

Faidherbia albida (previously *Acacia albida*), is the scientific name of a tree that grows in arid and semi-arid parts of Africa.

Some other names for the same plant -

Amharic: garar.

Arabic: haraz, azara, emil, atasa.

Bambara: Balansan.

Dioula: Balansan.

Dogon: sèngè

English: white-thorn, white acacia, apple ring acacia, Ana tree,

Winter thorn.

Fulfulde: tieaki, tiaski.

French: arbre blanc.

Malinka: alansan.

Mooré: Zaanga.

Ndebele: umpumbu, umtungabayeni

Peul: Tieaki.

Shona: mutsangu.

Senoufo: baazaa, wanfiré.

Songai: gao,

kassanegnia.

Soninke: kounie.

Swahili: mkababu, mgunga.

Tamasheq: afrer, atuss, harega, ifrar,



Tigrigna: garsha, momona, aqba.

Tongan: mujagwe, mutsangu.

Tswana: mokosho.

Wolof: cad.

Xaasongaxango: kunie sasé

Zulu: umHlalankwazi.

WHAT IS THIS ACTION SHEET ABOUT?

This action sheet is a brief guide to growing and using *Faidherbia albida*. There is some background information: description of the plant, fruit and seed, where it grows, the countries, habitats and its' ecology. Its' uses, the value for people, animals and the environment are described. There is information on how to grow it from seed and from cuttings, with advice on collecting and treating seeds, nursing seeds and cuttings, and planting out and caring for young trees. There are references, and sources of further information.

DESCRIPTION OF THE PLANT

Faidherbia albida is one of the largest thorn trees, it reaches up to 30m in height, with a trunk 6-8m tall and diameter 1-2m. It has spreading branches and a rounded crown. In very arid places or with much browsing it may be a shrub. It can also be multi stemmed. The young branches are white or pale grey with a distinctive zigzag shape. It has very long tap taps, up to 40m deep. Trees can live for 70-100 years.

FRUITS AND SEEDS

The fruit is a pod. It is bright orange to reddish-brown in colour, thick, curled and twisted; up to 25 x 5cm. The seeds grow inside the pod. There are 10-29 hard, dark brown, oval shaped, shiny seeds in each pod. They are about 1 cm long with a leathery, waterproof surface. Trees first flower at 8-10 years old. Flowering is 1-2 months into the dry season, lasting up to 5 months. Fruit ripen near the end of the dry season.



WHERE DOES IT GROW?

Distribution. It is native to arid and semi-arid areas of Africa: from Angola and Tanzania to South Africa, Uganda, Kenya, Somalia and Eritrea across Chad, Niger, Senegal to Mauritania.

Habitat. It grows in dry areas with mean annual rain of 50-1500 mm a year. It likes sandy soils, light clay or shallow rocky soil. It grows best in deep and light, well-drained soil. It can tolerate waterlogging and salinity. Naturally *Faidherbia* often grows on the banks of seasonal rivers and streams, it grows in open grasslands, scrub savannah and woodlands and is popular as a shade tree in villages and towns. Naturally it grows at altitudes of -270 to 2700m, tolerates temperatures 9-42°C.

ECOLOGY *Faidherbia albida* is a nitrogen fixing plant. This means that it has nodules on its roots containing specific types of bacteria. The bacteria take nitrogen from the air and turn it into a form usable by plants. It also has fungi called mycorrhizae that attach to the roots. The fungi break down resources in soil and make them usable by the tree. *Faidherbia albida* has very deep roots, up to 40m deep, so it collects water that is unreachable for most plants. Once these roots are established it can tolerate drought, as long as the roots reach down to underground water. They also bring nutrients up from deep in the ground. All these nutrients and organic matter are added to the soil when leaves fall and decompose, making it more fertile for other plants. Seedlings rarely grow naturally under the canopy of a mature tree. One reason is that most seeds get eaten. Another reason is that they can't survive in shade. Young trees also do not grow if they are shaded.

Reverse phenology - Phenology is the pattern and timing of fruiting and flowering. This tree is in leaf in the dry season, so leaves provide shade from harsh sun. Leaves fall at the end of the dry season, when farmers start to cultivate the soil. As rain starts to fall it decomposes the leaves on the ground providing organic matter and nutrients to nourish crops just when they are spouting and growing. Because it is most actively growing during the dry season it doesn't compete with crops for scarce nutrients, light and water when the crops are growing. Because the tree collects water from deep in the soil, it doesn't compete with crops for water.



Faidherbia is becoming scarce in many areas, in some places this is because of overuse for fuelwood and fodder. Livestock can cause other problems. The pods are nutritious, popular food for wildlife and livestock. Elephants, buffalo, eland and other wildlife will feast on pods of a fruiting tree, then drop the seeds in their faeces in far distant places. They carry seeds to places where they can grow. Their digestive system softens the seed case, so that it easily germinates after passing out in faeces, which acts as fertiliser for the seedling. Domestic animals also like to eat the fruits and seeds. However, cows, sheep, camels and goats eat their food differently to most wild animals. They often crush seeds as they chew, turning them to pulp which can never germinate. Seeds that pass through the gut of an elephant or antelope will germinate. The increased number of domestic animals and fewer wild animals in many places has meant reduced the number of young trees.

In Niger this tree is called 'Green Gold' because the yield of millet, sorghum and groundnuts is so much higher when grown under its' canopy. In the past Sultans decapitated anyone who cut a Goa tree. At this time farmers didn't need fallows because Goa trees kept the soil fertile. There was no such thing as desertification then.

In Sudan in the past law forbade taking wood from living *Faidherbia* trees.

USES : WHY IS FAIDHERBIA IMPORTANT?

1. The wood is excellent fuel and makes high quality charcoal.
2. It provides poles, wood for tools, carpentry, furniture, construction, biomass.
3. The leaves, pods and seeds are good fodder for livestock.
4. The roots stabilise the soil.
5. It provides shelter, from wind.
6. It provides shade in the dry season.
7. It improves the soil, so crops do better.
 - Yields of millet can be 50-150% higher when grown under Faidherbia trees.
 - It's 'a natural fertilizer factory', one tree has the fertilising power of 10 cows, equal to 300kg of fertilizers and 250kg of lime.
8. Having 20 trees per hectare can increase beef production by a one third. It provides food and shelter for biodiversity.
9. Tannin for preparing leather.
10. Medicine.
11. Source of pollen for honeybees at a time when pollen is scarce.

Sustainability. If seeds are harvested for fodder it is important to allocate some every year for planting, just as you do with millet, maize and other crops.

HOW TO GROW FAIDHERBIA

Many people encourage wild seedlings that grow on farmland, weeding and protecting them. This is good to do. But cultivating is an ideal way to get the most from this valuable tree. New plants can be produced where you want them to mature (in situ), or in a nursery using containers or a nursery bed before transplanting. Seedlings have very long roots, so allow space for these to grow and not be damaged when transplanting. Action sheet 49: Tree planting, has useful information.

Growing from seed.

The best place to get seed is from mature trees growing in your locality, or nearby. Seeds from your area will be adapted to local conditions. Provenances from the Sahel have longer roots than those from elsewhere in Africa, even if they are not grown in the Sahel.

Collecting seeds. Watch the trees so you know when the fruits will ripen. Seeds need to be removed from the pods as soon as they ripen because insects, especially beetles, will damage them very quickly. Wild and domestic animals, birds and rodents also like to eat the fresh seeds. They will congregate and eat the whole harvest. Collect from several trees, this gives genetic diversity. Seeds that are collected, dipped in diluted insecticide and dried can be kept in an airtight container for several years and will still germinate. If seeds are unavailable locally ask the World Agroforestry Centre (ICRAF) headquarters on Gilgil Road, Nairobi, Kenya.

Pre-treating seeds. These seeds can naturally stay dormant for years. Pre-treating lets moisture penetrate the hard case so that germination happens immediately.

Method 1. Scarification is the most effective way to treat your seeds. Make a tiny cut at the end of each seed. A pair of nail-clippers, or a sharp knife on a wooden board work well. Take care not to damage the seed inside the 'shell'. After cutting soak your seeds in water for 12 hours. Discard any that float. Then drain the water and keep the seeds damp (wet but not covered by water) and in the dark for two days more. Now plant your seeds.

Method 2. Boiling. Put your seeds in a bucket or basin. Pour enough boiling water to cover all the seeds. Cover the bucket and leave them to soak in the water for 24 hours. Drain and plant. The germination rate is lower with method 2.

Germinating seeds. Expect scarified seeds to germinate within 8 days, and seeds treated with boiling water to germinate within 30 days.

Germinating in a nursery. Place the seeds 2 cm below the surface of the ground. If possible dig a hole and mix in any kind of available 'compost' – actual compost made from food peelings, leaves, grass, straw, sawdust, animal droppings, etc. Any or all of these mixed with ash, burned bones, urine, silt and organic soil will help the seedlings grow. Germinating in-situ. If you choose to germinate your seeds where you want the trees to grow. Loosen the ground, mixing in compost material and a little soil from under a mature *Faidherbia* tree. Plant 3–4 seeds as soon as possible after the beginning of the rains, 2cm below the soil surface. Plant 10m apart, aim to have 70 or more trees per hectare. Mark the planting place so that you know where to check for signs of shoots. Keep the ground moist. Seedlings do not tolerate fire or shade. Clear the grass around each planting, this will act as a firebreak.

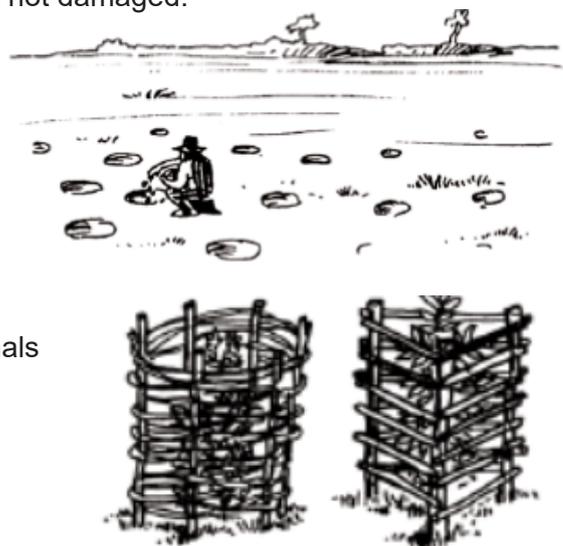
Nursing seedlings. Use sand, silt or light clay to grow your seedlings. Add actual compost (see Action sheet 31: Practical composting), made from food waste, leaves, grass, straw, sawdust, animal dropping, crop residue. Any of these mixed with ash, burned bones or urine will help your trees. The soil from abandoned termite mounds is good substrate. Add soil collected under the canopy of a mature *Faidherbia* tree to your substrate. This provides the microorganisms (bacteria and fungi) that your tree needs.

If you see little or no growth above ground in the first months don't be dismayed. Growth below ground is faster than above ground. A seedling 5-6cm tall can have a tap root 7m deep! If you sow seeds in containers use deep tubes or bags to allow space for the tap root to grow down. If you sow seeds in a nursery bed be sure that it is deep enough to lift out. Roots can grow 1cm a day as seedlings. If you are not ready to transplant, then prune the main root. Others will grow back, stronger.

- Seedlings will grow best if they have water and nutrients. Water if you can. Mix the surface of the soil frequently to prevent a hard cap forming.
- Seedlings need light. Clear away grass and anything else that creates shade.
- Protect your seeds and seedlings from predators. Rodents, birds and other creatures are all a danger. Parrots, horn bills, mice and baboons as well as larger animals will all eat and destroy seeds and seedlings.

PLANTING OUT AND CARING FOR YOUNG TREES

1. Seedlings can usually be planted out 3-4 months after germinating. When moving seedlings take care to gently dig deep under the pot to ensure roots are not damaged.
2. Plant out as early in the wet season as possible.
3. Prepare the planting spot by digging a hole twice the depth of roots, loosen the ground and add available organic or compost material as described above.
4. Plant about 10 m apart, aiming to have 70 or more trees per hectare.
5. Trees grow well when planted close to abandoned termite mounds.
6. Protect your seedlings and young trees from browsing cattle, camels, goats, sheep and other animals for the first two years.
7. Protect them from getting crushed or trampled by passing animals and humans.
8. Protect seedlings and young trees from wind and sand blasting.



9. In dry periods during the first year, giving water will help your trees. Providing water that penetrates deep into the ground less often is better than a little water on the surface every day.
10. Clear vegetation around seedlings to create a fire break and prevent shading. They will not grow in shade and are not resistant to fire.
11. They grow well in cultivated land where grass is cleared.
12. Your trees will grow more below than above ground. Tap roots can grow 7m in 9 months!

VEGETATIVE PROPAGATION

Root suckers. *Faidherbia* spreads by 'suckers' or spouts on side roots that produce stems and grow into new trees. Suckering produces lines or clumps of trees close to each other. When a sucker has a stem it can be separated from the 'parent' by digging and cutting through the side shoots that join the two plants. Dig the younger plant up and re-plant where you would like it to grow.

Root cuttings. To make root cuttings, dig in the ground under the canopy of a healthy, mature tree. Look for root that is healthy and can be pulled or easily cut loose. It should have fine roots visible. Detach and replant in a moist place or container in soil or sand with compost materials added (as described above). Take several cuttings but do not threaten the adult tree. Cuttings produce shoots and roots within 2-3 months, then you can plant out as if it were a 'seedling'.

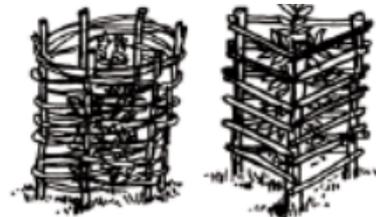
Coppice cuttings. When *Faidherbia* trees are cut the stumps sprout. You can make cuttings from by cleanly cutting a sprout with the thickness of a finger, 20-30cm long. Place the cutting with 1/4 of its length in compost and keep it moist. Plant out when it has shoots and roots.

Root cuttings do better than coppice cuttings. Growing from seed is most successful.

MANAGING YOUR TREES

Weed and protect young trees for the first 2 years.

After this, your trees become a valuable resource.



If you want to collect fodder repeated pruning during the growing season stimulates leaf production. It can be pruned up to twice a year, but will produce fewer leaves after each prune.

- More information on use for fodder in Action sheet # 37: Planting fodder banks for livestock.
- This tree can be coppiced to maximise wood and pole production.

REFERENCES

Agroforestry Database 4.0 (Orwa et al.2009) *Faidherbia albida* (Del.) A. Chev. Fabaceae – Mimosoideae . <http://apps.worldagroforestry.org/treedb2> downloaded Feb 22nd 2021.

Barnes, R.D. and Fagg, C.W. 2003. *Faidherbia albida* Monograph and annotated bibliography. Oxford Forestry Institute, Tropical Forestry Papers No. 41. Oxford Forestry Institute, Department of Plant Sciences, University of Oxford.

Chuyong, G. & Acidri, T. 2015. Combining Pre-sowing Treatments in *Faidherbia albida* (Delile) A. Chev. Does not Imply Better Germination Success. *International Journal of Plant & Soil Science* · July 2015

Roupsard, O., Ferhi, A., Granier, A., Pallo, F., Depommier, D., Mallet, B., . . . Dreyer, E. (1999). Reverse Phenology and Dry-Season Water Uptake by *Faidherbia albida* (Del.) A. Chev. in an Agroforestry Parkland of Sudanese West Africa. *Functional Ecology*, 13(4), 460-472. Retrieved February 22, 2021, from <http://www.jstor.org/stable/2656552>

Sacande, M, Sanou, L. & Beentje, H. 2012. *Guide d'Identification des Arbres du Burkina Faso*. Royal Botanic Gardens, Kew. UK

Sacande, M, Sanogo, S, & Beentje, H. 2016. *Guide d'Identification des Arbres du Mali*. Royal Botanic Gardens, Kew. UK. Tropical Plants database, KenFarm. tropical.theferns.info. 2021-02-21. ,tropical.theferns.info/viewtropical.php?id=Faidherbia+albida

FOR MORE INFORMATION

PACE Action sheet 31: Practical composting

PACE Action sheet 49: Multi-purpose trees

PACE Action sheet 50: Tree planting

PACE Action sheet 67: Planting trees for fuelwood

PACE Action sheet 37: Planting fodder banks for livestock

PACE Action sheet 36: Planting nitrogen fixing trees

PACE Action sheet 35: Agroforestry

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