regions of the country within the next few years.

## Adoption of Improved Sorghum and Pearl Millet Varieties in Tanzania

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### Introduction

Sorghum [*Sorghum bicolor* (L.) Moench] and pearl millets [*Pennisetum glaucum* (L.) R. Br.] are important cereals for food security in the central high plateau comprising Singida and Dodoma regions of Tanzania, and come second to maize (*Zea mays* L.) in the Western (Tabora, Shinyanga, and Mwanza), and Southern (Mtwara, Lindi, and Ruvuma) Zones (Anonymous 1998). In Dodoma, Singida, Shinyanga, Mwanza, and Mara, sorghum and millets account for most of the national area under sorghum cultivation, while Dodoma, Singida, Shinyanga, and Tabora account for a large proportion of the national area under pearl millets. The area under millets includes both pearl millet and finger millet. The latter is grown mostly in Rukwa, Mara, and Kilimanjaro, and accounts for approximately one-third of the total millet hectareage.

The importance of sorghum and millets in the food basket of the Tanzanian population has led to considerable technological development, particularly of improved varieties that will provide a solid foundation for increasing farm-level productivity and incomes. A number of institutions such as the Food and Agriculture Organization of the United Nations (FAO), realizing the importance of quality seed of improved varieties, have from time to time provided farmers with seed through relief programs. Private seed companies have not fully engaged in the commercial aspects of developing seed of open-pollinated varieties or seed of small and coarse grains like sorghum and pearl millet. To ensure sustainable availability of quality seed of improved varieties of these crops, SMIP worked closely with both public and private institutions to develop alternative seed systems strategies in three SADC countries including Tanzania, and measured the impact of this intervention.

### Improved varieties

Under the terms of the impact-monitoring plan for SMIP Phase IV, a baseline estimate must be established for adoption of improved varieties in each of four pilot countries. In Tanzania, the baseline established in the