

Cyclamen species have produced few hybrids in the wild or in cultivation. Only four hybrids being substantiated. These are:

*C. africanum* × *C. hederifolium*

*C. balearicum* × *C. repandum*

*C. creticum* × *C. repandum*

*C. cyprium* × *C. libanoticum*

The species *Cyclamen* should, in theory, be susceptible to all the various pests and diseases that afflict the *C. persicum* cultivars. These include vine weevil, cyclamen mite, aphids, and *Botrytis*, however, these species are relatively untroubled by pests and diseases provided that the plants are not forced too much and become soft.

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## The Importance of Selection and Root Pruning in Container-Grown Seedling Production of Ornamental Trees and Shrubs

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The purpose of this paper is to raise some very important factors which are sometimes overlooked by nursery growers in the raising of tubestock from seed. Certainly many factors are involved in successful production, not the least of which are selection and root pruning in the development of reliable nursery stock. Occasionally in our nursery we come across a plant or a group of plants that stay alive, but do not grow on to a marketable size. In order to ascertain what is wrong the following factors need to be considered:

- The plant origin—50-mm tubestock from a reliable source
- The potting mix used—moisture and nutrient levels
- Problems associated with pests and diseases
- Environmental conditions

In this case everything appears to be satisfactory. The potting mix drains well, there is adequate moisture and nutrient levels, and there is no sign of stem rot or problems with insect pests. The leaves have a slight yellowing but are generally healthy. It's winter time in Queensland, with temperatures for the past 3 weeks between 10 and 25C.

Good growing conditions prevail. It is not until the potting mix is removed from the plants root system that we are aware of the real problem—the root system itself. There are two categories to this problem:

- 1) Root malformations
- 2) Weak root systems

Root malformations are the result of serious kinking and circling of roots which restrict growth and do not allow adequate nutrient uptake. When planted in a landscape situation such plants often die or break at ground level. Root conditions of this type usually commence during transplanting from seedling stage to the tube or pot.

Weak root systems are those with short fibrous roots barely able to support the stem and leaf growth; these plants generally lack vigour. Seed taken from old parent plants which are no longer vigorous, or from plants under stress due to climatic conditions, will often produce weak plants.

Problems associated with poor root systems can largely be overcome by applying a few simple management techniques. In the case of root malformations effective root pruning and transplanting is the solution. When the seedling is removed from the germination container approximately 50% of the total root length should be removed. The trimmed seedling should then be planted into the new container without bending or kinking the root system.

Seedlings left in the germination container for an extended period, and then transplanted with an extensive root system, will increase the incidence of malformed roots. When selecting a suitable container, consideration must always be given to the type of root system likely to be developed by a particular plant. To avoid the problem of plants with weak root systems it is important that seed is selected from only healthy vigorous parent plants. If selection of the parent is not possible then ensure that the seed comes from a reliable source.

Selection of the germinated seedlings is also important as variation in type often occurs. Weak and overly vigorous seedlings can be discarded. Similarly plants grown for their leaf colour will need to be rigidly selected and "off" types discarded.

To summarise, production of ornamental seedling-grown trees and shrubs can be improved by:

- Pruning the germinated seedling root at transplanting;
- Planting the seedling root without bending or kinking;
- Selecting seed from healthy vigorous plants which are true to type, or obtaining seed from a known reliable source;
- Selecting out uniform seedlings for growing on and discarding the rest.