IMPROVING AFRICA'S SORGHUM VARIETIES
by JEAN-MARC FLEURY

"One day", says Jacques Denis, geneticist and plant breeder at the Centre de recherches agronomiques in Bambey, Senegal, "I visited a neighbouring farmer who asked me to look at his field of sorghum. The variety he grew had tall stems and loose, large panicles, bent towards the ground. Well, 114 panicles of this sorghum equalled the weight of 100 of mine and no tilling or fertilizing had been needed to grow this variety."

"Unfortunately", he adds, "although the farmer is particularly proud of his sorghum, which, I admit, is excellent, he can't continue to grow it if he wants to increase his productivity." The variety grown by the farmer only tolerates a low density of plants per hectare and will not respond to the fertilizers he may eventually want to use. His yields are therefore frozen at half a ton per hectare when, elsewhere, yields of three tons are possible.

How do you convince the farmer to replace this variety with another that will enable him to increase his production and therefore improve his living standards? For Jacques Denis there is only one way: simply ask the farmer to "try this and let me know what you think of it". To do so however, the new variety must be somewhat similar to the old. The problem is that the farmer prefers a tall sorghum because he uses the stems for fences, as fuel and to feed his animals. But the most productive sorghum varieties are those that direct the soil's nutritive elements directly to the panicle, to the detriment of the stem that remains relatively short. You therefore have to slowly reduce the height of the sorghum while quickly increasing yields. Once his production has increased, the farmer may have sufficient funds to buy materials for his fences.
In the three years that he has been at the Bambey research centre, Dr Denis has crossed, sown, recrossed and resown hundreds of sorghum varieties imported from America, Asia and other African countries. His research, funded by Canada's International Development Research Centre, has two objectives: to develop early varieties with a growth cycle of 90 days, and late varieties with a growth cycle of 125 days. The yield of the early varieties must be adequate and their grains highly resistant to mould since they will have to produce and mature in the rain. Their advantage is that, after harvest, the farmer has time to till his fields before the end of winter and thus plant his peanut crop earlier. The late varieties must have higher yields than the early varieties. These are particularly suited for southern and central Senegal where winter lasts for four months.

Selection follows two patterns: a high yield per land surface and a high yield per sorghum plant. In the first pattern, the panicles may weigh only 20 to 30 grams but plant density can reach up to 180 000 plants per hectare. This high density offers the farmer a wide margin of security and should be particularly suited to small farms. In the second pattern, plant density is low -- from 50 000 to 80 000 plants per hectare -- but the panicles weigh up to 80 to 100 grams. These varieties will respond well to fertilizers and should be particularly suited to large farms.

It is not sufficient, however, to select plants only for their growth cycle and their yield. One just take into account their resistance to mould, to insects and to Ramulispora, a plant disease widespread in eastern Senegal.

Since his arrival at the research centre, Dr Denis has developed three sorghum varieties: the first has a growth cycle of 90 days, a short stem -- from four to five feet -- and an average yield of three tons per hectare. The second variety takes 125 days to mature, has a short stem and a yield of 2.5 tons; the third, also a late variety, has a tall stem -- almost 11 feet -- and yields close to three tons per hectare.

Some problems do crop up. The high yielding varieties, for instance, usually have a compact panicle in which insects can hide and they provide birds with a solid landing platform. The variety grown by the farmer has a loose panicle and, since the spikelets are well spaced, there is no place for insects to hide or birds to perch. Recognizing these problems, Dr Denis has developed high yielding varieties with long, semi-compact panicles.

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But Dr Denis is not satisfied with only improving sorghum varieties. He also wants to communicate a bit of his knowledge to the farmer. In fact, even though sorghum is an autogamous plant (autogamous plants possess both male and female parts and are therefore self-fertilizing), some plants will be fertilized by others. And tall plants have a better chance of fertilizing others. If the farmer decides to adopt a short variety, he will have to learn to harvest the panicles on windy days. In this way he will maintain a certain uniformity of his seeds and thus obtain a more uniform, more easily commercialized crop. Dr Denis hopes that once the farmer is conscious of the process of natural selection, he will be able to choose the most promising plants himself. "At any rate", says Dr Denis, "the farmer has always carried out a great deal of this breeding work himself."

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