



Planting the trees

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Successfully planting a tree in agroforestry does not only mean buying good quality seedlings. Die off after planting is primarily attributable to inadequate management beforehand. Drying out of roots or exposure to excess sun, wind, or frost can substantially hamper the development of young trees.

Seedlings have to be handled carefully from the nursery to the field (including transport) to avoid injuries and deterioration of their quality.

Planting has to be done when the vegetation is at rest, this generally means from autumn to the end of the winter. Farmers should avoid planting in periods of frost, when the soil is wet or very dry and during windy periods.



Efficient and fast plantation with a hoe



Bare-root seedlings stocked and protected from the sun and the wind before planting

Seedlings packaging

- Bare-root seedlings are usually packaged in bundles of 25, 50 or 100. The ties should not be too tight to avoid causing injuries to the stems.
- Bundles must be packed in opaque plastic bags (polyethylene). Paper bags are not recommended. In each plastic bag, all bundles of deciduous seedlings should be the right way up (with root systems towards the bottom of the bag) to avoid contact between aerial parts and the roots. Small softwood seedlings can be safely packed head-to-head.
- The seedlings must be packed on the day they are grubbed-up from the nursery. The bags have to be closed tightly to limit water evaporation. The aerial parts must not be wet and must not stick out of the bag (unless it is necessary, for large deciduous seedlings).
- Seedlings in containers and clods have to be transported in boxes or crates that are easy to handle. Their conservation is easier if they are maintained in their growing medium before planting and if the substrate is kept moist by frequent watering.



Bare root oak seedlings conditioned in opaque plastic bags



Seedling of *Sorbus torminalis* in clods. Substrate must be kept moist



Plastic bags must be properly labelled and inform about: customer's name, species, age, number and size of bundles, dates of packaging and expected delivery. The white colour-bags reflect light and reduce risk of heating and fermentation

Seedling transport

Transport of bare root seedlings from the nursery to the planting site is a delicate step.

It is critical to protect the seedlings against:

- the risk of drying out: ask for 1) seedling delivered in opaque and air tight plastic bags, 2) a transport in closed or tarpaulin-covered lorries. If not, protect the plants with a dampened hessian cover;
- frost and sunshine, both of which will damage the seedlings' root systems;
- the risk of overheating and fermentation due to the seedlings being packed in air-tight plastic bags: choose a nursery located near the planting site in order to reduce the transport time as much as possible.



Individual containers placed in wooden crates to facilitate transport and handling at the plantation site (*L. Amandier* - CNPF)

Taking delivery of the seedlings

In most cases the seedlings from the nursery are sorted before delivery and only the best trees are delivered. However, on delivery it is recommended to check that the seedlings are appropriate. Make sure that they are well balanced, with a single straight stem, a healthy terminal bud and thick collar, abundant and fresh roots.

On delivery the farmer should:

- ask the supplier to provide a properly completed document which has both the seedlings health passport and their certificate of provenance;
- check that the ordered number of seedlings matches the number that is delivered;
- evaluate the age, the quality, sanitary state and size of the seedlings.

This evaluation is useful in case it is necessary to reject a seedling lot (in cases where more than 5 % of the lot is poor quality seedlings) and will avoid any contention with the nursery or the carrier in case of a high die off of the seedlings.

Seedling storage

After delivery, the farmer is responsible for storing the seedlings. He must ensure that the seedlings are protected from the sun, frost, wind and dryness until they are planted.



The storage period should be as short as possible

The seedlings should be stored in a sheltered, dark and sufficiently warm place, for not more than two days. They should be kept in their plastic bags. The roots must be kept moist enough, but not too much to avoid risk of rot.

If there is a need to store them longer than two days, seedling should be heeled into the soil near the planting site, in a place sheltered from the sun and the wind with a soft and well-drained soil. Dig a trench (deep enough to host the roots) to store the seedlings. Ensure the bundles are first loosened and that the seedlings are aligned and their roots are covered with fine soil or sand. The soil should be slightly compacted to remove air pockets. The seedlings can then be dug out as the planting progresses. The seedlings in containers just need to be stored in a safe place with their substrate is always kept moist.



The roots of the seedlings must be in contact with the soil: heeling in of bundles that have not been loosened should be avoided

Planting

A carefully handling of the planting operations is essential to ensure the best survival chance for the seedlings. The planting conditions will heavily impact the hydrological and mineral conditions of the future tree by directly affecting the shape of the root system.

When to plant?

Bare-root seedlings are planted from autumn to spring (end of November to mid-March, approximately) avoiding frost or snow, windy or heavy rainy days. It is recommended to plant on cool but not soaked soil (especially on loamy or clayey soils). Avoid times where there is a need vehicle activity in the fields.

If possible, planting should preferably take place in autumn. This is generally possible where late autumn and winter climates are moderate. In case of harsh winters or short autumns, planting should be planned in the spring.

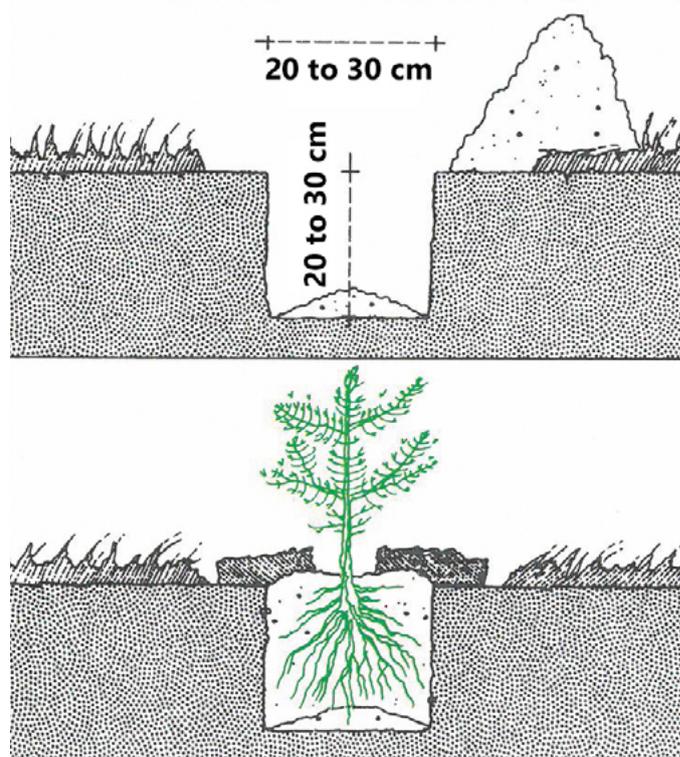
Seedling preparation

In bare root seedlings, injured roots or roots that are too long or dry have to be cut off before planting. This operation helps the seedling recover and should be carried out with sharp pruning shears.

Maintain a tap root of at least 20 cm for those species that need them (especially oaks, walnut and chestnut trees). Above ground the main stem should be kept intact and the forks and lateral branches of large seedling can be cut off.



Pre-planting preparation of a bare-root seedling



Planting

Special precautions should be taken for successful planting:

- planting should be carried out on well-prepared, soft soils, never on wet or frozen soils. If a tillage has been carried out beforehand wait for a few days until the soil has settled down;
- if a superficial vegetation layer is present, remove it on a 1 m² area and dig with a spade a square hole between 20 and 30 cm width.
- each seedling should be placed vertically with its collar placed at ground level. The roots should be well spread in the planting hole to avoid any risk of deformation which could hamper the growth and future stability of the tree. Then the roots can be covered with fine earth;
- after planting, the soil around the seedling is lightly tamped down with the foot without hurting the collar. Seedlings should be kept packed whilst on site

and only taken them out their bags as the planting progresses.

- for seedlings in clods or containers, a hole is dug in the same way with a spade or a forest hoe. Once the container has been removed, the clod is placed vertically and covered with 3-5 cm of fine earth to prevent the substrate from drying out. The clods must be rewetted a few minutes before planting.

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