KEEP ROLLING

Dung beetles will be rolling up the themes again. When we publish a Newsletter on a certain theme, we hope that readers will digest it so that new ideas can emerge. In this section "Keep Rolling" you have a chance to present further information about themes highlighted in previous issues, thus giving still more food for thought and action.

Photo: Daniel Buckles

Edible cover crops

The traditional food uses of mucuna (*Mucuna pruriens*) and canavalia or jackbean (*Canavalia ensiformis*) in Ghana make these cover crops an option for farmers with limited land, labour or rainfall. This article describes traditional food uses which make these two nitrogen-fixing crops more interesting for for small farmers.

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Mucuna pruriens and *Canavalia ensiformis* are among the most promising legumes currently being studied and promoted as green manures and cover crops in the humid tropics. In Mexico and Central America alone, at least 50 NGOs, universities and research institutions currently feature these two legumes in their research and extension programs. The benefits of green manure/cover crops with mucuna and canavalia have been documented. Up to 9 t/ha of dry matter containing an estimated 150 kg/ha of nitrogen are provided by the cover crop. In addition, effective weed control take place, even of *Imperata cylindrica*. Also, the reduction of drought stress in wintermaize and erosion control have been observed. Mucuna is already used by some 25,000 farmers in Mesoamerica (Southern Mexico and Central America). Canavalia is gaining ground among farmers in drier regions where it can also be used as a forage crop for cattle. This is the result of independent farmer-to-farmer diffusion and focused research and extension efforts in various regions (Buckles, 1995; Bunch, 1990; Gordon et al., 1993).

Despite these advances, the use of green manure/cover crops is constrained by the other more economically promising uses for land, labour and scarce rainfall. The so-called "opportunity costs" refer to the loss of income which would have been obtained had that land, labour of moisture been used for another crop or activity. This is especially the case in areas where land use is intense or where complex intercropping systems (maize-bean-squash in Mesoamerica) are common. Further utilisation and adaptation of green manure/cover crops such as mucuna and canavalia would consequently benefit greatly from a better understanding of the potential food and forage uses of these crops. This article describes traditional food uses of mucuna and canavalia in Ghana, West Africa, with a view to stimulating further research on the multiple uses of these versatile legumes.

Sources of information

Data on traditional uses of mucuna and canavalia in Ghana were collected through informal discussions with approximately 60 farmers in the forest and transition zones of the country from 1991 to 1994. Most interviews were conducted in the villages of Goaso, Nkawie and Effiduase in the forest zone and Sekodumasi, Ejura and Nkoranza in the transition zone. During this period, some of the authors made random stops at villages in various other parts of the country to interview farmers on the use of these legumes, particularly on the road from Kumasi to Accra, Kumasi to Sunvani, Kumasi to Techiman and Kumasi to Goaso. Observations in farmers', fields were also made during visits to on-farm trials, and extension staff in all of these zones were interviewed.

A food-first tradition

Results of the interviews show that many farmers in the forest and transition zones grow small quantities of mucuna or canavalia for food. About 90% and 55% of the people interviewed in the forest and transition zones, respectively, knew that mucuna and/or canavalia are used for food. Most of the respondents (about 90% and 30% in the forest and transition zones, respectively) also indicated that they regularly consume mucuna or canavalia in soups and stews. The interviews in the forest zone indicated that mucuna is much more popular than canavalia and almost as popular as lima beans. In the forest zone, mucuna is consumed almost every day by many households. In the transition zone, however, lima beans are used more often than mucuna, which in turn is used more often than canavalia.

Farmers usually plant only a few stands of these legumes, normally four to eight plants in part of their fields. Mucuna is planted beneath trees so the vines can climb to bear fruit. Planting is done together with the other crops at the beginning of the major season (April). The legumes may also be established from volunteer crops of previous years. Both mucuna and canavalia are grown for home use, although the legumes are sold in small quantities in both urban and rural markets, typically as fresh beans in the pod.

The seed of commonly grown types of mucuna is ash, black or mottled in colour while canavalia is white or mottled. The farmers classify the mucuna according to maturity period. The mottled-seed mucuna is described as early while the black and ash are described as late maturing. All mucuna varieties are known as Adua-apia in the language of the Ashanti. Canavalia, known in Ghana as Adua Nkrante, is classified as erect (white seeded, *Canavalia radiata*) and climbing

(mottled seeded, *Canavalia ensiformis*).

Most informants over 70 years of age interviewed during the study indicated that their grandparents grew mucuna and canavalia for food, an observation suggesting that these legumes have been used in Ghana for at least a century, if not more. The interviews also indicated that both mucuna and canavalia are grown mainly by old and/or married women.

None of the people interviewed had knowledge of the potential benefits of mucuna or canavalia as green manure/cover crops, although some informants were familiar with the use of other crops such as *Pureraria* and *Centrosema* as cover on plantations. Nevertheless, some farmers observed that if mucuna is allowed to grow without control it smothers field crops and weeds. All experienced growers of mucuna and canavalia indicated that these legumes can easily be controlled, hence they pose no threat as weeds.

Method of preparation

The beans of mucuna and canavalia contain approximately 24% protein, a clear indication of their nutritional value. However, mucuna beans also naturally contain the chemical Levodopa. This chemical is used in the treatment of Parkinson's disease but can also produce vomiting and a toxic, confusional state in humans. In 1989, an outbreak of acute psychosis affecting more than 200 people in Mozambique was attributed to the consumption of mucuna (Infante et al, 1990). The authors of the medical report indicate that due to famine and drought, mucuna beans were prepared improperly and consumed in much larger quantities than normal. This experience raises concerns about preparation techniques and safe consumption levels. The consumption of canavalia does not appear to present risks to human health.

Traditional food uses of mucuna and canavalia in Ghana provide reasonable guidelines to safe levels for human consumption, although research on this issue is still needed. Only small quantities of the beans are consumed daily. Interviews with Ghanaian women indicated that between 10 and 15 mucuna beans or 10 canavalia beans are consumed per person during a meal. In both cases, the legumes are boiled for 40 minutes with other ingredients and the water discarded before the beans are used in stews and soups. Dry or fresh beans can be used. No health problems associated with the consumption of mucuna or canavalia prepared in this manner were reported.

To prepare a stew, mucuna or canavalia beans are boiled with chillies and onions. The seed coat and the water used in boiling are discarded and the remaining endosperm is ground into a fine paste along with the other ingredients. The seed coat is discarded because it does not grind easily. Salt and heated palm oil are added to the paste and the dish is eaten with yam, plantain or cocoyam.

Soups are also prepared by boiling mucuna or canavalia seeds with chillies and egg plants or cocoyam leaves. After discarding the seed coat of the legume and water used in boiling, a fine paste is prepared from the ingredients and dissolved in a soup made of onions, tomatoes, salt and meat or chicken. Soup in Ghana is eaten with fufu, a starchy food made of pounded cassava and plantain, cocoyam or yam. A soup or stew prepared for a family of four includes between 40 and 60 seeds of mucuna or between 20 and 40 seeds of canavalia.

Most of the respondents likened the taste of both mucuna and canavalia to groundnuts when used in soups and eggs when used to prepare stew. Although some of the respondents maintained that the taste of mucuna and canavalia is different, there was no consistent response as to which of them has a better taste. There was, however, a general response that the taste of different varieties of each of the legumes did not differ. About 40% of informants who use these legumes said they mainly consume mature, fresh beans while the rest indicated that they consume both the dry and fresh beans. Although all the respondents indicated that the taste of dry and fresh beans is the same, most prefer to use the fresh bean because cooking time is reduced. Dry beans can be cracked, soaked overnight or briefly toasted on a fire to reduce cooking time.

Conclusion

Mucuna and canavalia have been grown extensively as minor food crops in Ghana for at least a century. The legumes are used frequently in stews and soups, but in very small quantities during any one meal. Boiling the mucuna bean for 40 minutes and discarding the water seem to render it safe for limited human consumption. Human consumption of canavalia presents no known complications. Given the proven utility of mucuna and canavalia as green manure/cover crops, further research on potential food uses is called for. Traditional food uses of these legumes in Ghana are encouraging, and can provide some guidelines to farm families.

References

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Study on farmer management of wild sunflowers *(Tithonia diversifolia)*.

As part of a wider investigation of farmer-generated innovations towards improved fallows, the ICRAF SE Asian programme is currently conducting a study in the Philippines on farmer management of wild sunflower to exploit its agronomic properties. This sunflower originated in tropical America and is thought to have been introduced to the Philippines as an ornamental early in this century. It has now become naturalised in upland areas throughout the country. Older farmers in Luzon describe planting "fertiliser banks" of wild sunflower which would then be harvested and applied as an organic fertiliser to cultivated plots. *T. diversifolia* is exploited by farmers as a soil improver in a wide variety of ways, but this study focuses on its application as an improved fallow species in Bukidnon province of Mindanao. Through rapid growth, efficient scavenging of soil nutrients, copious leaf litter, and rapid decomposition,wild sunflower appears to accelerate nutrient cycling and enable soil rehabilitation during an abbreviated fallow period, much the same as other *Compositae spp*. Sunflower hedgerows maintained around the swidden perimeter provide the seed source to facilitate rapid colonisation during the fallow. The large leaf area of sunflower intercepts most light and hard-to-control grasses are quickly choked out. A two year fallow appears to be the norm, after which the sunflower biomass is easily slashed and mulched or burned. Some farmers interviewed claim that soil physical properties improve so dramatically during this peribd that ploughing is unnecessary and seeds can be dibbled directly - a big advantage in erosion-prone sloping uplands.

ICRAF's study in the Philippines will collect and analyse aerial biomass / soil samples from sunflower fallows at a range of ages from 3 mo. to 7 years - as well as adjacent *Imperata cylindrica* and *Pteridium aquilinum* (Bracken Fern)-dominated fallows for comparative purposes. Structured interviews will then elicit farmer perceptions on the role of sunflowers in their farming systems. Other farmers in the study area are manipulating wild sunflower as a biological tool to eradicate Imperata and rehabilitate degraded grasslands. In this case, stem cuttings may be planted at intervals throughout Imperata swards - or alternately, seeds are sometimes broadcasted. Farmers claim that at the end of the first year, the "cogon" is almost completely choked out and displaced by sunflower. By year two, the sunflower fallow can already be re-opened and a good crop grown without fertiliser inputs.

Collaborative field trials being conducted in Kenya by ICRAF and the Tropical Soil Biology and Fertility Programme are providing convincing quantitative data on the green manure potential of *Tithonia* and validating the indigenous knowledge underlying Filipino farmer practices. Although *Tithonia diversifolia* is widespread and reportedly similarly perceived by farmers in other equatorial regions, there appears to be little documentation available on its agronomic potentials. Much information appears to be anecdotal and undocumented. ICRAF would welcome hearing from others with observations, research or relevant literature regarding farmer perceptions and management of this species. Comments and suggestions are most welcome.

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