



How to plant a **micro-forest** in 10 steps?



Micro-forest

A micro-forest is a small, planted forest that maximises tree density and biodiversity. Micro-forests are essential for environmental restoration and carbon sequestration.

A typical micro-forest is 100m² to 1 hectare in size. It hosts at least 25 tree species though ideally this should go to 50 or more.

In the design of its micro-forests, the Aga Khan Foundation (AKF) emphasises the protection of endemic and indigenous species and the planting of food, medicinal, and feed plants that can be useful to local communities.



01 Land identification

The plot of land you choose should have a clear and secured legal status.

All relevant stakeholders should agree on its future use as a micro-forest. This is particularly important in urban areas or when dealing with community land.

Meetings, negotiation, and authorisations might be required. Be sure to document all of these.

The plot of land should have access to water.

The soil shouldn't be too shallow or rocky.



02 Plot delineation

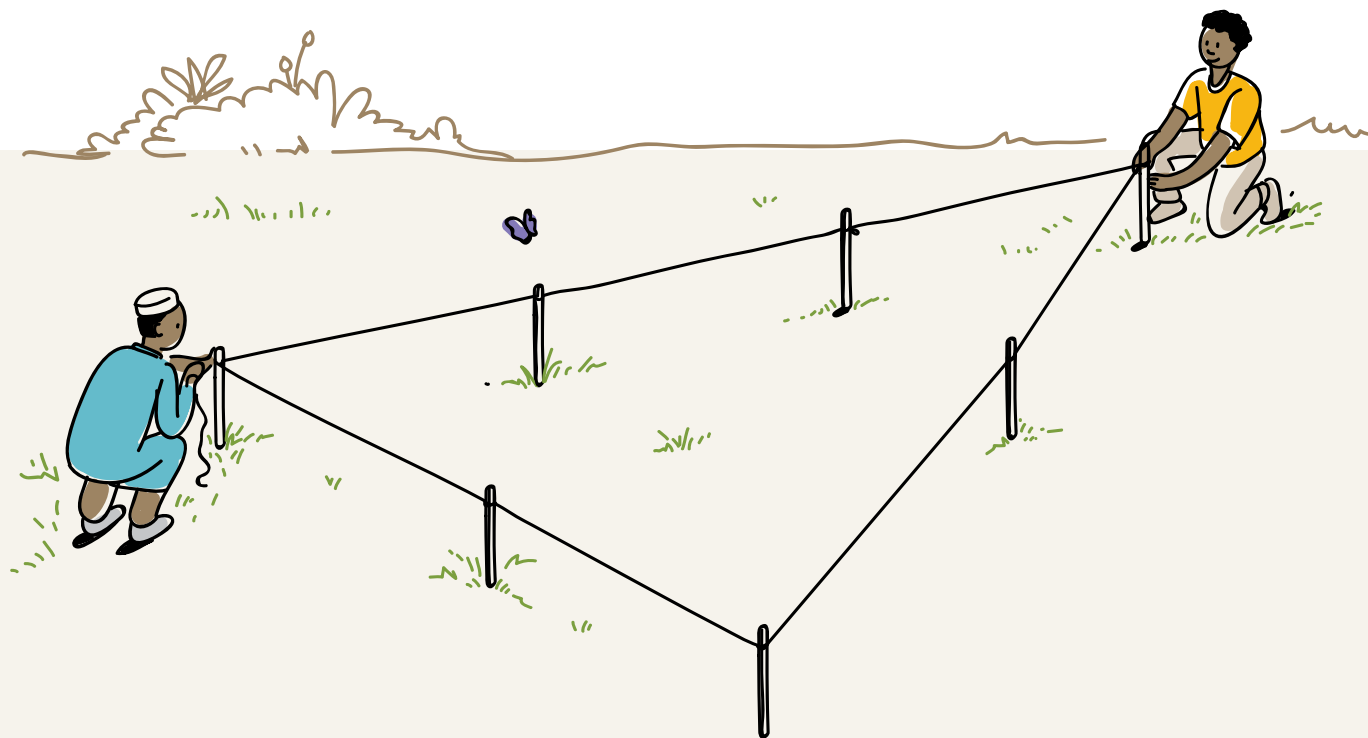
Once identified, the boundaries of the plot of land should be delineated using alignment, picketing, and lining.

Make sure to minimise the distance to the nearest source of water. Consider the topography so that you can take advantage of gravity for irrigation purposes.

The main length of the plot should have a North-to-South orientation, whenever possible. This will maximise solar input, photosynthesis, and tree growth and development.

When deciding the dimensions of the plot, consider the amount of mulch and the number of seedlings available to you. Aim for 20-40kg of biomass per square metre. Adequate mulch and plant cover should be your priority.

We recommend starting with a smaller plot of land and expanding over time.



03 Plot planning

Plan the plot on paper. Consider the dimensions, the topography, the soil, the climate (using an ombrothermic diagram), and the tree and plant species available.

If you can, include the installation of a drip irrigation system to facilitate watering.

The largest and tallest trees – including any mature trees already present on the plot – will be your “anchor trees”. It is around them that all the other plant species will be planted.

Typical anchor trees include:

- In India: Tamarind, Fig, Coconut, Neem...
- In Central Asia: Poplar, Birch, Linden, Planetree, Hazelnut, Walnut...
- In Coastal East Africa and Madagascar: Baobab, Coconut, Tamarind, Mango, Casuarina, Fig...
- In Upland East Africa and Madagascar: Fig, Mantaly, Giant palm, Albizia, Acacia...

Aim to have up to 10 anchor trees per 100m².



04 Anchor tree positioning

Determine the positioning of your anchor trees first.

You can do this through picketing, using a colour code if necessary. Plan a distance of 6 to 10 metres between anchor trees.

Position all the other species based on two factors:

(1) the potential canopy generated by the anchor trees, and (2) their specific needs in terms of shade and competition for resources.



05 Soil preparation

Soil preparation is probably the most critical step in the process. In densely populated areas, where the plot of land will likely be marginal and degraded, soil preparation will require considerable effort. Handle this step with the utmost care. Soil preparation will require a massive quantity of material (up to 40kg/m²) and will also represent a considerable portion of your overall investment.

Your goal will be to replicate in a very short period of time what a natural forest takes decades or even centuries to produce: a combination of humus (blackish decayed organic matter) covered by a litter of non-decomposed plant material rich in lignin. (Lignin is a wood component which feeds fungi, which are in turn responsible for the humification process.)

Ideally, the whole surface of your future micro-forest should be covered with a layer of (1) humus-rich compost or decomposed animal manure, and (2) mulch (dry leaves, livestock litter, bark chips, wood chips, sawmill dust, coconut peat, sphagnum peat, pure or combined).

This layer should be 10-30cm thick. Balance the pH with a good supply of limestone or dolomite powder, particularly if the subsoil is acidic.

Once in place, soak the mulch with water and liquid manure and leave it to moisten and soften the soil for up to two weeks.



06 Hole digging

Dig cubic holes for the anchor trees. These should have 30-60cm long sides. Fill these holes with compost or fermented manure mixed with limestone or dolomite powder.

Dig smaller holes for the other plant species. Prepare them in the same manner as the holes for the anchor trees.

In mountainous areas or regions where frost comes early, you might want to dig the holes during summertime and fill them with compost or mulch. This is to avoid having to dig holes in hard, icy soil in the fall.



07 Planting

In temperate and mountainous climates, the best planting season is the fall. Use good-quality turgescient and dormant (leafless) seedlings. You can also plant in the spring though seedlings may require more care.

In tropical environments, the best planting season is the beginning of the monsoon or rainy season.

Use only top-quality seedlings and make sure they show no sign of disease, pests, nutrient deficiency, water stress, or kinked taproots.

Remove the seedling containers carefully just prior to planting. Dispose of this waste properly.

Once you have planted the anchor trees, compress or trample the substrate to avoid air bubbles, which can be lethal to tree roots. Add an extra layer of mulch, about 5cm in thickness, on top. Water abundantly. Then, plant the smaller species based on your plan. Compress, add a layer of mulch, and water well.

We recommend you plant a mix of green manure or cover crops made of grass and legume species between the freshly planted seedlings. These will cover the soil, prevent desiccation by the sun, prevent sterilisation by ultraviolet (UV) rays, stimulate soil biological life, fix nitrogen, and sequester carbon in their thick rooting network.

Fruit tree seedlings usually need at least two to three years to start bearing fruit. They tend to be larger than their indigenous or medicinal counterparts. Having been selected for fruits and yield, they tend to grow less aggressively.



08 Animal biodiversity

A micro-forest is not only a plant habitat. It is also a haven for a wide range of both invertebrate and vertebrate animals.

Insect hotels (also called insect condominiums), bird nests, and small ponds are ideal for stimulating the colonisation of the micro-forest. They allow dozens of species to move in and contribute to biodiversity.



09 Maintenance

The first three years after planting are critical.

In the first three years after planting the micro-forest, maintenance will mainly consist of irrigating and adding mulch.

You will also occasionally need to replace dead trees, even though the tree survival rate in a micro-forest is usually very high, around 80%. Leave all dead organic matter in the micro-forest as this will contribute to a humus-rich topsoil.

Keep in mind that some species might be somewhat invasive and take over their neighbours. When this happens, prune reasonably and carefully, leaving branches and leaves to decay on the litter.

Pest invasions and disease outbreaks rarely occur. The extreme biodiversity of the micro-forest ensures they don't cause too much damage.

In most cases, after three years of good maintenance and care, your micro-forest will not require further intervention. The only exception to this will be helping the forest to expand!

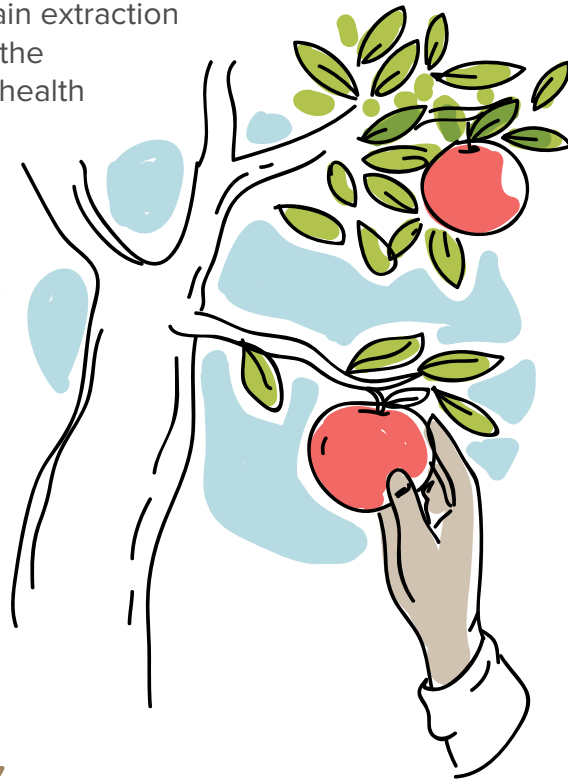


10 Harvest

The Aga Khan Foundation's micro-forests host many edible and medicinal plants. Harvesting is therefore also part of the process.

Harvesting should be carried out responsibly. If you can, engage children and youth under adult supervision in harvesting. They will learn a range of important life lessons.

Harvesting will lead to a certain extraction of nutrients and carbon from the micro-forest. To maintain the health of the soil and maximise the productivity of the micro-forest, be sure to compensate for this with a generous supply of organic matter in the form of mulch or compost.



THE NURSERY

You can purchase seedlings from a commercial nursery or you can set up your own. If you're planning to set up your own nursery to produce seedlings or saplings obtained from sawing, cutting, or marcotting, make sure to:

- Use only fresh seeds of the highest quality.
- Break their dormancy using the adequate physical (heat from boiling water or fire, or scarification) or chemical (chlorohydric acid then soaking in water) treatment.
- Plant the seedlings, cuttings, and marcotted saplings in well-drained containers which are either reusable or biodegradable and contain a balanced mix: 1/3 clay, 1/3 sand, and 1/3 compost or humus.
- Water regularly.
- Depending on the species and the climate, keep them all in the nursery between three months and three years.
- Use only the healthiest young seedlings to plant your micro-forest.





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