

The Norfolk Island pine, *Araucaria heterophylla (excelsa)* is grown in large numbers as a pot plant (fig. 1) for indoor decoration, and is planted outdoors for lawn specimens (fig. 2), as cut Christmas trees, and as a timber crop. It grows best at altitudes under 1500 feet and with an average annual rainfall of 50 inches or more. Being tropical, its range is the southern hemisphere, coastal Florida, sheltered parts of California, possibly small sections of the warmer parts of Texas and Arizona, the Hawaiian Islands, New Zealand, Australia, Norfolk Islands (its namesake) the Greater and Lesser Antilles, Mexico, Central America, South America, Africa, Singapore, New Guinea and Indonesia.

At present seeds are produced in Hawaii, the Norfolk Island Territory, Canary Islands, Peru, and Brazil. Indications are that soon viable seeds may be produced from Florida and Puerto Rican sources. Norfolk Island pine is a windpollinated species and a lack of trade winds when the pollen is ripe results in few fertile seeds and a poor crop. The seed ripening period extends from July through September and about every fourth or fifth year the harvest is sparse. The seed cone consists of the stem or core and the scales or seeds (fig. 3) and measures 5 inches by 3 1/2 inches wide.

The best seeds are fresh and plump, with the seed capsule full of a white milky latex substance. The winged parts of the seed - are light tan and the underside a mottled cream and tan color, with the outer rim, which contains the spur, a dark green. Fresh seeds average 516 to the pound, but drier seeds numbering up to 574 to the pound still show good sprouting results, according to our studies (table 1).

Seeds of higher count per pound

(indicating considerable dryness) do not give good germination results.

The fully mature seeds of the Norfolk Island pine, measure 1 1/2 inches long by 1 1/4 inches wide. The seed spur is 1/4 inch long and the seed capsule is 1 inch long by 1/2 inch wide. Cone collected seeds are superior to

Growing the Norfolk Island Pine

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ground collected seeds because, of those which are dehisced upon the trees and drift earthward, some lodge upon the broad branches where they become sunburned, others fall to the forest floor where they sprout if the ground is moist, and others are stepped on and crushed by collectors or others. The cone collected seeds, while somewhat hazardous to secure as they must be gathered by climbers, are dehisced in shaded, airy, cool places and are free from injury by man or the elements.

As soon as dehiscence occurs, the collector should grade the seeds, discarding the blackened ones, the small seeds that form at the top and bottom of the cone, carefully pack them in corrugated cartons, and ship them by the fastest means, generally airmail. The seeds should never be packed in plastic bags, unless ventilated, as they may heat and spoil, nor in burlap bags in which they might be crushed in transit.

Care should be taken to secure seeds free from *Crytospora longispora* Servazzi; seeds so infected require a sulfuric acid treatment at port of entry and such treatment is detrimental to germination.

Upon arrival at their destination the seeds should be immediately planted, in previously prepared and treated seedbeds. Our seedbeds are

Figure 1.-Potted Norfolk Island pines under 60 percent shade.





Figure 2.—*A. excelsa*, Lilliani, 5 years old, 18 feet tall.

mixture in our pot mix. The bed mix is filled to within 4 inches of the top of the beds and is well worked and levelled. Just before planting, the surface is given a light watering.

The seeds are placed upon the moist surface of the seedbeds with the seed edges barely touching each other, in rows of about 40 seeds per row. Subsequently rows are planted

with the pointed ends of the seeds

TABLE 1.—Planting and germination data for Norfolk Island pine

Date seeds harvested	Number seeds per pound	Number seeds planted	Date seeds planted	Number seeds sprouted
8/9/62	516	100	8/28/62	70
8/9/62	527	100	9/ 5/62	68
8/9/62	544	100	9/11/62	69
8/9/62	574	100	9/18/62	60
8/9/62	602	100	10/ 8/62	25

All seeds were harvested at same date, number of seeds per pound was at date of planting.

100 feet long, 4 feet wide, and 12 inches high. Seedbeds should be located in greenhouses or shade-houses, where they are protected from the weather, with 45 percent to 60 percent shade. The bed mixture is composed of one part sand, one part loam and one part peat. A light application of superphosphate, balanced dry fertilizer, and steamed bone meal is incorporated into the mix. We also use this same

barely touching the spur edges of the seeds of the previous row. (fig. 4)

Seeds are placed with the pointed ends westward and the outer green edge, which contains the spur, facing east. The seed spur is pointed downward helping anchor the seed to the soil surface, and bringing the soft, mottled side of the seed capsule into contact with the moist earth. The planted seeds are barely covered with fine sand or ground peat, the object not being to cover them but rather fill in the spaces between the seeds to keep them from shifting when watered. If the seeds are covered, the weak stems will be unable to raise the seed capsule for shedding, resulting in

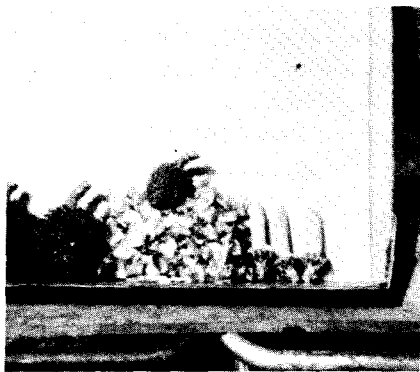


Figure 3.—At right, seed cone, center dehisced seeds with cone of next years crop upon top, far right stems and core of cone.

the stems rotting off at the soil line. By this seed placement, the sun assists in drawing the large seed upright, from which position it is readily shed.

Planting is followed by a gentle but thorough watering, with care taken not to disturb the seeds. The seeds should not be allowed to dry out, but on the other hand they should not be flooded-at this stage, light, frequent waterings are preferable to heavy drenchings. Four light waterings per day prior to sprouting are about right.

Fertile seeds sprout quickly (fig. 5) the first within 4 days after planting and the bulk by the 12th day (fig. 6). Intermittent sprouting continues over the next 6 months. During the sprouting period, germinated seeds should be carefully inspected each day and those with sprouts that have not penetrated the soil should be given an assist by making a small hole and inserting the sprout into the soil. Water only as required after germination is completed.

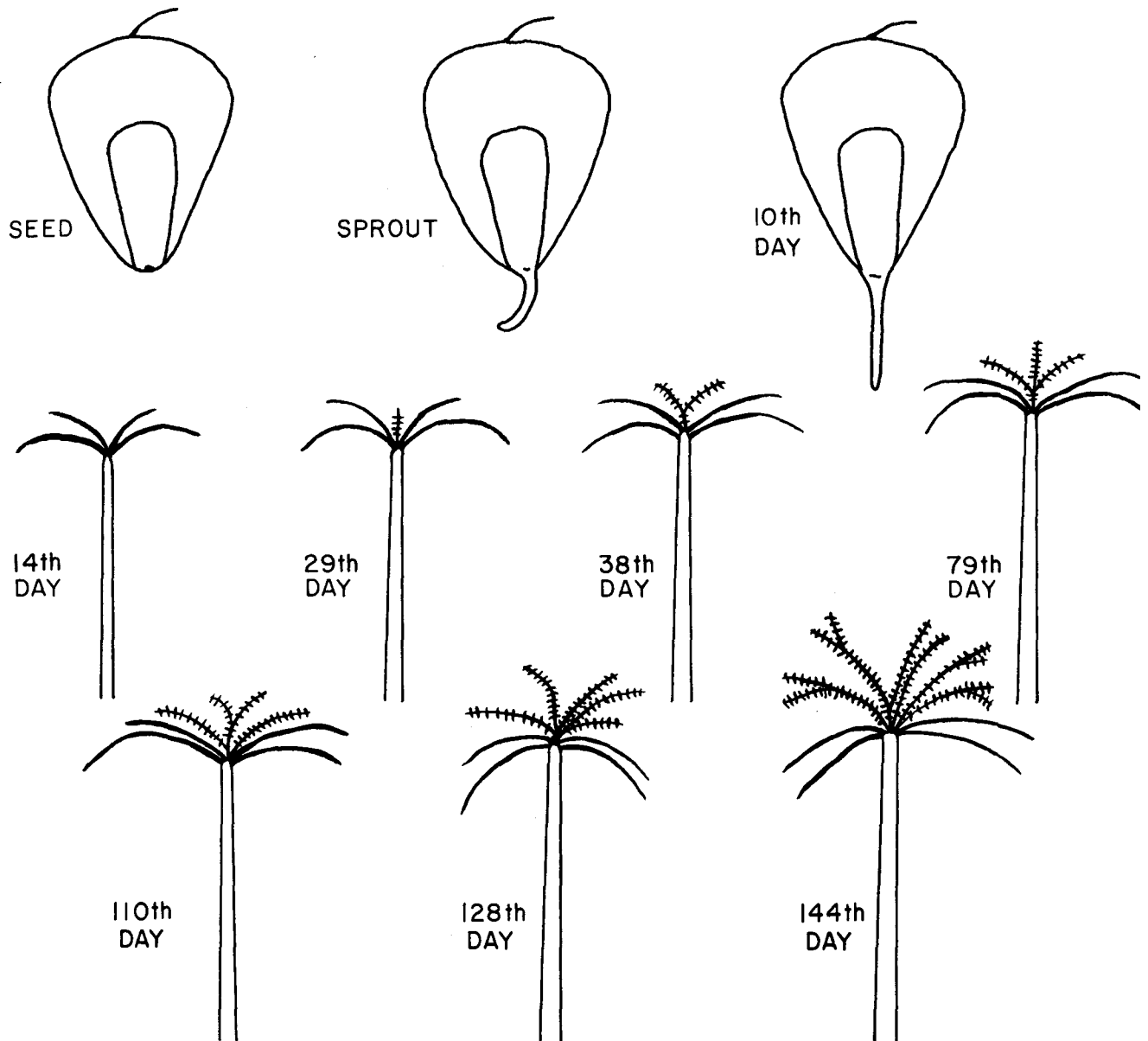
Four months after planting, the



Figure 4.—Freshly planted seeds; note how they are placed upon soil.

small trees will be 3 inches to 4 inches tall with four to six small branches. At this stage, they can be potted into 2 1/2 inch or 3 inch pots

Figure 5.—Development of Norfolk Island Pine Seed.



if desired, or left in the seedbeds until they are 4 to 6 inches tall at which time they should be potted into 4 inch or larger pots. Seedlings left in the seedbeds will be 6 to 8 inches tall after 1 year, at which time they should be placed in 6 1/2 inch pots or gallon containers. It is unwise to leave the seedlings growing in the seedbeds for longer than a year, unless they are thinned

out, because fungus will attack the lowermost branches due to lack of air and buildup of moisture causing them to brown off and die, resulting in a leggy tree. The thinned out seedlings left to grow for 2 years in the seedbeds will be 24 inches to 30 inches tall and can be successfully potted at this size providing 8 inch or larger pots are used and seedlings run under mist for the

first month after potting.

Norfolk Island pines planted outdoors, either as specimens or for later harvest, should be 18 inches tall or more and should be container grown. Under ideal conditions growth is quite fast and an 18 inch tall seedling will add 2 feet the first year, and thereafter from 2 to 5 feet a year for the first few years (fig. 7). As the trees mature,



Figure 6.-Seeds sprout quickly; the sun aids in pulling seedlings upright.

growth slows down. In Florida *A. excelsa*, reaches heights of 80 feet, in Hawaii up to 115 feet, and in Africa, giants up to 200 feet are found.

Vegetative reproduction of the Norfolk Island pine, is quite simple and the results are rewarding. Small tips, 2 to 3 inches long are cut from the upright stem of the seedling trees, dusted with a root stimulator, (preferably one that contains a fungicide) and inserted in 3 inch pots filled with soil mixture. Good results are also obtained from use of the new pressed fiber blocks. When placed under mist in a shaded house, cuttings will strike roots in from 90 to 120 days. The cuttings should be thoroughly hose-watered at time of setting and then misted 5 minutes twice a day, at midmorning and midafternoon. Constant or intermittent misting is not necessary; however, twice a week the cuttings should be thoroughly hose-watered in addition to the misting schedule. Once roots have struck, the small rooted trees are handled as are the seedlings. In general, the smaller the plant from which the tip is taken, the faster it will root. Tips taken from 6 inch tall seedlings will root under proper conditions in 90 days, tips taken from larger seedlings will require longer to strike roots and

tips taken from very large plants of 4 feet or more will require a year or more to root and a large percentage of these will never strike roots. Side or lateral branches should never be used for tips, for while they will root they never grow a tree but rather a prostrate type growth.

Several diseases and pests must be guarded against which will attack both the seedlings and the rooted tips of the Norfolk Island pine. Some of them are: cutworms, larvae of several moths, grasshoppers, aphids, red spider, spittlebug, and mealybug. Disease to watch are *fusarium* sp., *rhizoctonia solani*, *gloeosporium*, *pestalotia*, and *ericoccus Araucariae*. "Prevention is the best cure" and if good sanitation, careful watering, good air circulation, and screen to keep out insects are used, a healthy chop can be grown with little or no insect or disease problems. When treatment is required, manufacturers' recommendations for the particular problem will generally effect a cure.



Figure 7.—Author standing beside 6 foot tall *Araucaria excelsa* Lilliani.