

PLANT PROPAGATION IN OKLAHOMA

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The propagation structures and techniques utilized at Greenleaf Nursery are based upon the basic concepts of being simple, functional and economical.

Propagation Facilities. The basic propagation structure is of a quonset-type construction that is 97' long, 12' wide, with two ground beds 5' 4" wide divided by a center walk 16" wide. The first, and certainly one of the most important, factors in utilizing ground beds for propagation, is the grading for drainage during construction. These beds should have a 12" vertical drop in the 97' length. Less than 12" vertical drop will not allow adequate drainage potential, and more than 12" vertical drop makes proper leveling of mist lines to avoid dripping very difficult. The beds are crowned to allow an 8" vertical drop from the center aisle to the outside edge of the quonset on both sides.

The basic construction and dimensions were dictated to utilize standard and readily available materials. The length was made 97' to utilize the standard 100' length of polyethylene plastic sheeting and the width of 12' was dictated by bending a standard 21' joint of $\frac{3}{4}$ " galvanized pipe into a 6' radius, leaving approximately 8" on each end to anchor the bow. This also allows the polyethylene plastic cover to be a standard width of 20'.

Each quonset is served by two water lines; one is injected with fertilizer, the other nonfertilized. This allows more versatility in the utilization of the individual quonsets, rather than having to schedule blocks of quonsets for the same purpose. Each quonset is also served with two electric lines; one connected to a 24 hour clock for automatic control of mist or irrigation lines; the other is a constant source for heating cables or heaters. The quonsets are also served by a natural gas line for heater fuel. They are heated by a 105,000 BTU forced air heater controlled by a standard greenhouse thermostat. Each quonset is equipped with an overhead irrigation system consisting of a single line having twelve Buckner III sprinkler heads spaced 8' on center.

The material cost of these quonsets, based on prices quoted in July, 1974, is 54c/sq. ft. This material cost is for a complete quonset ready for use but excludes the price of a heater or mist line, as each quonset does not necessarily need these items. The labor cost for construction of a quonset is \$270, based upon 108 total hours at a cost of \$2.50/hr., or 24c/sq. ft. This gives a total cost of 78c/sq. ft. for a completed quonset structure.

Preparation and Sanitation. The rooting medium was originally 50% Gardengrade Detorf German peat moss and 50% class A concrete sand, by volume. We have since substituted yellow pine bark, ground to a consistency similar to the peat moss, with no significant change in results.

Sanitation is the dominating consideration in preparing a quonset for rooting cuttings. The standard procedure followed at Greenleaf Nursery is as follows: The beds are filled level full with the rooting medium. This is very important as the depth of the medium greatly effects the drainage of a ground bed. The medium is then wet with the overhead irrigation system and rototilled to insure a uniformly moist, loose mix. The beds are then raked level and the aisles and side boards are cleaned of any surplus medium, debris, etc. A Modine heater and thermostat is installed. The mist lines and controls are installed. These two items are installed prior to fumigation so there will be no reason for anyone to enter the quonsets after they are fumigated except for the crew that sticks the cuttings. Also, the heater is needed during cold weather to maintain adequate temperature levels in the medium to insure proper fumigation.

The beds are fumigated with Dowfume MC2 at the rate of 3 lb./150 sq. ft. to insure control of *Pythium*, *Rhizoctonia*, and *Fusarium*. The temperature of the medium greatly affects the effectiveness of methyl bromide. For best results, the medium temperature at the 4" depth should be above 60°F. If the temperature is between 50°F and 60°F, double the exposure time from 24 hrs. to 48 hrs. For safety in utilization, never use 100% methyl bromide but always get material with 2% chloropicrin added since methyl bromide alone is odorless. The fumigation cover is a piece of 6' x 100' 4 mil clear polyethylene plastic which is lathed over the bed. In addition to fumigating the beds with methyl bromide, the center aisle, bows, outside aisle boards, and the quonset ends are sprayed with a solution of 1 part formaldehyde and 3 parts water. Upon completion of the 24 hr. fumigation period, the quonset is opened up, the plastic fumigation cover removed, and the beds are allowed to air for 24 hrs. Extreme care is utilized in removing the plastic cover so that the medium in the beds is not contaminated. After the beds have aired properly the medium is again moistened if needed and the same plastic which was used as a fumigation cover is draped over the beds for the people who are sticking the cuttings to work on and prevent contamination.

Sticking of Cuttings. The propagation of juniper cuttings at Greenleaf Nursery is done annually between December 1 and March 1. Under the climatic conditions of northeastern Oklahoma the wood is quite dormant during all of this 3 month period. Last year 1,973,000 juniper cuttings were stuck during this time. The cuttings were made, treated, and stuck by three 6-man crews at a

piecework rate of 65c per 100 cuttings, or slightly less than 2/3c per cutting. Two men treat and stick the cuttings taken by a four man cutting crew. These six people are one piecework crew and are paid for the total number stuck each day.

The advantage of piecework is that the crew is self-motivated by the opportunity to make higher daily "take home" wages. It places great importance on close, firm, supervision to maintain quality control but the supervisor never needs to worry about attendance or if the crew is working. Some examples of the amount of work piece-work inspires: The all-time Greenleaf record for 4 men taking and making cuttings in the field is 43,075 in a 9 hr. day, or 10,768 cuttings/man. The record high for sticking cuttings by 2 men in a 9 hr. day is 32,500 cuttings, or 16,250/man. The average for 4 men taking and making cuttings in the field is 25,000/9 hr. day, or 6,250 cuttings/man. The average for 2 men sticking cuttings in a 9 hr. day is 25,000, or 12,500/man.

The procedure for taking the cuttings is quite simple. Four men comprise a crew and each person is equipped with a nail apron to carry #10 rubber bands, brown cotton gloves, a Corona #21-S hand shear, and a sterilized container to store cuttings. In addition, the total crew has a large container for transporting cuttings, a bucket of disinfectant for sterilizing shears every 30 to 45 minutes, and a sprinkler can to keep the cuttings moist. The cuttings are selected from 1-year-old 1 and 2 gallon container stock, being sure that the base is firm, brown wood. The bases of the cuttings are stripped between the thumb and index finger of the right hand and the glove for these two fingers are wrapped with black plastic tape to avoid injury. The cuttings are taken in bundles of 25, with the bases secured with a rubber band. The bundles are stored in the sterilized container until picked up by the propagation foreman. These cuttings are collected every 30 to 45 minutes in the field and taken directly to a "crisper" in the propagation area.

The two people responsible for treating and sticking the cuttings first dip them in a fungicide dip of 3 tablespoons of Captan and 1 tablespoon of Terrachlor in 5 gal. of water. Upon removal from the fungicide dip, the bundles of cuttings are set, base side up, and excess moisture is allowed to drain off. The bundles of cuttings are then "quick-dipped" in a liquid rooting hormone ranging from 1% to 0.187% indole-3-butyric acid depending upon the cultivar.

The cuttings are stuck in the quonsets in rows of 50 cuttings per row. Since there are 25 cuttings/bundle, each of the two people stick one bundle of cuttings per row. This greatly facilitates the speed of handling the cuttings during sticking. After each row is stuck the cuttings are firmed-in with a tamping board and hammer to insure uniform contact between the basal area of the

cuttings and the medium. The spacing of the cuttings within the row is a standardized 1.25 inches. For juniper cuttings we have three standard spacings between rows, dependent upon the cultivar: 40,000 cuttings/quonset or 3.0 inches between rows, 50,000 cuttings/quonset or 2.33 inches between rows and 60,000 cuttings/quonset or 1.9 inches between rows. As the cuttings are stuck, the stickers are working on polyethylene plastic which covers the bed to prevent contamination of the medium. As the bed is filled with cuttings the plastic cover is rolled back and the mist heads are actuated. At the end of each ½ day work period the cuttings are watered in by hand to further insure good cutting to medium contact. Upon completion of sticking a house with cuttings, the mist lines are leveled and the complete quonset is drenched with a Dexon-Terrachlor drench. The cuttings are then placed under a regular preventative spray program.

The cuttings are then carried under mist until rooting occurs and are then hardened-off. All quonsets are hardened by July 1 with easy-to-root cultivars being hardened in early May. The liners are then forced with optimum fertilizer and water levels for the remainder of the growing season and are planted as bareroot liners in 1 and 2 gallon containers the following February.

VICE-PRESIDENT BATCHELLER: For the second half of this afternoon's program we will switch moderators. I would like to introduce David Lannon of the Ornamental Horticulture Dept., California Polytechnic University, Pomona, California.

MODERATOR LANNON: Thank you, Jolly. Our first speaker, Doug Ericson, upon graduation from Cal Poly toured Europe, visited many of the nurseries there, then came back to head up the Propagation Department for Rancho Soledad in California. As of September 1st he is the President of Rancho Propagators. It is a new firm that has high hopes for success.

Our second speaker will be Ron Halverson, who graduated from Cal Poly at San Luis Obispo in 1958. He worked his way through school with Jackson & Perkins, so he gained that practical experience. In 1962 he started his own nursery in Pleasanton, California, and has that nursery today.

Our third speaker, Burt Silva, also studied at Cal Poly, Pomona, after a career at Hartnell College in Monterey, California. Upon graduation at Cal Poly he went to work for Burpee Seed Co. but now is in research and new product development at Brokaw Nurseries at Ventura, California¹

¹ Ed. Note: Doug Ericson, Ron Halverson, and Burt Silva described, with the use of slides, propagation operations at their nurseries.

MODERATOR LANNON: Our next speaker studied at Cal Poly in San Luis Obispo, where he graduated in 1971. Upon graduation he worked for Oki Nursery in Sacramento for a year and now he is branch manager of the Oki operation at Portland, Oregon. Paul Fukasawa.

WHAT THE HORTICULTURAL EMPLOYER CAN EXPECT FROM COLLEGE GRADUATES

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The rapidly growing ornamental horticulture industry is presently looking for mid-management personnel. The industry is hiring horticultural graduates to fill a wide diversity of positions. There is considerable value in hiring college graduates, rather than filling needed positions through an apprenticeship training system. A college graduate obtains the basic language of the industry. With the language and tools he has obtained in his schooling he is able to seek out new approaches from a varying number of sources. A college graduate may not have the technical background necessary in present job applications, but he does have the basis for understanding why, along with how, a task is performed. The nursery and floriculture industry is constantly undergoing change and progression. Future management must be able to be innovative and adaptable. A college graduate will be far more adaptable to change, and more innovative than a non-college graduate.

A common complaint amongst employers is that upon hiring a college graduate they have a person who understands theory, but not techniques. At Oki Nursery we have a saying, which I think describes the situation. The saying is "you must learn to walk before you can learn to run." However, the meaning of the saying is that a certain amount of time must be spent immediately learning the technical aspects of the industry to give the new trainee a solid foundation upon which to grow. My first period of training involved learning to drive a fork-lift and tractor, soil filling for potted plants, plant movement, irrigation, crew leadership, and other technical tasks. I think it is unfair to put the total burden of training on the employer. Labor is becoming a high enough priced expense without having college-educated pot fillers. It is partially up to young graduates entering the industry to be willing to pay a tuition for their training period. I remember being told by Mr. Kubo, as a student at Cal Poly, that a college graduate just starting out in the industry should be able to divide his salary