

The many uses of millet residues



Photo: John Lamers

In the West African Sahel, extension agencies have started to promote the recycling of organic matter such as crop residues and animal manure to deal with problems of soil erosion and low soil fertility. But farmers are reluctant to adopt it. To find out why, researchers from the University of Hohenheim and the ICRISAT Sahelian Center studied how farmers in western Niger currently use millet residues.

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After grain harvest, most millet and sorghum stover is left in the field, whereas cowpea and groundnut hay are harvested and stored as feed. Livestock owners send their animals to their fields to graze during the day and to manure by night. Farmers also accept offers by herders, who camp their animals on fields in return for bundles of unthreshed millet. The herds thus have access to crop residues to eat, while the farmers obtain organic manure.

Cattle, goats and sheep normally do not eat stalks at the onset of the dry period, because the millet leaves and herbaceous plants in the fields are more palatable. But in very dry years, even low-quality stalks are a precious feed. The stems are cut into small pieces to improve their digestibility.

Improving livestock diet

As the quality of the stover declines with the advance of the dry season, many farmers supplement the animal diet with leaves and fruits of trees and shrubs. Some preferred species are *Balanites aegyptiaca*, *Silerocarya birrea*, *Faidherbia albida* and *Ziziphus mauritiana*. Tree pods are collected and brought to the animals, or the animals are taken to the trees and eat the pods which fall naturally or are knocked down by herders. Farmers also like to include millet bran, cowpea and groundnut hay in the feeding ration, especially of sheep.

Farmers also appreciate the feeding value of weeds such as *Eragrostis tremula*, *Commelina forskalali* and *Alysicarpus ovalifolius*. Around urban centres, the men make modest earnings by collecting and selling these weeds.

Stalks for home and sale

With the gradual loss of natural grazing

areas, farmers have become aware of the rising market value of crop residues (Speirs & Olsen 1992). Particularly around urban centres, millet stover is harvested and sold on town markets for about 7-10 FCFA/kg (in 1992/3). This income can be important during years of poor grain harvest (Hopkins & Reardon 1989). Around the capital Niamey about 20% of the millet residues are cut and carried from the field (ICRISAT 1992).

From fields near villages, some millet stalks are collected for building granaries, fencing or making mats. In areas where firewood is scarce, stalks are used as fuel. Children use the pith to make toys.

Halting erosion

Wind erosion damage is a vicious cycle: decreasing soil fertility and reduced yields lead to a surface crust unsuitable for plant growth. As there is less straw, the top sand layer becomes more prone to wind erosion. The only way to break this cycle is to improve soil fertility and rebuild the soil.

Farmers know that stalks protect the soil from erosion. They apply millet stalks from more productive patches or branches of shrubs as mulch, so as to capture the air-borne sand and regain a sandy topsoil. They concentrate this material on specific bad spots, instead of following the exten-

sion recommendation of broadcast application. During the dry season, the stalks are gradually decomposed by the soil fauna, especially termites.

Farmers appreciate the sand-trapping more than the fertilising effects of stover. As fertiliser, they prefer a mixture of crop residues and manure. The straw then decomposes more quickly and has a better effect on the following crop. Moreover, broadcast application of crop residues at a rate of 2 t/ha stimulates weed growth and increases weeding time by 25-30%. This may be another reason why farmers prefer concentrated application of organic matter.

Competing demands

Farmers in Niger are obviously aware of the beneficial effect of crop residues on soil fertility and erosion. However, millet residues are scarce and are important in feeding strategies. Broadcast application of crop residues for soil improvement, as proposed by research and extension, competes with traditional uses. In peri-urban farming systems, the sale of millet residues is another competitive factor. The common practices and farmers' preferences can explain their reluctance to adopt the recommendations.

The holistic view of the farmers was underestimated. Farmers should be offered a range of options (eg, decomposing of household refuse, increased use of locally-practised agroforestry systems, improving manure quality) so that they can choose and build them into their own ways of using resources.

References:

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Table 1: Common uses of millet crop residues in western Niger

Non-harvested residues		Harvested residues			
Animal feed*	Mulch	Cash by-products	Manual crafts	Animal feed*	Fuel
Own animals	Fertilising effects	Huts Granary	Huts Granary	For own animals	For own use
Exchange with herders	Anti-erosive effects	Fence Mats Fodder	Fence Mats		

* Eventually results in manure after passing through animals