

# Improved *matmuras*: effective but underutilized

Nageeb Ibrahim Bakheit and Kees Stigter

For thousands of years farmers have used underground storage pits to preserve their grain. In Eastern and Central Sudan these pits are known as *matmuras*. Traditionally they are dug in black cotton soil, trying to avoid areas with big cracks or sand or chalk deposits. Cylindrical in shape, they hold from 2 to more than 65 tons of sorghum grain, and are always dug in the same way. The *matmuras* have to be dried before use. Humidity and radiation intensity are important factors in drying and the longer the *matmuras* are dried in optimal climate conditions, the longer they are able to store grain effectively.

Researchers in the Sudan have been studying the *matmura* system for many years. In the 1960s, experiments were carried out in Eastern Sudan where farmers with larger farms are famous for constructing *matmuras* that can hold 200 tons of grain. From time to time the government itself has made use of *matmura* technology. In 1985/6 and 1986/7, for example, the Agricultural Bank of Sudan used heavy machines to dig large storage pits to preserve the country's bumper sorghum harvest.

Improved *matmura* systems have the potential to increase farmers' food security and improve their economic position. Currently, improved *matmura* systems are under-exploited even though the knowledge accumulated through research, experience and farmer innovation shows that *matmuras* can be further developed and adapted. The absence of a policy environment capable of stimulating the use of research results and encouraging the exchange of information on this technology is partly responsible for this situation and has led to a situation where farmers are unable to benefit from the information that exists and are not encouraged to make improvements. At the strategic levels of economic planning and agricultural development *matmuras* have also been largely ignored. They are not included in the storage capacity inventories drawn up by the Ministry of Economic Planning and Investment, and they are seldom mentioned in the lists of research and publications in agricultural bibliographies.

In 1992, *Traditional Techniques of Microclimate Improvement* (TTMI), a research project at Gezira's University supported by the Dutch Ministry of Foreign Affairs through Wageningen University, started experiments aimed at improving smallholder traditional storage pits in Jebelmuoya, Central Sudan. In a specific application of climatological research, studies were made of the factors affecting the climate within storage pits.

The Jebelmuoya area in Sennar State is officially defined as rain-fed, un-demarcated land and has lower rainfall and poorer soils than the nearby demarcated areas where large mechanized farming schemes have been established. Smallholdings in Jebelmuoya vary considerably in size and are supervised by the *Small Farmers' Union for Un-demarcated Areas*. Local farmers generally have little capital, but they do have access to the resources necessary for improving their *matmuras*: cheap labour, abundant land and suitably dry soils. Unlike farmers 30 km away in the *Sennar Agricultural Extension Unit* who also used the

*matmura* system, smallholders in Jebelmuoya are not considered part of the modern sector and are, therefore, not eligible for government services.

Their poverty has made the smallholder communities of Jebelmuoya particularly vulnerable to the climatic changes affecting the region as a whole. They stagger their sorghum planting to offset the risks of crop failure and need storage facilities that will preserve sorghum long enough to carry them through periods of crop failure and food shortage. However, at the moment there is little to encourage them to invest their meagre resources in improving their *matmuras*. Information is scarce and practical help and advice largely unavailable.

Research results from the TTMI project, based on farmer innovations, showed that digging wider, shallower pits and lining them with thick layers of chaff can be very effective if additional, wide soil caps are applied to cover surface cracks. Possibly, plastic would be a better lining, but farmers do not have the money to buy polythene. Even chaff is difficult to find when harvests are poor. Those farmers who are able to invest in improvements are not always able to benefit from the sale of well preserved sorghum, because when poverty and hunger are widespread, the local population is ready to accept whatever sorghum quality they can find on the local market.

The TTMI initiative showed that farmers in Jebelmuoya could benefit from improved *matmuras*. Calculations indicate that improved *matmuras* could increase returns by up to 45% even in the case of small-scale farmers and that the larger the *matmura*, the higher the benefits. A recent survey carried out in three villages in the area showed that farmers were aware of the advantages of developing the system. Forty percent of farmers questioned in the survey commended improved *matmuras* for their storage qualities and low cost. They particularly appreciated the reduced need for chemical protection against pests and the security they provided against theft and fire. There is an urgent need to disseminate these types of research results. The government extension services have an important role to play in this process but at the moment local farmers are largely excluded from extension networks. Even though there is an extension station in the nearby town of Sennar, officials there have no communication links with farmers in Jebelmuoya.

The TTMI project has shown that participation in farmers' problems by observation and targeted problem-solving at a micro-level can increase the resilience and capacity of smallholders in areas with unstable climates. The task of improving farmers' access to information and extension is now in the hands of the *Small Farmers' Union*, which is currently lobbying for demarcation status so that it becomes eligible for planned agricultural development and extension. However, it should be remembered that top-down interventions are likely to be less effective amongst the smallholder communities of Jebelmuoya than participatory approaches focusing on farmers' specific needs. One of the successes of the TTMI initiative has been to show that only targeted participatory research can have far-reaching effects at local and regional level. However, the results of research and farmer innovations must be disseminated, adapted and encouraged by appropriate policies and promoted by agricultural extension services. ■

**Nageeb Ibrahim Bakheit.** TTMI-Project. Lecturer, Faculty of Agriculture, Abu Naama, Sinnar University, P.O. Box 11174, Khartoum, Sudan.  
Email: nagibrahim@hotmail.com

**Kees Stigter.** TTMI/African Network. Visiting professor in Africa and Asia, Wageningen University and Research Centre, The Netherlands.  
Email: cjstigter@usa.net