

Using Supplemental Light In An Accelerated Growth Program For Nursery Seedlings

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Accelerating the growth of nursery seedlings by growing them in a greenhouse has been practiced for many years in Connecticut. The better environment control provided in the greenhouse results in less stress on the plants, allowing a larger and stronger plant to be grown in a shorter period than if grown in an outside bed.

Research by Dr. James Hanover at Michigan State University and by other scientists has shown that the three most important aspects of an accelerated growth program are temperature, moisture and light.

A bottom heating system is the common method used to provide the ideal temperature in the root zone. Both air and water root-zone systems are commercially available. These use a probe type thermostat to control the soil temperature.

The moisture level is maintained by installing an overhead misting or fogging system. The use of a porous growing mix keeps the root zone from becoming saturated.

Supplemental lighting can be installed at two levels. Exposure to a light level of about 50 footcandles for 30 seconds every 30 minutes will trigger the internal chemical changes that keep the seedlings from going into dormancy. This can be provided with incandescent lights spaced about 3 feet apart over the growing bed. Control of the lights is through an interval timer and a 24-hour time clock that activates the system in the evening and turns it off at daybreak. The growth that the plants make is from the sunlight they receive and not from the lights. This is rather limited during the winter because of the short days and the extended cloudy periods.

To get additional growth, a light level of 800 to 1000 footcandles is needed. A daylength of 16 to 24 hours should be used depending on the species of plant grown. High pressure sodium lighting has worked well. The high light levels can be obtained with a small number of fixtures, and the efficiency of energy usage is much higher than with incandescent or fluorescent bulbs. One 400-watt fixture will cover about 50 square feet of bed or bench area at

800 footcandles. Adjustable reflectors are available from some manufacturers to direct the light to the plant area. Control is with a 24-hour time clock that turns the system on and off.

Several precautions should be observed if this system is to be used.

1. Start on a small scale--one bench or bed. Try several species. Some respond differently to daylength and light level.
2. Plants from an accelerated growth program may be out of synchronization with conventional plants and schedules may have to be changed to have them ready for potting at the appropriate time.
3. Seedlings may have to be conditioned so they can adapt to the outdoor environment without setback.

The advantages usually outweigh the disadvantages:

1. Most tree species respond with an increased growth rate producing a marketable seedling in months rather than years.
2. Accelerated growth continues even after the plants are potted or placed in the field.
3. A more uniform, better quality plant is produced.
4. Once a production cycle is developed, plants can be produced to meet a desired schedule.