

The spinach tree – a versatile crop for semiarid areas

Introduced species – particularly ones which enter through informal communication channels – can become so integrated into "traditional" farming that they become part of indigenous knowledge. Ronald Watts discovered that peasants in Zambia have long been growing the spinach tree (*Moringa oleifera*) to produce leaves for "relish". This encouraged him to find out more about the tree.

Ronald Watts/Zambia



An impressive orchard of *Moringa oleifera* at Slatwinda in Zambia in the hot and dry Gwembe Valley. The trees have been pollarded because of the regular use of leaves. Photo: Ronald Watts.

It was at the southern end of Lake Kariba that I first became aware of the spinach tree. The farmers told me it came across the river from Bulawayo in the days before the dam. Several orchards were probably covered by the rising waters. In over 30 years of working in Africa, it was the first tree I had seen grown by peasants on a substantial scale for its leaves. The farmers said that people with this tree were besieged by neighbours during a drought year because they could not find any "relish" to go with the staple food. Relish is ideally made from a mixture of meat or fish, groundnuts and vegetables but a poor person will sometimes use only spinach leaves. As the leaves of *Moringa oleifera* are a good substitute for spinach, an appropriate name in Zambia would be "Relish Tree". Other names include Benzoline, Mother's Best Friend, Drumstick Tree and Horseradish Tree (the roots taste of horseradish).

Better than Leucaena

We have all heard of multipurpose "miracle" trees that could revolutionise farming, e.g. *Leucaena*. Where *Leucaena* is difficult to grow, *Moringa* can serve many of the same purposes. It seems to have excellent prospects as a fodder tree. Its main advantage over *Leucaena* is that it can be propagated from cuttings and, if a large cutting (ca 2 m) is planted, the tree is immediately out of reach of free-roaming animals. Another problem with *Leucaena* is that termites attack the young seedlings in the dry season. Termite attack seems to be less of a problem in *Moringa*. In any case, cuttings are less vulnerable than

seedlings because of their size.

Moringa can also be grown from seed. Germination takes place very quickly and early growth is phenomenal. According to Roy Danforth in Zaire (Echo Technical Note A-5), one 3-month-old tree grew to almost 3 m. Another tree grew to about 5 m in 9 months. The trees I saw in Zambia had obviously been regularly cut at about 2 m high to provide relish.

Suitable natural conditions

Moringa is grown throughout the tropics, most notably in the Philippines, Haiti and Hawaii. In Africa it is grown along the Nile in Sudan and in Uganda, Zaire, Cote d'Ivoire and several other countries. According to the ICRAF database, the tree grows well in the following conditions:

Mean annual rainfall: 366-1177 (!) mm
Annual mean minimum temperature: 18-20°C
Annual mean maximum temperature: 31-34°C

Absolute minimum temperature: 6-8°C
Altitude: 0-660 m

Moringa also grows at higher altitudes, as a specimen tree has grown for many years in the Harare Botanical Garden (1470 m). Echo reports that it grows in Nepal. In the Dominican Republic, it is said to withstand frost and even frozen soil.

According to ICRAF, *Moringa* likes light sandy and medium loamy soils with a minimum depth of 50 cm and no water-logging. It will stand some acidity. Beth Mayhood (Echo) reports that it also stands alkalinity and a high salt content. In dry areas *Moringa* needs a reasonably high groundwater table.

The tree can be propagated in several ways. According to ICRAF, it will grow from stumps, seedlings, natural regeneration, coppicing, air layering, direct sowing and cuttings. Zambian farmers said that the best time for planting cuttings was in the late dry season, but this may depend on soil type and termite challenge. A nursery at Magoye in Zambia's Southern Province reported problems with termites when cuttings were grown in plastic pots, but achieved some control by planting with the plastic sleeve as protection. The tree can be grown as a hedge. When it is used mainly for the roots, it is grown from seed in beds like a vegetable.



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.

Wide range of uses

Moringa can be used in a multitude of ways. Its main deficiency compared with many leguminous trees is that it does not fix nitrogen. As it is deep-rooting, it could also be tried in alley cropping.

ICRAF also lists the use of Moringa for cosmetics, insecticides, fibres and aromatic essences. Maydell (1986) reports a wide range of medical applications.

Many management possibilities

The farmers near Lake Kariba plant Moringa in and near their compounds,

so the leaves are readily accessible for cooking and the trees provide shade. Since branches and leaves are constantly being removed, pruning is automatic, but would need to be done anyway to prevent lanky growth and breaking branches during high winds. The height of cutting would depend on access of domestic animals, particularly goats. Spacing depends very much on use, the widest spacing being in woodlots and the closest when Moringa is used as a root vegetable. The range would thus be from 4 m to 20 cm.

Potential in Africa

For a peasant farmer to grow 20-30 Moringa trees on his own initiative around his compound must mean that the tree

has considerable potential. Much research is needed to find out how its obvious qualities can be used more widely. Farmers could gradually extend tree cultivation, starting with a few around the house and could then expanding to a plot for feeding livestock in dry periods, and later planting it all over the farm along contours to prevent erosion or for alley cropping between annual crops. The area in Zambia where I first saw Moringa has a mean annual rainfall of about 700 mm but a very severe 7-month dry season. In such an area, the main factor which might limit the spread of Moringa would be the presence of groundwater at a reasonable depth.

In this area of Zambia, a detailed study of the food economy of the Tonga people was made from 1957 to 1971 (Scudder 1971). Moringa oleifera was mentioned as an introduced species in Mwemba villages, and given the local name Zakalanda. The study focused on the 131 wild plants eaten by the Tonga. While there is nothing wrong with eating wild plants, these must increasingly be supplemented by cultivated crops. The population of the area has risen greatly since 1957 and has been concentrated on higher ground after the flooding of the Zambezi Valley by the Kariba Dam in the early 1960s. The fact that these farmers have adopted Moringa without encouragement from extensionists is a good omen. It opens up the possibilities for agroforestry in a semi-subsistence economy. This would have tremendous benefits in ensuring more ground cover, reducing erosion and, at the same time, providing both humans and livestock with a better and more reliable diet. ■

References

- Brandis D. 1984 *Indian trees*. Archibald Constable & Co.
- ICRAF. *Multipurpose tree and shrub database*. Details from Dr. P.G. van Carlowitz. ICRAF, PO Box 30677, Nairobi, Kenya.
- Jahn SAA et al. 1986. *The tree that purifies water: cultivating multipurpose Moringaceae in the Sudan*. *Unasyva* 38 (2): 23-28.
- Martin. *Survival and subsistence in the tropics*.
- von Maydell HJ. 1986. *Trees and shrubs of the Sahel*. Eschborn: GTZ.
- Okafor JC. 1980. *Trees for food and fodder in the savanna areas of Nigeria*. *International Tree Crops Journal* 1.
- Price ML. *The benzoline tree*. Echo Technical Note A-5. Available free from: ECHO, 1743D Durrance Road, North Fort Myers, FL 33903, USA.
- Scudder T. 1971. *Gathering among African woodland savannah cultivators*. Harare: Institute of African Studies, University of Zambia.
- Singh RV. 1982. *Fodder trees of India*. New Delhi: Oxford & IBH.

Ronald Watts,
Dept of Community Medicine
PO Box A178,
Harare, Zimbabwe

USE	NOTES	REFERENCE
1. Leaves as vegetable Pick young, remove stems, steam for few minutes;	high in Ca, Fe and vitamin A	Martin
2. Edible roots Grind taproot of young plant, add vinegar and salt to make horseradish sauce		Echo
3. Edible pods Cut in short lengths, boil 10 minutes, makes mock asparagus soup.	add milk and season to taste	Alicia Ray (Echo)
4. Edible nuts and seeds Cook seeds before they start to turn yellow; dry seeds have bitter coat which limits use		Maydell
5. Edible oils and fats High oil content (38%), remove oil with press, used for cooking or lubricating, also used as soap		Alicia Ray (Echo); Brandis
6. Seeds to purify water Suspension of seed as primary coagulant to remove turbidity and bacteria.	doses up to 250 mg/l	Jahn et al
7. Flowers Eaten and used to make a tea; used as a cold cure, source of pollen and nectar in apiculture		Alicia Ray (Echo), Okafor; Singh
8. Livestock feed Fruit, pods and seeds used as fodder: shoots and leaves highly palatable, can be fed as supplement, young leaves contain vitamin C		Singh, Price, Maydell
9. Fencing Makes good live fencepost for wire; plant closely from seed or cuttings for living fence/hedge		Okafor
10. Pulpwood Wood very soft		Singh
11. Fuelwood Exceptionally quick growing, acceptable firewood.	not suited for charcoal	Singh, Price
12. Shade/ornamental Grown in compound; feathery, fern-like leaves makes it attractive		Okafor
13. Soil conservation Quick growth and natural regeneration		Okafor
14. Magic rites Used against witchcraft and hyenas		Maydell