Table 1. Grain quality evaluation of fourteen photoperiod-sensitive sorghum varieties from southern Tanzania in comparison to two improved varieties Maria and Pato

Cultivar	Visual hard-ness score	Kernel weight (g/100)	Floaters (%)	Dehull-ing loss (%)	Milling yield (%)	Water absorp-tion (%)	Size fraction[1]			Agtron reading-Dry	Agtron reading-Wet	Tannin content (%CE)
							Large	Medium	Small			
Wanahe(a)	4.9	1.88	0	13.75	85.04	6.7	0.50	98.88	0.51	79.6	60.5	0.00
Dimule	4.8	2.16	1	12.70	86.78	5.2	0.39	99.60	0.10	81.0	61.4	0.00
Wanahe(b)	4.8	2.49	2	12.53	86.75	5.9	32.95	66.65	0.42	77.1	56.2	0.00
Namcheta	4.8	2.36	0	12.11	87.72	4.3	32.95	66.65	0.42	79.6	60.5	0.00
Mwavuli	4.7	2.54	1	13.75	85.04	6.4	32.95	66.65	0.42	79.6	60.5	0.00
Mpunga	4.7	2.18	12	13.75	85.04	7.4	32.95	66.65	0.42	79.6	60.5	0.00
M Kimakua	4.6	2.00	0	14.13	85.48	6.9	32.95	66.65	0.42	82.0	65.6	0.00
Lionja 2	4.6	3.58	1	13.75	85.04	7.5	32.95	66.65	0.42	79.6	60.5	0.00
Kimakonde	4.6	1.93	2	13.17	84.70	6.2	0.02	98.40	1.58	78.2	57.0	0.00
Meele b	4.5	1.96	3	14.68	81.43	6.7	32.95	66.65	0.42	79.0	59.4	0.00
Lionja	4.3	3.23	2	14.63	84.78	5.4	85.61	14.37	0.05	80.7	62.5	0.00
Meele a	4.2	2.89	1	14.11	83.82	7.0	24.03	75.77	0.27	75.0	54.5	0.00
Chijenja	4.0	2.95	0	15.72	83.98	6.7	87.15	12.88	0.00	83.7	67.4	0.00
Mkia Kondoo	3.7	3.46	2	13.75	85.04	7.7	32.95	66.65	0.42	79.6	60.5	0.00
SE±	0.342	0.027	0.979	0.176	0.569	0.192	0.570	0.584	0.018	0.276	0.349	0.00
Mean	4.53	2.54	1.95	13.75	85.05	6.43	32.95	66.65	0.42	79.57	60.54	0.00
CV(%)	10.7	1.5	70.9	1.8	0.9	4.2	2.4	1.2	6.0	0.5	0.8	0.8
Macia	3.6	1.68	22	15.20	81.60	14.30	0.26	99.27	0.38	75.3	56.1	0.0
Pato	3.4	3.56	23	7.23	87.00	4.0	80.54	9.44	0.00	74.5	53.2	0.0

1. Large: % > 4.0 mm^2; Medium: % 4.0-2.6 mm^3; Small: % < 2.6 mm

Note: Commercial maize meal; Agtron Reading - Dry = 83.4, and Agtron Reading - Wet = 67.1

Grain hardness (visual score) for 9 out of 14 photoperiod-sensitive varieties was superior to that of Macia or Pato, scoring ≥ 4.6 on the visual hardness score scale compared to just 3.4 for Pato and 3.6 for Macia. All of them were also superior as determined by the floaters test; only 0-3% kernels floating compared to over 22 for Macia or Pato. The only exception was Mpunga with 12% floaters (Table 1). On ability to produce white flour, the best entry, Chijenja had agtron readings of 83.7 (dry) or 67.4 (wet) compared to 75 and 56 for Macia and 74 to 53 for Pato. Chijenja compared very well with commercial maize (*Zea mays* L.), that gave readings of 83 (dry) and 67 (wet). Other varieties with agtron readings similar to maize were Dimule, Meele, Kimakua, and Lionja (≥ 80). These results that show that these varieties have potential for commercial milling.

Conclusion

The late-maturing sorghum landraces grown in southern Tanzania have such unique quality traits as vitreous pearly endosperms and high commercial milling yields. Strategies for introgression of such quality traits into adapted sorghum varieties and improvement of the agronomic characteristics of photoperiod-sensitive sorghums are objectives of the current sorghum improvement strategy through the lead NARS spearheaded by the Zambia National Program.

Field Days in Tanzania Enhance Regional Spillover of Models and Technology Developed in SMIP Pilot Countries

M A Mgonja and E S Monyo (International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), PO Box 776, Bulawayo, Zimbabwe)

The primary aim of SMINET is to provide evidence that two or three countries are adopting processes and technology developed in pilot countries through previous investments and from SMIP IV to increase adoption of improved varieties or enhance crop management practices. Phase IV of the SADC/ICRISAT Sorghum and Millet Improvement Program (SMIP IV) is targeting 4 pilot countries. Field days were suggested as the best way to:

- Expose national agricultural research systems (NARS) scientists and other collaborators from non-pilot countries to activities in SMIP IV target countries.
- Identify technologies and processes implemented or tested in SMIP IV target countries for possible emulation in other Southern African Development Community (SADC) countries.
- Assist in implementation of activities to effect spillover to non-target countries.

The SMIP seed system has assisted NARS in three target countries (Mozambique, Tanzania, and Zimbabwe) to establish a revolving fund account for sustainable breeder seed production, and to test various models that may improve alternative seed delivery systems. Community seed production through primary schools and farmer groups are being tested in two districts (Dodoma and Singida) in Tanzania. Regional networking and seed systems field days were organized in May 2000 and May 2001 to:

- Popularize the concept of the dissemination of improved seed through farmer groups
- Introduce the rural schools seed production concept to three other SADC countries
- Facilitate regional spillover of the initiative.

Representatives from Botswana, Malawi, Mozambique, the Republic of South Africa (RSA), and Zambia were invited and supported through SMIP. After the field tours, participants outlined each country's seed system, challen-ges, interventions to date, and lessons learned from the field day. They discussed how they would continue to tackle the seed availability constraint; not single-handedly but in collaboration with partners.

Outcomes

- Malawi partners (World Vision International and the NARS breeder) indicated interest in emulating the primary school model. SMIP provided Malawi with nuclear seed (2 kg) of sorghum *[Sorghum bicolor* (L.) Moench] (varieties Pirira 1 and Pirira 2) and pearl millet [*Pennisetum glaucum* (L.) R. Br.] (varieties Nyankombo and Tupatupa). During the 2001 season Malawi produced 300 kg of Pirira 1 that was certified by the Malawi Seed Services Unit. Experiences from pilot countries suggest that while pursuing community-based seed production, collaborators should consider the sustainability of the schemes, seed marketing, and adherence to quality . A seed production training course for collaborators was held 20-22 November 2001.

- A different set of strategies was articulated for the Northern Province (NP) of RSA to reach small-scale/ emerging farmers with quality seed of improved sorghum and millet varieties.
- A stakeholders' workshop was held in August 2001 entitled *'Challenges and opportunities to increase smallholder benefits from sorghum and millet production systems in the semi-arid areas of the Northern Province of South Africa'.* 26 participants from various organizations in NP and elsewhere in in RSA with interests in community development work in NP. The major challenges lie in the areas of variety improvement, soil fertility, seed systems and regulatory aspects, marketing, and governance.
- Delineation of zones using Geographical Information Systems (GIS) supported by stability analysis of a SADC regional Multi-Environment Trial revealed that such sorghum varieties as Macia, Sima, and Pirira 2; and pearl millets Okashana 1 and PMV 3 have high potential adaptability in NP.
- The Mother-Baby trials for sorghum and millet currently funded by the Commercial Farmers Union will be implemented to further confirm the suitability of these varieties prior to their recommendation for listing in NP.
- Small-scale farmers can access sorghum and millet seed through a recognized and legalized community-based seed supply system. The South Africa National Seed Organization (SANSOR) representative provided an overview of regulatory aspects, particularly the minimum requirements of seed testing and plant genetic auditing for producing and selling legal seed. This is a status through which seed of improved RSA-listed varieties can reach small-scale farmers.
- The Progress Mill (PM), milling company in NP has an in-house Community Development Program (CDP) to empower previously disenfranchised communities.

This program ensures small-scale farmers' access to extension support, input supplies, infrastructure development, training, agricultural information, and markets. Progress Mill is committed to buying sorghum from small-scale farmers and has the infrastructure to accommodate 7000 t. A follow-up meeting was held by PM on 23 August 2001 and a work plan has been developed that will model marketing as a stimulant to the use of improved technology. A number of organizations have indicated their interest in participating in this work

- ICRISAT-SMINET will assist in organizing an exposure trip for a selected group of collaborators [Tompe Seleka, PM, SANSOR, Northern Province Department of Agriculture and Evironment (NPDAE), South Africa] to Namibia to study smallholder seed production by the Northern Namibia Seed Growers Association in order to develop a seed system that will help the small-scale farmers of NP.
- ICRISAT-SMIP is leading the development of a concept note that will address *Challenges and opportunities to increase smallholder benefits from sorghum and millet production system in the semi-arid areas of the Northern Province of South Africa'.* This will be submitted through the USAID Regional Centre for Southern Africa (RCSA) support on good governance for RSA
- In three districts of NP field activities were initiated during the 2001/2 season to introduce improved technology for sorghum and millet and strengthen links with the output markets. The objective is to test the hypothesis that output markets will stimulate small-scale farmers to adopt and use improved technology. This work is implemented in collaboration with public and private partnerships within and outside NP.

Five SMIP non-pilot countries were exposed to the seed system models practiced in pilot countries. Follow-up meetings in RSA helped in developing work plans and strategies to link grain markets with the use of improved sorghum and millet technologies. The primary school seed production model is being emulated in Malawi.

Field days have proved effective in efficient regional technology exchange in that various models can be developed in a few pilot countries for adaptation across the region depending on similarity of constraints, and socioeconomic and policy systems.

Regional Collaboration for Research Impact: the Case for SADC Regional Development and Adaptability of Improved Sorghum and Pearl Millet Varieties

M A Mgonja, E S **Monyo, A O** Ohilana. **D D Rohrbach, D Murambadoro,** and C **Mpande** (International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), PO Box 776, Bulawayo, Zimababwe)

Introduction

Public and private investments in technology development offer high payoffs if the resulting technologies are distributed and applied regionally across national borders. Economies of scale are commonly being sought in the private sector and in public-funded, international agricultural research systems. The international application of technology and associated scale economies are readily apparent in the experience of the ICRISAT/ Southern African Development Community (SADC)-Sorghum and Millet Improvement Program (SMIP), which has shown that regional collaboration in crop breeding makes good agricultural and economic sense. Recent analyses of the adaptation of sorghum and pearl millet varieties in southern Africa provide a scientific justification for strengthening regional collaboration in breeding. This evidence is reinforced by the fact that countries throughout southern Africa have clearly benefited from spillovers in crop varieties. The regionaiization of seed markets has provided a foundation for seed delivery to flood- and drought-relief programs. The implications of these findings merit further discussion.