

## Agroforestry: Design and planting in silvoarable systems

**Source:** P. Verdonckt, B. Reubens and V. Nelissen

Depending on particular regional conditions, from mid-November to the end of March is the ideal planting season for trees. During these months, the trees can tolerate transfer as bare root trees from the nursery to the field. For most deciduous species, the earlier they are planted during the planting season (November to December), the better. Before you start planting, think about the design of your agroforestry system, the choice of tree species, the type of planting material (seedlings, standard trees, ...), and the way of planting, etc.

### Design

When designing an agroforestry system it is particularly important to find a good balance between the production of the crop and sufficient space for the trees to develop. A general guideline for the distance between the tree rows is to take at least twice the height of the full-grown trees. But of course there are other aspects that play an important role when designing your agroforestry system. For example, the shape of the field together with the widths of the machines will influence the working direction, but also minimising shading, prevailing wind directions and soil erosion pressure can play a role in the design.



**Figure 1: In this design there is a space of 45 m between the tree rows (the sprayer of the farmer has a width of 42 m and the tree strips are 3 m wide). While a north-south orientation is recommended for minimal shading, the orientation was northeast-southwest due to the 'workability' of the land.**

### Tree type selection

First and foremost, the soil type and moisture condition will determine which tree species you can plant. For example, not all tree species will grow well on a very wet clay soil or on a dry sandy soil. A second determining factor is your main goal: do you want to harvest fruit or nuts? Or do you think about the production of quality timber or firewood?

### Choice of plant material

Good quality plant material is extremely important in order to make a good start. A good tree has one **continuous spindle with a dominant ending**, a **fine branched root system** and is **free from diseases**. Fruit trees must have a heart branch and at least three main branches.

Four types of planting are suitable to use in agroforestry:

- seedlings (20 cm - 175 cm),

- transplants (150 cm – 250 cm),
- standards (8 - 40 cm or more circumference at 1 meter stem height), and
- cuttings (6 - 14 cm circumference at 1 meter stem height).

Generally, standard trees are the best choice for fruit trees (crowns already shaped and fruit production guaranteed) or for trees in pasture (less accessible to cattle). For other trees in arable land, however, it is better to choose transplants or seedlings. These adapt more quickly to the new soil and climate conditions and will usually have a better growth, through which they will quickly reach an equal height as the standard trees. In addition, the plant material is cheaper to buy, which also gives the chance to plant trees at higher densities and select future trees after about ten years. Finally, unrooted cuttings are often used for planting poplars.

### **Planting step by step**

#### **Always plant in good weather conditions:**

Avoid planting trees in wet conditions: planting trees in puddles of water is not a good idea, but slightly humid conditions are optimal. Also during a hard frost you cannot plant trees, as digging tree pits is not easy and frozen clots prevent good contact between the soil and the roots and can cause root damage.



1) Indicate where the trees should be planted with a bamboo stick, based on the planned design.

2) Make sure the planting holes are sufficiently wide and deep to allow the roots to fit in smoothly, without force and without a turning motion. Removing part of the roots to make it fit is not a good idea; this reduces the capacity to absorb the much needed moisture and nutrients in spring.



3) For bigger trees, for example standard trees, it is recommended to always use a tree stake. To install the stake, you should dig a hole 40 cm deep and a diameter equal to that of the tree stake (diameter 6 cm and height 150 cm is sufficient) to the southwest of where the tree will be planted.



4) Plant the trees at the same depth as in the nursery, not deeper and not higher. Carefully fill the planting hole back with crumbled soil (avoiding grassy and large clumps) until the soil surface is reached. Push the ground firmly so that the tree is fixed and standing right. Any labels or straps should be removed from the trees so that they do not damage the stem.



5) Fix the tree at the end of the tree stake by using a rubber strip. By using a nail to fix the strip to the stake, you avoid it from falling down. Make sure that the space between the support and the tree is at least 15 cm. When you put the rubber strip in an eight-form around the tree, you avoid the tree (at northeast wind) scratching against the tree stake.



**!! Always protect the roots from drying out.**

At the nursery, during transport and storage, and on the field while planting, the tree roots should always be covered and kept humid. A short ride in an open trailer without covering or half an hour unprotected in the field under dry weather conditions is enough to destroy the plants.



Tree protection

Small and large livestock, wild rabbits, hares and deer are potential offenders for vulnerable, young trees. With livestock, all types of planting must be protected. Depending on the size, a tree protection of 60 cm high (chickens) to 2 m high (horses) will be needed. Wild animals can also cause considerable damage (to both leaves and buds or by scraping antlers on the trunk and branches). For rabbits, hares and roe deer you need a tube of at least 60, 75 and 120 cm respectively. There are many different systems; from simple tree nets to advanced biodegradable hard plastic tubes that also provide a tree growth-promoting microclimate.