

Transforming Acacia Shrubs into Trees

a rapid, low-cost afforestation strategy
for *Acacia tortilis*

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The information in this guide was collected through experimentation and consultation with several communities in Samburu County, Kenya and through consult with sustainable development professionals, namely Tony Rinaudo of World Vision, Australia.

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How to use this guide:

Teachers, community leaders, development professionals, volunteers, and other change agents can use this booklet as a visual aide to inspire communities to maximize their benefits from naturally-occurring *Acacia tortilis* tree. This is a loose set of guidelines. It is a starting place for individuals, community organizations, schools and other groups to experiment with ways of managing their existing wood and fodder resources and for transforming stunted, shrub-like *Acacia* plants into productive trees. The strategies highlighted here are based on work with pastoralists in the semi-arid, Acacia-scrub of northern Kenya; it is likely that the optimal strategy for other communities will differ in several ways. Users of this guide are encouraged to: participate in the process of experimentation, monitor and adjust their strategies over time, and share their own insights with the authors of this guide and other change agents.

For more information about Farmer Managed Natural Regeneration (FMNR) and management practices for other tree species please visit FMNRhub.org

Afforestation is a process through which people work to increase the number of trees on a landscape. It is often viewed as one of the most effective strategies for increasing global food security, reversing the effects of desertification, combatting climate change and creating livable environments for humans and wildlife. To date, the majority of afforestation projects in Africa have focused on the direct planting of seedlings, a process that requires significant investment in time, labor, water and other resources, not to mention a fair amount of luck. Transplanted seedlings seldom survive in dry environments without regular watering and diligent protection. This puts an unnecessary strain on individual land users and on communities who are meant to benefit from such trees.

Fortunately, there is a more efficient, more reliable way to increase the number of trees. *Farmer managed natural regeneration* (FMNR) has already proven to be a rapid and cost-effective means of increasing tree cover in semi-arid sub-Saharan Africa. By facilitating the growth of naturally occurring trees, FMNR has been used in the afforestation of millions of hectares and has improved food security for many thousands of African farmers.

(for more information about FMNR visit FMNRhub.com)



A student waters a newly transplanted *Acacia tortilis* seedling, which requires much more care and protection than an established plant. It did not survive despite frequent attention.

FMNR *usually* involves pruning small shrub-like trees, and re-sprouted stumps so that growth is focused into one or two upward growing trunks, instead of spreading out their growth among several low-lying branches. This helps the plants escape the reach of domestic and wild herbivores, which tend to suppress their growth into shrub-like form. Pruning in this way usually results in *rapid* upward growth because stunted plants often have mature root systems, despite appearing small above ground. Some tree species have even grown 2-3 meters in the first year.

Like many arid-land species, *Acacia tortilis* often grows as a small shrub when it is over-browed by sheep and goats, improperly cut by humans, or exposed to harsh environmental conditions. In areas like Samburu, Kenya, where people are concerned about the decline of larger *Acacia* trees, there may be hundreds of stunted, shrub-like *Acacias* per hectare, waiting to be transformed into trees. If such communities adopt the techniques described in this guide, they may be able to rapidly increase the number of *Acacia tortilis* trees on their landscapes at little-to-no cost.

Neighbors gather to perform FMNR around a home in Samburu, Kenya. Now that they are tied, the shrubs in the foreground are more likely to become trees like those in the background.



About *Acacia tortilis*:

Commonly referred to as the umbrella acacia, *Acacia tortilis* (aka *Vachellia tortilis*) is a relatively fast growing species common throughout Sub-Saharan Africa and the Middle East. Many may recognize it as the iconic flat-topped tree scattered across East-African savannahs, though it occurs in wide range of environments and soils. They are regarded as one of the more adaptable trees species, able to tolerate extreme drought, flooding, and salty and/or poor soils. As trees they can reach a height of 20 meters with a spreading crown of a similar width.



Acacia tortilis is best distinguished from other *Acacia* species by the presence of two different types of thorns; the first are paired, long (2-5cm), thin and white; the second are small, brown/red and hooked towards the plant. It has small (2.5 cm), bi-pinnate leaves that often persist into the dry season. Its fragrant flowers grow in round, white clusters. The bark varies from dark-brown to grey, but it may be yellowish on smaller plants.



Acacia tortilis wood is used extensively for construction and as fuel for cooking. Many thousands of acres of *Acacia* in East Africa have been deforested to supply the charcoal industry. It is also widely used in home construction and the thorny branches are an important fencing material for pastoralists. The value of this species for pastoralists cannot be understated. It produces high protein leaves and a coiled, high-protein, seed pod during the dry season that both serve as vital sources of fodder for livestock (and wildlife) during times when little else may be available. Herders will often cut down entire trees in order to feed their livestock. This practice should be replaced with the conscientious pruning methods described in this document so that a sustainable use of those resources can be maintained year after year.

In some parts of Africa *Acacia tortilis* can be considered a keystone species, meaning that it is a crucial part of its local ecosystem. *Acacias* create conditions that support the growth of grasses and other plants, including many crops. There are a number of possible reasons for this: For one, *Acacia tortilis* trees have spread out leaves, so plants growing beneath them are shaded from intense sunlight but are still receiving plenty of light to grow. These *Acacias* are also nitrogen fixers, their decomposing leaves help build up soil and provide a natural mulch and fertilizer. In harsh environments hardy trees like *Acacia tortilis* also help other plants keep from drying out by protecting them from wind and by shading the soil. The plant is also an important part of the food chain, providing a vital food source for many of Africa's larger herbivores.



FMNR with *Acacia tortilis*

Young *Acacia tortilis* plants tend to grow in a spread-out shape, close to the ground when they are frequently browsed by livestock or when they regrow from the stumps of previously felled trees. In this stunted form, it may take many years before a plant is able to escape the reach of animals and become a full, productive tree, if it ever happens at all. Fortunately, since those plants may be many years old, they often have strong root systems that are ready to support much larger plants above ground. By encouraging these plants to grow upward, we help them escape the reach of livestock and ensure that they maximize their growth potential.



The single most important step in transforming shrub-like *Acacias* into trees is to correct the direction of branch growth upward. Unlike many other tree species, smaller *Acacia tortilis* plants are especially susceptible to disease and should NOT be pruned while they are in shrub form. Only diseased and dead branches should be removed before the plant is at least two meters tall. Instead, the branches of *Acacia* shrubs can be tied together, propped with large stones or staked with a stick so that all of the branches grow vertically. This reverses the pattern of suppression. Instead of damage by livestock and people driving the plant downwards to grow horizontally, those same forces will now encourage more upward growth. The leaves of a tied *Acacia* are also better protected because the thorns become more densely packed when the branches are closer together. Eventually, the plant will grow high enough to escape the reach of animals all-together, at that point it should be free to grow tall and provide continuous benefits to people and wildlife.

This practice, in combination with sustainable pruning/harvesting techniques can help communities increase the number of trees around their homes, schools, farms and in community grazing areas.

The methods described here are partly based on existing practices among pastoralists in Samburu, Kenya. While promoting these techniques it is important to consult with community members about the tree management strategies they already use. There is no single correct set of methods. The most appropriate strategies in a particular area will be found by asking for local insights, soliciting full participation from community members and through continuous experimentation. Communities should experiment with pruning at different times of the year. Pruning at the beginning of the rainy season may be the best time, because it gives the plant the ability to fight disease and to maximize regrowth. Similar methods can also be tried on other species, such as *Acacia nubica*.



Acacia trees often grow as short, spread-out shrubs in areas with a lot of people and livestock (above). In fact there are several dozen of these stunted trees growing in the foreground of the photo on the bottom. With the techniques presented here those shrubs can be transformed into productive trees like those in the background. (Photos were taken during the dry season)



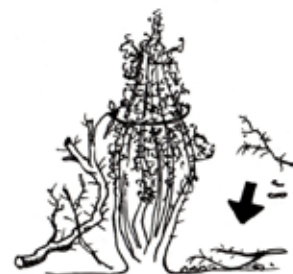
Step-by-Step: Transforming shrub-like *Acacias* into trees



1. Look for *A. tortilis* plants that are not growing in an upwards direction. These are common in areas where there are a lot of livestock.



2. Use a forked stick, length of rope (see 'belt-method') or gloves, to push all of the branches together and tie a string around them. The string should be loose enough to allow for the branches to grow and it should be tied near the top. Be careful not to damage the bark of the plant, as it can become diseased.



3. Cover the ground around the tree's base with bark and sticks. This will act as a mulch, shading the soil and providing nutrients over time. Thorny, dead (not diseased) *Acacia* branches can be placed around the plant to protect it from animals.

4. If the tree is growing on a slope, create a crescent-shaped line of stones to capture runoff water around the plant.



5. After the tree has grown over 2 meters in height few of the weaker/diseased branches can be removed. Leave at least 2-4 of the largest/healthiest branches (these will become the tree's trunks). Prune smaller branches on the bottom 1/3 of the tree, this tends to force the plant to grow upward. ALWAYS cut with a *sharp* tool, the plant will be less likely to become diseased.



6. After a few years the lower branches and smaller trunks can be harvested for firewood, fodder, charcoal production, construction, fencing or other purposes. Always leave the top 2/3 of the tree to keep growing.



Strings and other tying materials:

Choose a long lasting material to tie the plants. 2-6mm plastic string is low cost (\$.02 - \$.05 U.S. per tree), readily available and should last about a year or two, which should be long enough for the branches to stay upright. Natural fiber strings may be used, however goats have been known to chew on these when they get the chance. Bear in mind how long it will take for the material to degrade in sunlight. Avoid using metal wire, unless you are confident that someone will remove it when the tree grows larger (wire can eventually strangle a tree as it grows). When in doubt, use whatever is available: pieces of cloth, electrical wiring, plant-fiber ropes, shoelaces, and even the plant's own branches have been used.



Belt method:

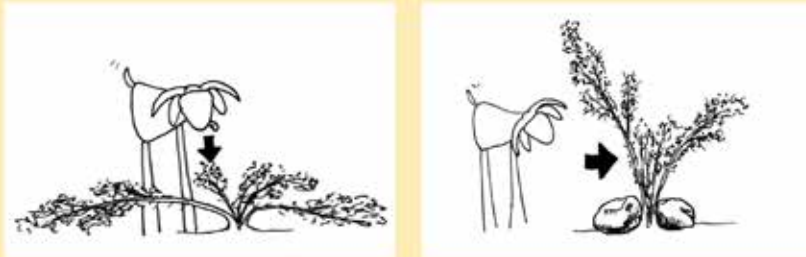
Use a belt or piece of rope-like-material to pull the thorny branches together and tie them with a piece of string. It is important not to use the string itself to pull the branches together because it tends to damage the bark.





Propping with stones:

Younger *Acacias* can be simply propped up with a few large stones. This takes about a minute to do and costs nothing. Notice that before it was propped animals forced the plant (below) to grow sideways by eating from the top. But now goats and sheep will eat the leaves from the side, forcing the plant to grow upwards. In addition, the inner branches are now protected by the outer ones.



These young boys decided to copy their parents and prop all of the *Acacias* they could find. Parents appreciate having tied or propped *Acacias* around their home, because children are less likely to trip or get caught on the thorny branches while playing.



Harvest branches, not trees:

Entire *Acacia* trees are often unnecessarily cut down for charcoal production or feeding livestock. As nearby trees become scarce people must walk further and further to find wood or fodder. But by pruning and harvesting only *branches* the trees nearby can survive to supply wood year after year. As we have seen, proper pruning can even be *helpful* to the plant's growth.



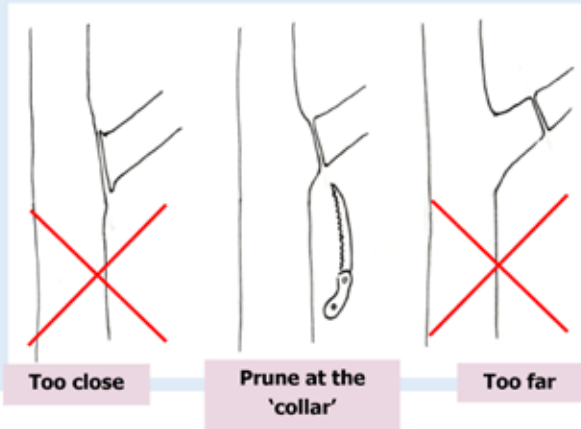
Always cut dead and diseased branches first. When a dead branch rots, bacteria and fungi may spread to infect the living parts of the plant. Likewise, a branch with obvious signs of disease, such as black spotting, discoloration and unseasonal leaf loss can spread the disease to other parts of the tree.

If more branches are needed, cut secondary branches (avoid the trunk and major branches) on the underside of the tree (see photos above). Never remove more than 1/3 of a tree's branch mass at a time, and wait until it has regrown at least as much as was taken before harvesting again.

If the trees (*Acacia tortilis* and other species) on a farm, or on pasture lands, are managed in this way there can be a continuous and growing supply of wood and fodder resources. In parts of Niger farmers harvest only a few branches from their trees at a time, enabling them to sell firewood year after year, as new branches grow to replace them.

(see FMNRhub.org for more information)

Prune branches from the bottom so that the falling branch does not strip bark from the trunk. Cut about 2-4 cm away from the trunk at the 'collar.' A cut that is too close will wound the trunk and it may become diseased. Likewise, if the branch is cut too far the remaining part may rot and eventually cause disease. Heavier branches may require an extra, outer cut to prevent stripping. Just be sure that the last cut is at the collar. It is very important to use sharp cutting tools whenever possible, saws are best.



Transforming Landscapes:

Imagine if your community worked together to transform all of its shrub-like *Acacias* into trees. What would the landscape look like in two years? Five years? How would people benefit? How would you recruit people to help you? What groups would be most impacted? Farmers? Youths? Charcoal producers? Herders?

Through FMNR millions of hectares in Africa have already been afforested, drastically improving farmers' yields and incomes, all at almost no cost. It is time reimagine the way we manage our landscapes. FMNR can help rural communities realize how much power they already have to improve their farm and pasture lands.

There is no right or wrong way to introduce FMNR and *Acacia* care to a particular place. Every community has its own needs, practices and culture to consider. However, the following ideas might be useful:

- Ask community members for traditional knowledge and practices that may be similar. Incorporate their ideas into your methods (if appropriate) and discuss those practices during demonstrations.
- Work with local schools. FMNR is a great way to teach about ecology and the importance of trees. Students can transform their campus into a young forest in one or two afternoons. Some students may even bring the ideas home.
- Identify other reasons why people may want to tie their trees. For instance, people in Northern Kenya preferred the 'neat' appearance of tied *Acacia* shrubs.
- Work with entire villages or clusters of farms at a time. This helps the practices seem normal in each community.
- Women's groups are an excellent place to start. It is often women who have to walk long distances in search of fuel wood. FMNR is most likely to improve their lives directly.
- Encourage others to *experiment* with their own methods and help spread FMNR to other communities.
- As everyone knows, songs and games are the best tools for engaging groups and creating lasting memories. Have fun!

