Seedling Propagation of *Sophora microphylla*

Robert Appleton
Appletons' Tree Nursery, Main Road South, Wakefield, Nelson, New Zealand

INTRODUCTION

The planting of indigenous tree species is continuing to increase and public interest in their use is in three broad categories:

1) Home gardens
2) Landscaping of recreational areas, riparian zones, and highway plantings
3) Regeneration of native forests

Seedling propagation of New Zealand indigenous plants is a common form of propagation for a number of reasons.

1) Where seed is readily available, large numbers can be grown economically
2) Root systems are superior to cutting-grown plants and can result in more successful establishment
3) Seed can be stored for long periods of time owing to the very hard seed coat
4) Genetic diversity through cross pollination is insured, very important when propagating small and isolated populations

BACKGROUND

The genus *Sophora* contains fifty species of trees and shrubs found in subtropical and temperate parts of North and South America, Asia, Australia, and New Zealand. Two of the three New Zealand species are endemic and are known locally as Kowhai.

The Kowhai is New Zealand's most beautiful flowering tree. Its feathery leaves and pendulous flowers borne in great profusion make a striking contrast against the many shades of green in the New Zealand landscape.

The flower colour ranges from a pale lemon-yellow in *S.* 'Little Baby' (syn. *S. prostata*) to the golden yellow of *S. microphylla*. Flower colour, leaf shape, and tree form depend on locality and the genetic content of individual trees. This allows the plants person the opportunity to collect and select forms suitable for a wide range of situations.

One or more species are found in most parts of New Zealand from the coast to mountain districts, in forests, on open hill sides, and along streams and rivers. They grow in most soil types and situations, all are hardy throughout New Zealand, with *S. microphylla* well adapted for planting in exposed sites.

Sophora microphylla is a 5- to 7-m tree with a spreading and drooping habit. The pinnate leaves are up to 15 cm long with 20 to 40 pairs of oblong leaflets. The two varieties of *S. microphylla*, var. *fulvida* and var. *longicarinata,* avoid the densely tangled juvenile stage which can persist for up to 7 years before the plant assumes its adult form and flowers. *Sophora microphylla* var. *longicarinata* has a very

distinct slender habit and smaller size making it ideal for home gardens. It flowers within 6 to 7 years from seed, in the month of October.

GENERAL PRINCIPLES FOR SEEDLING PRODUCTION

Seed Collection. Collection by the grower is usually the preferred option as specific locations and forms can be selected. Garden seed collection can result in a hybrid swarm of different form types. By choosing individuals with superior form from a uniform population of the species in an area and keeping careful collection records the propagator can produce true-to-type tree stocks.

Certain individual trees produce large quantities of seed each year, following heavy flowering in October. The seed is yellow in colour, slightly oval to round, 6 to 8 mm in diameter. The pods are green when young, 75 to 150 mm long, containing 3 to 8 seeds. The pods dry to dark brown and remain attached to the tree for 12 to 24 months. They are collected from the branch ends into a collecting bucket.

Seed Treatment. The seed pod is dry and removal of seed is slow, hence we soak the pods for 20 days in water. The soft and slightly decomposing pods can then be forcefully rubbed over a course sieve breaking open the pods. The seed is then screened from the seed pod residue.

The seed has a very hard seed coat which is not easily damaged and requires some form of scarification to allow the seed to imbibe and swell.

TECHNIQUES TO OVERCOME HARD SEED COAT DORMANCY

Mechanical Scarification. This involves the cracking, puncturing or reduction of the thickness of the dry seed coat allowing it to be permeable to moisture and air. Small quantities can be filed or rubbed with sanding blocks or in a rotating sanding drum.

Hot Water Soak. Seed is soaked in hot water which has been off the boil for 30 sec. The water is allowed to cool for 24 h and the swollen seed is twice the size of the nonimbibed seed.

Acid Scarification. Concentrated sulphuric acid is an efficient technique to reduce the thickness of the seed coat. Sulphuric acid is a very corrosive and potentially dangerous liquid and should be handled with full protective clothing and acid resistant glass. Water should never be added to acid. A sample of the seed is divided into sample batches and each is treated for a set period of time. The seed batch with the highest proportion of undamaged swollen seed indicates the optimum time period. The following acid scarification treatment is successfully used at Appletons' Tree Nursery:

- The first acid treatment of 60 min is followed by a 48 h water soak with water changed every 8 h to drain off leachates. The swollen seed is sieved off and stored in sealed plastic bags in a cool room at 4C prior to sowing.
- Unswollen seed is retreated with acid for 30 min and repeated treatments are necessary until all seed has swollen.

OPEN-GROUND SEED BED PRODUCTION

Seed Bed Formation. Appletons' Tree Nursery Ltd. practices a fixed seed bed production system. Once a seed bed is established, all subsequent operations are undertaken from the tractor alleyways and after the crop is harvested, the seedbed is ripped and reformed. The incorporation of organic compost allows the improvement of the seed bed soil structure.

Correct seed bed preparation involves forming raised seed beds which aid drainage and encourage successful germination and healthy root systems. A modified Howard rotary hoe with a bed-former forms 200-mm high seed beds.

Seed Sowing and Growing On. A five-row roller is used to form 20-mm-deep grooves in which the seed is hand sown. An inter drill spacing of 25 mm allows sturdy 35- to 50-cm plants to develop. A basal fertiliser of a slow-release type is used and side dressings of a balanced NPK are made during the growing season.

A sawdust covering of 10-mm covers the seed. A shade cloth cloche or a brushwood arch is used to protect the freshly germinating seedlings.

A reciprocating-blade under-cutter is used to cut the long tap root in December. This aids the formation of a branched and fibrous root system, which greatly enhances the ability of the seedlings to successfully transplant during the winter planting season.

During the plants' dormant period in winter, seedlings are lifted carefully so as not to damage the roots, graded and fully enclosed in plastic bags with peat moss around the root system, before dispatch.

As with all bare-rooted evergreen seedlings, they should be transported promptly and potted or planted in the ground with minimum delay.

SUMMARY

Sophora microphylla has the potential to be used in temperate parts of the world, where its attractive flowers and form would complement existing garden plants. The potential to select from its very wide genetic base, offers a real challenge to plants people and propagators.