Commercializing Sorghum in Tanzania

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The Tanzanian Ministry of Agriculture and Cooperatives seeks to strengthen the nation's agro-economy by promoting the expansion and diversification of commercial grain processing. One aspect of this strategy is to promote the commercialization of traditional food grains such as sorghum and pearl millet.

In 1999, SMIP-sponsored consultations with milling, brewing, and animal feed companies indicated that sorghum could readily replace much of the maize currently being used by these companies. This led to the formulation of a pilot project with a brewery, Darbrew Ltd, to contract traders for the supply of high quality sorghum grain from small-scale farmers in the Dodoma region. During the 1999/2000 cropping season, farmers were encouraged to grow a sorghum variety suited to the needs of the brewery. Traders in the region were then encouraged to purchase, assemble, and transport the grain to Dar es Salaam.

Within 2 months of the 2000 harvest, the brewery had purchased over 90 t of sorghum grain. A new sorghum-based beer is on the Dar es Salaam market, and the brewery is considering initiating sorghum beer production in other parts of the country. Additional sorghum grain purchases are expected in the months ahead.

One by-product of these efforts has been the recognition that the new sorghum variety Pato offers excellent brewing characteristics and is a good drought-tolerant variety. Many farmers in the Dodoma region lost their maize and traditional sorghum crops to drought this past season, but fields under Pato performed well. In consequence, the Ministry of Agriculture and Cooperatives is working with SMIP to evaluate several options for speeding up the production and distribution of Pato seed.

SMIP also organized a pilot program to evaluate opportunities for expanding the market for sorghum meal. The 1999 industry consultations found that sorghum meal was being sold on the Dar es Salaam market at three to four times the price of maize meal.

The high price, relative to a close market substitute, severely limited consumer demand. The assessment revealed that high sorghum meal prices resulted from the lack of adequate supplies of grain, high costs of grain cleaning, and uncertainty about consumer demand.

SMIP responded by initiating a pilot program with the company Power Foods. The pilot program will evaluate taste preferences for alternative types of sorghum meal, assess packaging options, and test market sorghum meal at varying prices. Support from outside advisors was also sought to identify opportunities for reducing grain cleaning and milling costs.

In sensory taste tests, Pato was viewed to be superior to a randomly chosen traditional sorghum variety. Consumers expressed satisfaction with the taste, aroma, and consistency of Pato in both stiff and soft breakfast porridge. However, most consumers marginally preferred maize for stiff porridge.

In in-store retail trade surveys, the majority (52%) of buyers stated a preference for paper packaging. However, many (45%) also expressed a preference for plastic packaging. This result may be influenced by the fact that maize and sorghum meal have traditionally been sold in paper packages.

Most respondents indicated that this was the first time they had bought sorghum meal. The product being purchased was mainly used for preparing stiff porridge (*ugali*) and soft porridge (*uji).*

Unexpectedly, the majority of respondents also indicated that sorghum meal is consumed mainly by children. Almost all buyers (98%) indicated that they would buy sorghum meal again.

Over the period of the study, Power Foods sold more than 7 t of sorghum meal. Based on discussions with retailers, consumers at lower-price shops in the city are particularly price sensitive. Here, significant quantities of sorghum will be purchased only if the price is less than or equal to the maize meal price. This will be very difficult given the current cost structure for sorghum grain production, cleaning, and processing. Retailers and consumers in medium and higher-price shops acknowledge the existence of a niche market for sorghum meal at higher prices.

However, there remains confusion about pricing. Sorghum meal has traditionally been sold for Tsh 1000 per kg. During the period of the survey, sales were made at Tsh 300 to 500 per kg, compared with Tsh 250-300 for maize meal. A new sorghum meal product was launched on the market by a competing miller, and sold for Tsh 600-800 per kg. Retailers expressed concern to keep the sorghum meal price as low as possible, but some commented that too low a price may signal a lower quality product to consumers.

More market education will be required. Correspondingly, Power Foods took advantage of the national trade fair and the agricultural show to advertise its products.

Further information on this work can be obtained from J. A. B. Kiriwaggulu, Marketing Development Bureau, Ministry of Agriculture, PO Box 2, Dar es Salaam, Tanzania.

Stratification of Pearl Millet Testing Sites in the SADC Region

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Introduction

Maximization of crop productivity requires accurate selection and targeting of cultivars for appropriate production areas. The number and location of testing sites are critical factors that affect the efficiency of and potential gains from breeding. The selected testing sites must be representative of the conditions of target production areas. Within a large region such as SADC, knowledge of underlying production zones within the region could help not only in choosing appropriate testing sites, but also in objective targeting of cultivars for production (Peterson 1992). The availability of long-term yield data from regional trials conducted in the SADC region over the past decade provides a unique opportunity to identify intra-regional production zones based on grouping of previously used testing sites with respect to their similarities in cultivar response to varying production conditions.

Plant breeders, over the years, often change both the genotypes and the locations in regional trials. Unlike the well-designed balanced genotype x location x year (GLY) investigations, where genotypes and locations remain the same over years, the analysis of regional trials is statistically more difficult due to highly unbalanced GLY data. Statistical techniques, developed over the last decade to stratify testing sites according to similarities in cultivar response, attempt to account for this imbalance in GLY data basically through averaging of location proximity matrices across years. This approach minimizes the influence of missing data and short-term weather events or rare disease epidemics on relative relationships among the testing sites (Peterson 1992).

Based on this basic approach, Peterson (1992) and Peterson and Pfeiffer (1989) applied factor analysis on the average correlation matrix to stratify international winter wheat testing sites using 17 years of trial data. The average correlation matrix was derived from the correlation matrices from individual trial years, the correlations within a year being computed between cultivar yields for pairs of locations. DeLacy et al. (1990) used the pattern analysis technique (Williams 1976) to stratify Australian cotton testing sites based on 6 years' data. They computed squared Euclidean distance (SED) between locations for each year and averaged the SEDs across years to produce a single average dissimilarity matrix for site classification. The individual years' dissimilarity matrices were either simply averaged or weighted by the number of genotypes grown in different years to obtain the single average dissimilarity matrix.

The objective of this research was to stratify the pearl millet testing sites in the SADC region based on available historical yield data from regional trials. This information allowed the identification of key benchmark testing sites representative of the underlying production zones in the SADC region. The site-stratification so obtained will also help to effectively use and target exchange of germplasm and information.

Materials and methods

Data from 90 pearl millet multi-environment trials (MET) conducted at 25 sites over 9 years, was split into two sets: Set 1 (1989/90 to 1992/93) included introductory genetic materials. Set 2 (1994/95 to 1998/99) included advanced genetic materials. Sequential Retrospective (SeqRet) pattern analysis was applied to stratify the test sites according to their similarity of genotype-yield differentiation patterns. This methodology is outlined in DeLacy et al. (1990). The SeqRet package and its manual are available at the website http://pig.ag.uq.edu.au/qgpb.

Results and discussion

Site stratification analysis from Set 1 and Set 2 partitioned the testing sites into six and five groups with R^2 values of 76% and 79% respectively. Analysis of the cumulative dataset (1989/90 to 1998/99) clustered the 25 sites into six