

A. Niang, E. Styger, A. Gahamanyi and J. Ugeziwe

## *Mimosa scabrella*: a tree for high places

**M***mimosa scabrella* is a multipurpose tree indigenous to southeast Brazil. In 1990 it was introduced, along with 64 other species with 24 provenances, to the Gakuta Research Station in western Rwanda.

The purpose was to identify species that could best be adapted to the difficult conditions of the rugged Zaire–Nile Crest, and ultimately to diversify the range of multipurpose trees in the area. The mountainous ridge has an altitude of 2500 m and very acidic soils, high in aluminium. It is usually windy and temperatures are relatively low, with sunshine less than 60% of daylight hours.

### Fast-growing, easily managed

At Gakuta, mimosa trees grew faster than all others tested. After two years mimosa trees were, on average, almost twice as tall (516 cm) as *Acacia melanoxylon* (282 cm), a species that is well adapted to the region and commonly used in reforestation projects. Vertical growth of mimosa was about three times more rapid than that of *Grevillea robusta*, a species that is well established and widespread in Rwanda.

*Sesbania* spp., *Leucaena diversifolia* and *Calliandra calothyrsus* did not do well in the ecological conditions at the Gakuta station.

Management trials showed that mimosa coppices extremely well.

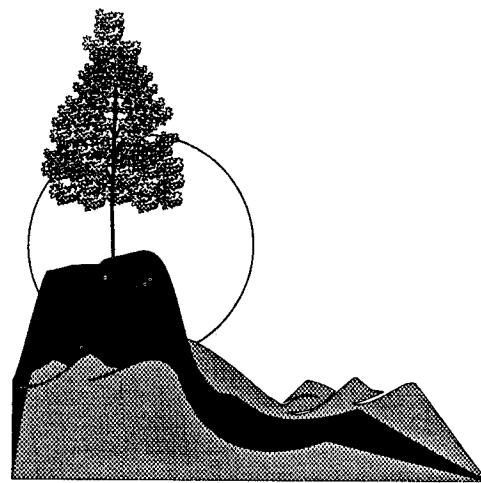
A. Niang is head of the ISAR/ICRAF Project, P.O. Box 617, Butare, Rwanda. E. Styger is an agronomist working with ISAR/ICRAF. A. Gahamanyi is head of the national agroforestry programme in Rwanda. J. Ugeziwe is a researcher with the ISAR/ICRAF project.

The leafy biomass produced by mimosa increases with the height of the cut, up to 75 cm. The amounts of fresh leaf material produced per metre were 13.8 kg, 17.8 kg and 20.3 kg respectively for cuts made at 25 cm, 50 cm and 75 cm, over a period of two years after six cuttings. The first cutting was done 9 months after planting.

At Rwerere, another highland station in Rwanda where researchers from ICRAF and the Institut des Sciences Agronomiques du Rwanda (ISAR) are working and where soil conditions are decidedly more favourable than at Gakuta, mimosa trees produced 1.25 times more leafy biomass per metre (10.2 kg m<sup>-1</sup>) than did *L. diversifolia* and *C. calothyrsus* (8.3 kg m<sup>-1</sup>).

### Goats like the fodder

In a trial to determine which species provided the best fodder, newly weaned male goats half a year old, with an average weight of 10.4 kg, were fed diets consisting of the grass *Setaria splendida*, mixed with leaves from each of the following species: *Hagenia abyssinica*, *Alnus acuminata*, *Chamaecytisus palmensis*, *Acacia melanoxylon*, *Acacia meamsii*, *Acacia koa*, *Acacia koaia* and *M. scabrella*. Overall the goats preferred the grass mixed with *A. koaia*, but the mixture of the grass and mimosa leaves came a close second (refused in 50% of cases compared with 40% for *A. koaia*). Indeed, the goats ate the mimosa–grass mixture as readily as they did the pure grass. Ingestion of dry matter actually increased by 80% when goats were given the mixture rather than just grass (392 g as opposed to 706 g per animal per day).



Mimosa is rich in protein, with a content of 24.5% that is comparable to other species popularly used in development projects in Rwanda—*sesbania*, *leucaena* and *calliandra*.


When young male goats were fed a diet of *S. splendida* enriched with 45 and 66% mimosa leaves for five weeks, their weight gains were 51–63% greater than when they were fed pure *S. splendida*.

### Farmers like the tree

Researchers from the ISAR/ICRAF project distributed mimosa seedlings to more than 100 farmers as part of its on-farm research and its collaborative work with development projects in the area. The positive results obtained on the research station were duplicated on the farms; farmers favourably compared the usefulness and the morphology of the mimosa trees with those of *leucaena* and *sesbania*.

Three years after mimosa was introduced at the Gakuta Research Station, it still showed no signs of flowering. However, where it had been planted elsewhere at lower altitudes—about 1700 m—the tree began to fruit after a year and a half.

### Looking ahead

*M. scabrella* shows great promise as a multipurpose agroforestry tree in the rugged highlands of Rwanda. Its rapid growth and high production of biomass make it excellent for fodder; goats thrive on diets that contain mimosa leaves. Studies are under way to assess the range of its uses on farms, the qualities and uses of its wood and its interaction with crops. 

## Mimosa scabrella

- [Species identity](#)
  - [Ecology and distribution](#)
  - [Propagation and management](#)
  - [Functional uses](#)
  - [Pests and diseases](#)
  - [Additional Info](#)
  - [Bibliography](#)
  - [Images](#)
- 

### **Species identity**

#### ***Taxonomy***

Current name: *Mimosa scabrella*  
Authority: Benth.  
Family: Fabaceae - Mimosoideae

#### ***Synonym(s)***

*Mimosa bracinga* Hoehne

#### ***Common names***

(English) : bracinga, mimosa  
(French) : mimosa  
(Portuguese) : abarácaatinga, bracaatinga  
(Spanish) : Abarácaatinga, Bracaatinga, Bracinga  
(Trade name) : bracinga

#### ***Botanic description***

*Mimosa scabrella* is a small- to medium-sized tree 4-12 (max. 20) m high, with a tall, straight, slender trunk 10-50 cm in diameter in forest, or short and branched, with dense rounded crown of grey foliage, or a large shrub. Bark whitish-grey, almost smooth. Twigs densely scaly. Leaves pinnate, compound and small, with axis 3-11 cm long and 3-9 pairs of pinnae 2-7 cm long, larger on vigorous twigs. Leaflets 15-35 pairs on each side of axis, narrowly oblong, tiny, 2-5 mm long, blunt, densely covered with fine, star-shaped hairs, upper surface yellow-green, paler underneath. Flower clusters (short racemes) 1-3 at leaf bases or several along short axis, consisting of heads or balls, rounded or elliptical, 7-10 mm in diameter. Flowers many, small, whitish, 5-7 mm long, composed or tubular hairless calyx 1 mm long, united into tube near base, and pistil with narrow ovary and slender style. Pods several in cluster, narrowly oblong, flattened, 2-4 x 5-9 mm, covered with tiny warts, separating into 2-4 joints or segments, 4-angled and 1-seeded, each splitting open. Seeds few, beanlike, egg-shaped, flattened, 3-6 mm long, brown. The generic name 'mimosa' is from the Greek meaning to imitate or mimic. This refers to some species of the genus that may appear to imitate animals because the sensitive leaflets move and fold up when touched.

#### **Ecology and distribution**

#### ***History of cultivation***

As early as 1930, F.C. Hoehne in Brazil called attention to this rapidly growing tree as an excellent source of fuel. As a result, forest plantations were established. It was introduced experimentally from Argentina north to Mexico, and to Africa and southern Europe.

#### ***Natural Habitat***

*M. scabrella* is native to the cool, subtropical plains of southeastern Brazil, but it is very robust and can grow in both warmer and drier areas. The species is not recommended, however, for areas with mean annual temperatures higher than 23 deg. C. Although in its natural range, rainfall is generally well distributed throughout the year, the tree can tolerate dry

is generally well distributed throughout the year, and trees can tolerate dry periods of up to 4 months. It is susceptible to strong winds.

### **Geographic distribution**

Native : Brazil

Exotic : Argentina, Cameroon, Colombia, Costa Rica, Democratic Republic of Congo, El Salvador, Ethiopia, Guatemala, Honduras, Jamaica, Kenya, Mexico, Nicaragua, Rwanda, Senegal, Spain, Uganda, Venezuela

### **Biophysical limits**

Altitude: 200-2400 m, Mean annual temperature: 12-23 deg. C, Mean annual rainfall: 600-3500 mm Soil type: Prefers free-draining soil. It tolerates strongly acid soils with pH as low as 4.8 and those with high aluminium content; it does not tolerate waterlogged, compacted or severely degraded soils.

### **Reproductive Biology**

It has been suggested that *M. scabrella* is cross-pollinating.

### **Propagation and management**

#### **Propagation methods**

*M. scabrella* can be grown from seedlings or by direct seeding with frequent weeding. To obtain rapid and uniform germination, scarify the seeds by pouring boiling water over them and stirring gently for 3 minutes. Seeds can then be soaked in tap water for 24-48 hours to accelerate germination. Successful germination is also possible with bare-root seedlings. Nursery-grown plants are ready for field planting in 2-4 months, or when seedlings are 15-20 cm in height.

#### **Tree Management**

*M. scabrella* is a fast-growing tree. In 14 months it grows to 5 m; in 2 years, 8-9 m; and in 3 years it sometimes reaches a height of 15 m. Plantations have been harvested on rotations as short as 3 years. Fuelwood plantations in Brazil are commonly planted at spacings of 2 x 2 or 3 x 3 m and harvested on 3-7 year rotations. Planted in Costa Rica at a spacing of 4 x 5 m in deep, fertile, well-drained fertilized coffee plantations, it reaches 5-6 m in height and 8-11 cm in dbh at 16 months. It is not a good hedgerow species because it does not coppice, though it can be pollarded or pruned effectively.

#### **Germplasm Management**

Orthodox seed storage behaviour; viability is maintained for at least 3-5 years when stored in cold chambers. There are 65 000-70 000 seeds/kg.

### **Functional uses**

#### **Products**

Apiculture: Abundant flowering make it excellent for honey production. Fuel: Produces high-quality firewood; however, the charcoal produces a large amount of ash. Before the advent of the diesel locomotive, *M. scabrella* wood was grown to fuel railroads in parts of Brazil. Fibre: *M. scabrella* fibre is approximately 1.2 mm long, and its pulp is good enough to use in the manufacture of printing and writing papers. Timber: A valuable source of timber. The heartwood is tinted a greyish-rose colour, is hard, moderately heavy, and with a specific gravity reported to range from 450 to 670 kg/cubic m; the sapwood is pinkish. The wood is used for lumber and is straight grained and medium textured with a moderately rough surface without lustre.

#### **Services**

Shade or shelter: *M. scabrella* is used as a shade tree for highland coffee plantations in Cameroon and Central America. Reclamation: As a pioneer species, it established pure, dense stands throughout vast areas in Brazil's Parana area after the native forests (*Araucaria angustifolia*) were cut and burned, indicating its reforestation potential. Nitrogen fixing: The tree is able to fix atmospheric nitrogen. Soil improver: Throughout the year, it sheds large quantities of nitrogen-rich leaves that decompose rapidly and form rich humus. Ornamental: Commonly referred to as 'the tree with many white feathers', it makes a beautiful garden or avenue tree. Boundary/barrier/support: The attractive flowers make it a pleasant live

boundary, barrier, support. The attractive flowers make it a pleasant live fence. Stakes are used as fence posts and in tomato production. Intercropping: Often found growing in association with maize and beans.

#### ***Pests and diseases***

In its native range, some 28 species of insects are reported to attack *M. scabrella*.

#### **Bibliography**

Glover N. 1988. *Mimosa scabrella* - the tree that fuelled the railroads of Brazil. Nitrogen Fixing Tree Association. Waimanalo.

Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.

ICRAF. 1992. A selection of useful trees and shrubs for Kenya: Notes on their identification, propagation and management for use by farming and pastoral communities. ICRAF.

Katende AB et al. 1995. Useful trees and shrubs for Uganda. Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).

Little EL. 1983. Common fuelwood crops. Communi-Tech Association, Morgantown, West Virginia.

MacDicken GK. 1994. Selection and management of nitrogen fixing trees. Winrock International, and Bangkok: FAO.

National Academy of Sciences. 1980. Firewood crops. National Academy Press. Washington D.C.