both grain and seed marketing

- Pursuit of selected policy objectives
- Synthesis of experience in plant breeding and agronomy so that this type of work can be done more efficiently in the future
- A careful analysis of various experiences in trying to form new partnerships.

It is the identification of the most efficient means of encouraging such partnerships that holds the key to determining future strategies for sorghum and millet research in the region.

Quality Analysis of Tanzanian Photoperiod-sensitive Sorghums and Potential for their Improvement through the Lead NARS Approach

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Rationale

Past breeding objectives, strategies, and achievements of the Sorghum and Millet Improvement Program (SMIP) correctly targeted the needs of farmers in drought-prone, less-endowed environments. More than 45 accessions of sorghum and pearl millet germplasm that are early maturing have been developed and released for small-scale farmers. An internal review during 2000 noted an obvious gap in technology for the wet semi-arid tropics (SAT) whose production system includes late-maturing photoperiod-sensitive sorghum. Such postharvest concerns such as storability, quality, processing, and utilization require-ments had not been adequately addressed. Based on these deficiencies and outputs from the October 2000 workshop for breeders, farmers, and industry, a need to develop and disseminate technology suitable for increas-ing productivity in these areas was identified. The purpose is to ensure that effective products are available to farmers in all SAT locations to enable them to steadily grow their way out of poverty and food insecurity. To use regional resources efficiently, a Lead national agricultural research systems (NARS) concept was adopted, whereby a breeder from Zambia would lead be tested in Tanzania and Mozambique.

The current traditional late-maturing photoperiod-sensitive varieties have provided farmers with sustainable production. These varieties are mainly white-seeded with a pearly white endosperm. The photoperiod-sensitive landraces are specifically adapted for yield, quality, and their defensive capacity against biotic and abiotic stresses. In particular, they have been shown to be less susceptible to damage by birds and storage pests than other cultivars. They are also unaffected by grain molds because they mature at the end of the rainy season. Their cooking quality is excellent, and in southern Tanzania and central and northern Mozambique, their food products are compa-rable and similar to those made from rice *(Oryza sativa* L). Because of these qualities, the photoperiod-sensitive mate-rials have roles in both food security and in the output market. Yet, their potential is not well documented and is therefore not well known because there has been minimal research work in crop improvement and management of this material.

Approach

In a variety adoption and seed survey conducted in Tanzania, 14 local sorghum landraces were collected and their food quality assessed for comparison with standard improved and released sorghum varieties. The local photoperiod-sensitive landraces were analyzed for: visual hardness score, kernel weight, floaters, size fractions (large, medium, and small), dehulling loss, milling yield, water absorption, agtron readings (colour of flour), and tannin contents. Dehulling loss, milling yield, and agtron readings have important bearing on suitability for milling and acceptability of the final product. Vitreous pearly white endosperm types, for example, have high commercial milling yields and are highly sought by industry. High agtron readings translate into whiter products and are preferred in the market.

Results

All 14 landraces had unique grain-quality traits. Their hardness indices (characterized by visual hardness score), floaters, and water absorption index, complemented by the quantitative dehulling loss, were compared to those of such released improved varieties as Macia and Pato. The landrace mean values particularly for visual hardness, floaters, water absorption, and dehulling loss were far better and more acceptable than those of released short-season sorghums. The agtron readings (dry) of landraces were also better than those of the released cultivars (Table 1).

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

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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: