

# Grain preservation

**Bob Stanley**

Harvest time in Senegal. A dozen or more men are at work in the field, cutting the millet stalks with metal blades bound to their hands, bundling the stalks and stacking the bundles ready for threshing. It is a familiar sight in much of rural West Africa, where millet is one of the staple grains that make up the basis of most meals.

It is backbreaking work beneath the hot sun, but if it has been a good year, if the rains have come, if the millet fingers are fat, the stacks grow quickly and the men sing as they work. A good harvest means full granaries and the assurance of food for all throughout the long dry-season that lies ahead. Or that is what it should mean.

But here is another all-too-familiar sight — long before the first stack is completed, the first of the ants appear. Dozens, then hundreds, then thousands of black soldier ants. Industrious they attack the bundles of millet and carry it away grain by grain, in apparently never-ending columns. The ants too have granaries to fill.

For the farmers and their families it is a heartbreaking sight. And ants are but one predator against whom they must defend their crop. The birds too must be kept away, and other insects, until the grain is dry and ready to be safely stored in the grain bins. Safely? Safe from the birds, perhaps, but all too often the bins provide little protection from the further ravages of insects and rodents. Sometimes more than half the crop is lost one way or another.

Prevention of this kind of food loss is the aim of a grain preservation project now under way at the national agronomic research centre (CNRA) at Bambey, Senegal, with the support of the IDRC. Here, in a corner of the centre's grounds, are rows of traditional grain storage bins of different types — a collection not just from Senegal but from several West African countries. The purpose of bringing them all together here is to try them under identical conditions and find out which of the traditional storage methods is the most effective.

In charge of the research is Dr Gordon Yaciuk, an agricultural engineer whose home is on the Canadian prairies. He explains the storage trials that are being carried out. In one bin is a mixture of sorghum and millet. The smaller millet grains mix with the sorghum and allow less space for insects to get in and move around. The two grains can easily be separated when they are needed by sieving.



*Ants attacking bundles of freshly harvested millet at Bambey.*

Another bin contains a grain and sand mixture. Sand is plentiful and cheap here, and when mixed with the grain it not only restricts the movement of insects, but is sufficiently abrasive that it could kill them. The main problem with this technique is that of removing **all** the sand from the grain later.

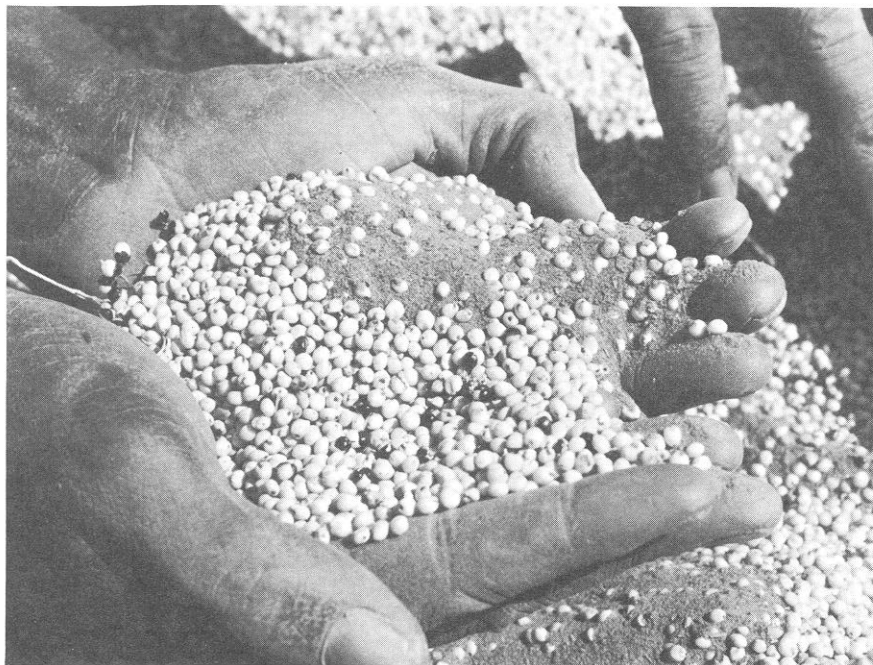
There are modern bins at the centre too. "Primarily we are looking at alter-

natives", says Dr Yaciuk. "Most six-ton bins are too large for the average farmer, so we have designed a four-ton bin with four compartments, which enables the farmer to store four different kinds of grain, and this is working well. We have looked at a three-ton concrete bin which is technically good, but it is too expensive. The cost is a major factor with all concrete bins."

*Grain storage bins at the research centre in Bambey — trying to find out which of the traditional methods is the most effective.*



# cutting the food losses



*Sand and sorghum mixture to keep out the insects.*

He recalls a recent visit to the centre by a group of farmers from a neighbouring village. "We simply let them look at everything and decide for themselves what was best", he says. "Once they saw the results we were getting with the traditional bins they weren't even interested in the concrete bins."

Another storage method is to put the grain in sacks and stack them in sheds.

*Doda Ngom and Ibrahamba Faye, two of the local workers at the centre who helped construct the traditional grain storage bins.*



*Photos: Neill McKee*

Dr Yaciuk is confident that great improvements in grain storage, and an accompanying reduction in losses, can be achieved without necessarily resorting to expensive imported concrete and steel bins. The locally made bins, he points out, although they are built on apparently flimsy bamboo frames, are surprisingly strong, and in many cases could be made much more efficient with only a few minor modifications.

Improved storage, however, is only half the battle. An equally important aspect of the project is concerned with drying and threshing the grain. If it is not properly dried it may develop mould, and there will be even greater losses. If it is not threshed it occupies vastly more space and is much more liable to attack by insects.

At the centre long narrow racks have been built, of simple construction and using locally available materials. Because they are oriented to take best advantage of both sun and wind, these racks allow the millet bundles to dry far more quickly than the traditional cube-shaped stacks that the local farmers build on the ground. Speeding up the harvesting process is an essential element in the grain preservation project.

Hand-threshing millet is a slow laborious process too — a woman may, with practice, be able to thresh two or three kilos an hour. Two small experimental decorticators — threshing machines — have been developed at the centre. If they are successful and can be put into general use they could free the women from hours of work each day, time that could be more productively spent. Dr Yaciuk envisages village vegetable gardens, even a chicken industry — with the chickens fed, of course, on waste grain.

In the long run the researchers hope to be able to introduce a total postharvest system. Most of the trials conducted at the centre are duplicated under field conditions in the villages. And it is here that such a system will have to be developed. Dr Yaciuk feels that the women — who do the threshing, pounding and cooking of the grain — are the key to acceptance of a total system.

As a first step a survey has been started, involving some 800 families in the villages of the surrounding countryside, to identify the needs of the people for a postharvest technology system. The results of the survey will help to determine the direction of future research.