

# Trees for Life

## The Propagation of Aspen from Root Cuttings

Because **aspen** rarely produces seed, alternative methods have to be used for its propagation. Trees for Life has been working with the propagation of aspen from root cuttings since 1991 and we now have the capacity to produce up to 3,000 young trees each year in our special aspen propagation facility at **Plodda Lodge**. We have developed techniques yielding a 90% success rate in the rooting of cuttings and can grow trees to plantable size in one year. Based on our experience, the instructions here provide a simple explanation of how anyone can propagate aspen by this method.

More information can be found at: [http://www.treesforlife.org.uk/tfl.aspen\\_propagation.html](http://www.treesforlife.org.uk/tfl.aspen_propagation.html)

### 1. Root Collection

- The best time to collect roots is from February to May on frost free days. The earlier the better as this will allow time for shoots to develop and cuttings to be taken before summer.
- Locate suitable roots near mature trees: check exposed rock and banks of streams and lochs where roots may be uncovered; lines of suckers will indicate the location of underground roots and wind blown trees will provide an abundance of propagation material. Collect roots of 1-3 cms. in diameter.
- Expose the root and follow in both directions until it becomes too big or too small.
- Detach the root and cut into sections of approximately 30 cms. in length.
- Place in a plastic bag, with damp moss if they are to be stored for more than a day or two.
- Label carefully with site name or reference number and date collected.
- Severed roots left in the ground will be stimulated to produce suckers, benefiting the site, but over-collection may be harmful.
- Leave the site as undisturbed as possible, replacing soil, surface vegetation etc.
- Record activity so that the site is not stressed by over-collection in subsequent years. Several years should be allowed between root collections, particularly at smaller sites.
- Put the roots in boxes of soil immediately or store in a cool, dark place.
- Roots packed with damp moss may be stored for several weeks if collected outside the growing season, or several days otherwise.



Lines of suckers such as this indicate the location of aspen roots. These are obviously easiest to spot when the suckers have leaves on them, so their location should be scouted out in the summer prior to when roots will be collected.



Aspen roots exposed and ready to cut.



Exposed roots can be cut with secateurs. Note the suckers growing out of the root to the left of the secateurs.



Sometimes it's possible to collect a long section of a single root.



In this example, the root has several suckers growing out of it.

## 2. Treatment of Roots

- Keep roots in the shade wrapped in polythene to prevent drying out until they can be planted.
- Plant in boxes which will accommodate approximately 10 root sections of about 30 cms in length.
- Cover with compost or composted bark to a depth of about 5 cms - this planting medium is to keep the roots moist, it does not need to provide nutrients as the parent roots use their own reserves of energy.
- Place boxes in a polytunnel, without heat, and water thoroughly whenever the compost starts drying out underneath the surface. Keep the polytunnel doors closed in cool

weather, and then open to provide increasing ventilation as temperatures rise during spring and summer.

- Suckers will begin to appear after 4 - 6 weeks and, if they are harvested regularly for cuttings, new suckers will continue to emerge from some of the roots for up to 12 weeks. The root sections are very unpredictable, however, and it is likely that some roots will produce plenty of suckers, whilst others produce few or none at all. Record data, noting the most productive clones, for future reference.
- The root sections run out of energy to produce any more suckers in late summer or autumn and at this stage they should be discarded, as fresh roots will be needed for the following season. Empty the boxes out, brush clean and leave to dry out over winter.



Once they have been cut to the correct length, the roots are placed on compost in boxes. Some of these roots have suckers growing out of them.



The roots can be placed quite close together in the boxes.



When covering the roots with compost, any suckers (as in the back of the box in this photo) should be left sticking up above the compost.



After a few weeks the roots send up vigorous new suckers.

### 3. Preparation of Cuttings

- When the suckers reach 5 - 7 cm in height, cut off individually with a sharp knife or scalpel near to where they join the parent root. Take care not to damage younger suckers below the surface of the compost, as several often grow in a cluster at one point. Leaving the suckers to grow larger before harvesting may exhaust the parent roots' energy faster and reduce the number of suckers produced.
- If cuttings are prepared in hot and sunny weather, they should be placed out of direct sunlight as soon as they are cut, and kept shaded throughout preparation.

- Remove lower leaves from the cutting and re-cut if necessary to provide a clean cut below a leaf node. Dip the cuttings into a rooting compound - either a synthetic one with hormone and fungicide such as 'Strike' or an organic seaweed rooting powder.
- Plant the cuttings, using a dibber, into trays of compost mixed with perlite. Perlite improves both the aeration and water-holding ability of the compost, which is ideal for rooting cuttings. 25% perlite by volume is sufficient, but the percentage can be increased up to 50% if required.
- We have used a peat-based tree and shrub compost, a bark-based and a coir compost. All allowed adequate rooting, although the bark compost was probably slightly less satisfactory and peat based composts are less desirable for environmental reasons.
- Label all trays with the date and source of cuttings.
- There is no need to water the cuttings, the trays are simply placed immediately into the misting unit.



This sucker is the right size to cut and root as a separate plant.



The suckers are severed near where they emerge from the parent root.



This cutting has been dipped in a rooting compound (which gives the stem the white colour visible here), and is being planted in a Perlite and compost mixture.



In this tray of planted cuttings, each plant has been labelled to indicate the date and the site where the originating roots were collected.

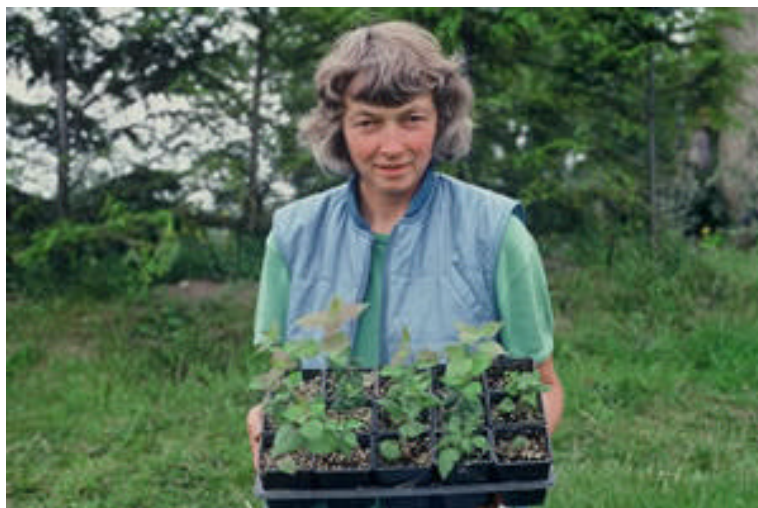
#### 4. Care of Cuttings in the Misting Unit

- The misting unit automatically produces intermittent mist to increase humidity and to cool the leaves of the cuttings, preventing excessive moisture loss at a time when they have no roots to draw up more water. A soil heating cable in the base of the unit provides warmth from below to encourage the formation of roots.
- When the electronic leaf sensor in the misting unit dries out, there is a break in the electric current between its two electrodes, so it can detect when the leaves of the cuttings may have dried out - this allows the misting unit to respond to the needs of the cuttings at different times of the day, etc.

- There are also dials to manually control the length of the mist burst, the delay period before misting begins and the sensitivity of the leaf. If the mist is on for too long or too often, the cuttings and the compost become too wet and black rot may develop on the stems, causing them to topple over - this appears to be a particular problem in cool, damp weather in summer. Increasing the amount of shade over the unit, especially over the newest cuttings and in very sunny weather, allows you to decrease the amount of misting without detriment to the cuttings and this helps prevent the stem rot occurring. We have found it best to turn the misting unit down to almost the minimum settings when it is cool or damp, and then turn it back up to allow more misting in hot, sunny weather.
- Cuttings usually form roots within 2 or 3 weeks, after which time they should be removed from the misting unit.



The misting unit in our Aspen Propagation Facility at Plodda Lodge. Newly-planted cuttings are in the blue trays in the middle, while larger, more established aspens are in the foreground.



When the cuttings have successfully formed their own roots, the plants can be removed from the misting unit and hardened off in a cold frame.



## 5. Hardening Off and Potting On Cuttings

- When the cuttings come out of the misting unit, they need to be gently acclimatised to outdoor conditions by placing them in a cold frame and using heavy shading to protect them when the sun is strong; this also retains some humidity around the plants.
- After a further 2 or 3 weeks, there are usually plenty of white roots showing beneath the trays of cuttings, and at this stage they can now be potted into individual pots.
- We have found that both peat-based and coir composts give excellent results when used for potting but, as before, the bark-based compost was far less satisfactory.
- Use fairly small pots (half litre size) as this limits the amount of compost needed and means the trees are not too heavy to carry when planting out. However, root growth is often vigorous and if the pots are placed on the ground, the trees will rapidly root through the pots, causing a real problem for when they need to be moved. It is better to stand the pots up on benches or racks so that the roots are 'air-pruned' and kept inside the pots. Careful attention to watering will be required with this method - watering will be necessary every day during hot weather, to prevent the plants becoming stressed.
- Plants that get stressed are vulnerable to the fungal disease *Venturia*, which causes the leaves and ends of the stems to turn black and die back. Strong plants will recover from the disease, but it could be fatal or prevent further growth on small, weak trees. (The fungus persists over winter in the dead stems so these should be cut out to remove the source of infection for the following year.)
- Trees grown from cuttings taken in spring are generally ready to plant out by autumn or the following spring. Trees from cuttings taken later on during summer may need to be kept on in the nursery for a further growing season before planting out.
- We have been experimenting with the use of 'Rootrainers' which produce trees with lots of straight roots in long, thin 'plugs' - ideal for planting out. Provided that the rooting success rate is high, they save on compost and also on time because the cuttings are not potted up. Cuttings are placed directly into the Rootrainer cells in the misting unit. After hardening off outside, the Rootrainer trays are lifted up off the ground onto racks to 'air-prune' the roots and ensure they stay inside the container. We have been pleased with the results using Rootrainers, but in dry weather it is difficult to keep the trees moist enough as there is so little compost and such dense foliage. Extra fertiliser is also probably needed as each tree has such a small nutrient reserve in its compost plug.



A cold frame full of aspen plants grown from root cuttings at Plodda Lodge.



The aspens in this tray have grown from cuttings which were planted 4 months previously. The larger plants are in their second year of growth in pots.

## Other Methods of Aspen Propagation

### A. Hardwood Cuttings

- We have found hardwood cuttings of aspen to root readily only when they are taken from extremely vigorous wood of the previous year's growth. (We were able to collect such material from a site where some big aspen trees had been felled and their root systems had then sent up large numbers of extremely vigorous suckers, often up to a metre in height within one growing season.)

- Collect the material in early spring, e.g. late March, and trim to approximately 20 cm in length, cutting just below a bud at the base of the cutting and just above a bud at the top of the cutting.
- Dip the base of the cuttings into a hormone rooting powder - although this step may not be absolutely necessary.
- Plant the cuttings deeply (two thirds of each cutting below ground) into well drained soil or compost, and do not allow to dry out.
- The cuttings can produce strong new shoots throughout spring and summer and can be large enough to plant out after one growing season.

## B. Seed

- We do not have any direct experience of growing aspen from seed ourselves, as we have not been able to collect seed to grow. However, if you are able to obtain seed, then from research, we would suggest using a similar method to growing willows from seed. A method for growing willows from seed is outlined below, with which we have had some limited success:
- The timing of the seed collection is crucial in order to collect the seed when it is ready but before it blows away. Collect catkins when the white down just starts to appear (April or May for aspen). Leave the catkins to "fluff-up" for a couple of days in the warm, e.g. on a windowsill in the sun.
- Separate the seeds from the white down - this can be done by placing the catkins in a container with holes in the base just a bit larger than the size of the seeds. Agitate the catkins by spinning a piece of stiff wire in an electric drill and the down will be left in the container whilst the seeds fall through the holes in the base.
- Sow the seeds immediately as they are likely to lose their viability rapidly if stored.
- Seedlings are likely to be very susceptible to heat, wet, drought and damping-off fungi. Therefore seeds should be sown very thinly on the surface of moist compost and kept shaded from strong sun, protected from rain and misted with a hand-mister to prevent drying out.
- Germination is likely to occur rapidly, within a few days of sowing. Seedlings will need to be very slowly acclimatised to normal outdoor conditions.
- If sown thinly enough, seedlings can be left in their seed tray for the first growing season, and then pricked out into pots or a nursery bed the following spring.

## C. Micropropagation

- This is a technique which can yield enormous numbers of young plants from small amounts of plant material but must be undertaken in sterile conditions. It involves taking small slivers of the undifferentiated tissue contained within the growing tip of the plant

(apical meristematic tissue) and growing it on in a culture medium. This can then be repeatedly subdivided, cloning many genetically identical plants. Due to the delicacy of the operation and the requirement for sterile equipment and conditions, this process is only practical in a laboratory.

## **D. Division of Roots**

- If only small numbers of plants are required, the easiest method is to dig up some roots in March, which already have young suckers emerging from them and transplant them in the desired location. Root sections should be 2-3 cms. in diameter and 40-60 cms. in length, to provide sufficient reserves for a new plant to grow, with suckers of 15-60 cms. in height. These could be rescued from an unprotected site where suckers are being browsed and should become established quite quickly.

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For further information about aspen, please go to our [Aspen Information Resource](http://www.treesforlife.org.uk/tfl.aspen_info_resource.html) at [http://www.treesforlife.org.uk/tfl.aspen\\_info\\_resource.html](http://www.treesforlife.org.uk/tfl.aspen_info_resource.html)