THE DEVELOPMENT OF NATIONAL SORGHUM AND PEARL MILLET RESEARCH CAPABILITIES IN NAMIBIA

Wolfgang Lechner
Mahanene Research Station, P. O. Box 144, Oshakati

Unfortunately Namibia does not have a long history of association with SADC/ICRISAT SMIP up to 1983. Namibia is a new associate of SADC/ICRISAT SMIP. The official link with SADC/ICRISAT began after Independence in 1990, when Namibia became the 10th member state of SADC.

A healthy Sorghum stand at the Agricultural Research Station, Sebele. Namibia will soon have their own germplasm.

But nevertheless, there was already a link between ICRISAT and the NGO-Roussing Foundation, as far back as 1986 at the time I was working for the Roussing Foundation.

After independence Namibia gained straight access to SADC/ICRISAT SMIP and all activities were delegated to the Ministry of Agriculture, and subsequently, the Mahanene station was reopened to begin functioning officially with SMIP.

After a break of more than 10 years agricultural research resumed at the station. Core activities now concentrate on new food crop varieties vital to northern Namibia, particularly pear millet. The is in line with the station’s mandate as it is the centre for research on genetic improvement for the whole country. As there was virtually no research on food crops cultivated by small farmers during the colonial period, the work on new varieties has started by collecting and evaluating traditional varieties grown by
local farmers.

There is, therefore, a clear justification for the development of a full-scale national breeding program on pearl millet in spite of the limited resources available for agricultural research.

During the 1986/87 season, an introduction nursery of 50 varieties from Matopos was sown at the Okashana Centre and in March 1987 the first ever pearl millet (Mahango) Farmers' day was held in Namibia. At the field day, 80% of the visitors selected ICTP 8203 as their favourite. This season had also a very low rainfall and ICTP 8203 performed very well. For the 1987/88 season we requested foundation seed for multiplication and testing on farmers' fields. The 1988/89 season began with a farmers' seed day in November, and it was the first time that proven millet seed was made available to farmers in northern Namibia. About 4t of ICTP 8203 were sold to over 500 farmers on this day. At this time, in agreement with ICRISAT officials, we renamed ICTP 8203 as Okashana 1. In September 1989, it was also the first time that a participant from Namibia attended a SMIP Workshop, in Bulawayo, as an observer.

In the 1989/90 season, Dr Lee House and Dr Gupta visited Namibia and created the Namibia Composite 90 (NC 90), which is undergoing the fourth cycle of random mating at Mahanene Research Station. NC 90 contains the 10 best varieties and a local entry.

In May 1990, the Ministry of Agriculture requested ICRISAT to multiply Okashana 1 seed for Namibia. ICRISAT responded by producing 10.5t of seed at Muzarabani. The seed was distributed (sold 1 rand/kg) to farmers for the 1990/91 season. During 1990/91 Namibia produced 25 t of seed for of which 20t are being sold.

We now have 25t of seed available and we are looking forward to getting another 25 to 30 t from the USAID seed multiplication project, under the supervision of the former Executive Director, Dr Lee House.

To begin the work of the breeding programme, a germplasm collection of more than 900 traditional pearl millet landraces was launched during the 1990/91 season with the assistance of SMIP. The head of the mission was Dr Appa Rao, a botanist from ICRISAT Centre Hyderabad.

Approximately 750 of these landraces were grown last season in trials at Mahanene as well as in Mashare and in Zimbabwe to identify the most promising ones. From this collection we will identify a range of potential varieties for national testing over the next 5 years.

In addition, there were more than 2ha of breeding lines grown that were derived from crosses between selected entries in the collection and adapted varieties from the SADC region, and from 2 500 outstanding plants that were selected from the collection.

These represent the genetic base for breeding new varieties for at least the next 10 years.

There is a real justification that the new government of Namibia has given research on pearl millet top priority. Although the area sown to Pearl millet in Namibia is not large—by global standards, (estimates range between 100 000 and 150 000 ha per annum)—the crop is the predominant cereal grown by all of the country’s small farmers and contributes 24% of the overall total calory intake of the country’s population, compared to 23% for maize and 13% for wheat. (SADC Food Security Quarterly Bulletin June 1991).

This is far more than the corresponding figures for any other SADC country, for which millet and sorghum combined range from 1% to 12% of total national caloric intake.

This predominance of Pearl millet is unlikely to change in the northern districts of Namibia, as no other cereal is as well adapted to the climate and soil conditions.

A good example is the last season where maize farmers had to endure a great loss through the drought. They are now looking forward to planting Pearl millet and demand for is expected to increase substantially.

Namibia at does not present have the resources to conduct its own breeding programs for all other crops which are grown by its farmers.

Fortunately, however,
Namibia's membership in SADC allows its researchers to obtain trials of experimental varieties of many crops from national and regional research programs within the SADC region. Last season, the Mahanene station conducted trials of groundnuts, red and white grain sorghum, and of pigeon peas from several countries. The first varieties from these trials will be entered into the Namibian national variety trials for testing and possible release to Namibian farmers.

All crop research must take into account the harsh environment of the country. Namibia is one of the driest countries in sub-Saharan Africa. Located in South Western Africa, it shows all the characteristics of a semi-arid environment. Rainfall is highly variable and the occurrence of episodic events, for example, an unusually high rainfall or a severe drought, can influence the environment for decades thereafter.

Across northern Namibia, mean rainfall increases from the west (less than 300mm) to the east (more than 550 mm). About 99% of the annual rainfall occurs in summer from October to April. Rainfall is highly variable from year to year and place to place, becoming more variable as average rainfall decreases westwards. Because of this variability, the mean is not a good indicator of conditions but it has been used here as it is conventionally used and understood throughout the world. In semi-arid areas, the median is a better indicator. Rain over Owambus usually falls during convective thunderstorms and can be disastrous for the crops. All these factors have a direct impact on the timing of growth of annual and perennial vegetation, on the presence of surface water including flooding of oshanas, on the pattern of groundwater recharge and, consequently, on all management strategies based upon renewable natural resources.

Most of the rain that falls in Namibia has its origin over the Indian Ocean. Consequently, the air masses bringing rain to Namibia have lost much of their moisture by the time they reach this area. Many other components of global weather patterns also influence the amount of rainfall in Namibia. This adds to its variability.

The critical part of an approach based on the adaptation of existing technology to local problems is the final stage of the testing, which is done on farmers' fields. On-farm testing is the meeting place between the designers of new technology and users. The transfer of new ideas from researcher to farmer and the feedback of problems and needs from farmer to researcher which on-farm testing produces is absolutely essential to a research program with practical, short-term objectives.

On-farm testing does two things that cannot be accomplished by on-station testing: it exposes potential new technologies to a wider range of environmental conditions than would ever be possible on research stations. These include obvious factors such as disease and pest problems variation in soil fertility, amount of rainfall and its distribution pattern plus more intangible factors such as local preferences for colour, taste, ease of preparation, etc. of food products made from new varieties.

It allows farmers themselves to judge how new technologies will fit into their present management systems and to address potential problems in the actual use of these technologies by farmers. The feedback obtained from farmers who have the opportunity to see and try new technologies on their own farms is absolutely essential for the research process. New technologies may, for example, demand skills or resources that farmers do not presently have, or do not believe that they can acquire or may have requirements that conflict with traditional practices, or demands for labour or resources from other parts of the local farming systems (such as the use of crop residue for cattle feed rather than for building soil fertility).

On-farm testing not only serves as a meeting place between researcher and farmer, but between each of these and the extension service, which will ultimately be responsible for the spread of new technology to farmers. Although on-farm testing is primarily a research activity and a part of technology evaluation it is also an effective means of communication between research and extension. This process allows extension personnel to keep abreast of new ideas and allows research personnel to benefit from extension. The extension
service will have to be directly involved in on-farm testing/research in Namibia, because the research service does not have the staff to conduct such trials itself.

The first initiatives into on-farm trials were organised during the 1991/92 season. These included varietal trials, with five to six entries. These comprised varieties released in the region such as Kaufela, PMV-2, etc. a farmer local variety, and Okashana 1. The trials were organised in conjunction with the extension department which was responsible for identifying the farmers and supervising the trials under the farmer's management. The trial was sown on 20 locations and results were obtained from 11 locations of which only 2 were meaningful. The problems that faced the on-farm test program included:

- drought, bird and livestock damage,
- poor management starting from site selection, through sowing, inter-culture, sample harvesting, threshing and data collection;
- poor farmer cooperation;

The extension officers were themselves not competent in crop management to advise the farmers with confidence. They did not fully appreciate the need to carry out all operations on time, and with precision.

To address some of the recognised shortfalls and prepare for better results next season, a training program has been mounted for extension officers. The training includes a hands on practical period during which the officers are expected to practice site selection, laying out of trials, sowing, crop management and using irrigation during the off season. This preparation, it is hoped, should improve the quality of trial results next year as well as make the extension staff more competent to handle production test plots and demonstration plots at the Agricultural Development Centres and on the farms.

There are plans to begin the collection of Pearl millet production data through sample surveys to be conducted by the extension department. It is planned to identify the major constraining to Pearl millet production in northern Namibia through these surveys. These surveys are being collectively planned by the Planning Division of the Ministry and the departments of research and extension.

Another area of research is crop utilisation and marketing. The commercialisation of Pearl millet which has historically been viewed as a mere subsistence crop for the peasants in the north is fundamental to the government's strategy for the development of the northern areas of the country. Namibia currently supplements its own cereal production with imported maize meal which primarily goes to the urban markets. The alternative means of making up the cereal deficit through increased national production of millet is attractive because it could also provide a market opportunity for small farmers in the north for a crop which is well adapted to the climate and with which farmers are familiar. For millet to compete with maize, however, the millet will have to be in the form of meal of flour rather than as unprocessed grain, and the cost of production will have to be competitive with the cost of imported maize. Meeting the first objective should be possible as preliminary milling tests indicate that varieties with hard, round, probably white grain, can be milled to make near white meal. The Namibian White Grain Composite is intended to produce such varieties.

Processing and shelf life is at the moment the bottleneck. We are working on it and are again looking for assistance from ICRISAT food technology division. I'm sure we will succeed again.

Lastly, I would like to thank ICRISAT for all the help we have received so far.

1. Reference

F.R. Bidinger, PhD, Research on Small Farmers Crop in Northern Namibia.