



FEATURE

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ACACIAS AT HOME ON THE RANGE

by Jean-Marc Fleury

SENEGAL, IDRC -- Mbiddi. When this small isolated hamlet of some 50 people in the north of Senegal is invaded during the dry season by thousands of cattle, the huts disappear behind the dust. The herders - Senegal's cowboys - know that there they will be able to water their herds. The well at Mbiddi is 250 metres deep and never dry.

The animals come for water, but the inhabitants stay behind the forestry station. "If it wasn't for the research station," says Oumar Tandia, technician with Senegal's Directorate of Water and Forests, "the drought would have emptied the village." Forestry work employs many heads of households.

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In this region, typical of the Sahel, a good year will bring from 250 to 300 mm of erratic rains. El Hadji Sène, Director of Water and Forests, calls it "mosaic rain." "It rains enough to grow the crops in one village, yet in another barely 30 km away, there isn't a drop," he says. It is for this reason that many deep wells have been bored. There are now more than 70 throughout Senegal's rangelands, spaced about 30 to 40 km apart.

The environment around the boreholes suffers from the regular onslaught of large numbers of animals: some are more affected than others as brush fires and mosaic rains drive the animals toward certain sites. Between October and June, the leaves on the trees are the only green forage available. Toward the end of the dry season, leaves and edible pods make up about half the diet of the region's goats, camels, and cattle.

The ligneous (woody) cover near the water holes is subjected to extremely intensive grazing.

The drought that came in 1972 delivered the final blow. The water table fell, slipping away under the roots. Over-exploitation coupled with the drought to destroy 20 to 80 percent of the ligneous cover, particularly around water holes.

The disappearance of the trees deprived the animals of the much-needed "aerial pastures." The nomadic herders also lost an important source of revenue. One of the trees, the *Acacia senegal*, secretes gum arabic, a valuable ingredient in many pharmaceuticals and foods. Senegal has traditionally been one of the main exporters of gum arabic, but the drought caused exports to plummet from 6000 tonnes in 1971 to 500 tonnes in 1972. And because the trees were destroyed, Senegal's production has remained at 500 to 1000 tonnes a year.

Because of the importance of cattle-raising to the area, Senegal's forestry authorities decided to wage war against the desert. Reforestation, especially around water holes, became a priority in order to promote a better-planned development of the cattle industry and encourage the settlement of nomadic herders.

Some research on gum and forage producing acacias had already been carried out in Senegal and elsewhere, but without follow-up. "It was back to square one," says El Hadji Sène. In 1972 discussions were undertaken with the International Development Research Centre (IDRC), of Canada, which supported a research project on the reforestation of rangelands.

The Senegalese researchers and engineers have now succeeded in establishing an impressive collection at Mbiddi. The experimental plantations total 340 hectares 75 of which are planted to gum trees, the rest to forage trees. Planted in 1974, the gum trees stand proud - even though a mature *Acacia senegal* tree only grows to 2-5 metres. The survival rate has remained at 85 to 95 percent despite extremely difficult years. In 1976, for example, an army of rats gnawed all the young trees. The next year, the drought returned with a vengeance. Although only 130 mm of rain fell, the acacias survived.

Thanks to the techniques developed at Mbiddi, 5,000 hectares of gum trees have been planted since 1975 at water holes and settlements. The cost per hectare, some 100,000 francs CFA (about US\$360), is too high to permit the reforestation of the region's 80 000 sq. km, however. To reduce this cost, Mr. Sène is relying on community participation. In one department, for example, the Directorate planned to establish 600 hectares of community plantations in 1981. "They told us that 600 hectares was good, but 1000 would be a lot better", says El Hadji Sène. "We gave them the green light, and true to their word, when we carried out an inventory in this community, we counted 1018 reforested hectares".

Research on the forage trees confirmed the remarkable drought-resistance of the indigenous species. The *Acacia tortilis*, *nilotica*, and *senegal* displayed a surprising vigour, growing 60 to 70 cm a year. The species imported from Australia, however, were disappointing, although the second and third generations - trees obtained from seed of trees grown in Senegal - seem more resistant. They will need to prove their hardiness: cattle and goats that have tasted the Australians leaves didn't leave so much as a twig or stem.

The solution to the adaptation problems of exotic acacia species could come from biotechnology. A young researcher at the National Centre for Forestry Research, Ibrahima Guèye has just returned from Canada where he completed a masters' degree in plant symbiosis. At the University of Laval in Quebec, he studied the bacteria and fungi that promote the growth of acacias.

Rhizobium bacteria colonize the roots of leguminous plants such as acacia enabling them to fix and use atmospheric nitrogen. In the same way, the microscopic fungi, mycorrhizae, help the plants to assimilate phosphorus, the most important nutrient after nitrogen. Both rhizobium and mycorrhizae are found on the roots of *Acacia senegal* and *tortilis*. The researchers hope to identify strains that will double the trees' initial growth rate in the nursery. These biological helpers will assist the trees to produce more protein-rich foliage and may also broaden the range of tree species that could be introduced in the Sahel's rangelands.

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If the research seems increasingly specialized, the researchers have not forgotten the users. "Mbiddi will only reach its objective if we can translate the results into tools for the people of the region," says El Hadji Sène.

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May 1982