In presenting this talk I referred to evergreens only in general terms. I fully realize that some evergreen species vary in their physiology and therefore demand specific conditions as a prerequisite for rooting. All I could attempt to do during this brief talk was to discuss in general what may occur within the cuttings at the time it is severed and to suggest some treatments that would be appropriate.

MODERATOR COGGESHALL: Thank you very much Dr. Waxman.

The final speaker on the panel this morning is Mr. Edwin Kubo, Oki Nursery, Inc., Sacramento, California, who will speak on Care and Management of Cuttings from Collection Through Rooting. Mr. Kubo.

CARE AND MANAGEMENT OF CUTTINGS FROM COLLECTION THROUGH ROOTING

EDWIN KUBO
Oki Nursery, Inc.
Sacramento, California

Before discussing my subject, "Care and Management of Cuttings From Collection Through Rooting," I would like to give you a brief resume of Oki Nursery. Located in Sacramento, Oki Nursery, one of the largest container nurseries in California, was founded by Mr. M. Oki in 1907. The approximate production acreage of the Nursery is 56 acres and the annual production is in the excess of 2 million container grown plants. Our production is based on the U.C. system in which the use of clean soil, clean stock, sanitation, standardization, systemization and mechanization plays an important role.

To increase the efficiency of our production program, we have emphasized careful planning of our production through the use of good record keeping. Our annual production projection schedule plays an important part in determining the varieties and quantities to produce for the year. The Seeding schedule and Cutting schedule are used as a guide before executing production. Once in production a careful set of records is kept for each item for future reference.

In our completed record for cuttings we have the following information:

1. Date, number of cuttings stuck, and location.
2. Date, number of liners planted, and location.
3. Date, number of gallons planted, and location.
4. Source of Wood
5. Treatments. (Dip and Drench)
6. Type of growth regulator or hormone.
7. Type of medium used in rooting.
8. Percentage of rooting.
9. Percentage take of liners
10. Remarks. (Used for evaluation)

We have standardized and systemized all procedures from the collection of the cutting through the rooting process as follows:

Cutting Wood Collection and Treatment

We have found that mother blocks and container plants that have been properly fertilized and sprayed produce our best cutting wood. Our cutting wood is collected in new 4 mil polyethylene sheets. After the cutting wood is collected, it is taken immediately to the cutting shed to be properly treated to prevent desiccation. The cutting wood is dumped onto a wire bottomed bed and washed thoroughly. A continuous over head mist is used to prevent desiccation.

Cutting Procedure

For preparation of cuttings, we prefer using a sharp shear. Cuttings are made 3 to 4 inches long. We normally take soft and semi hardwood cuttings. The cuttings are then bundled and placed in wire bottom boxes. When the boxes are filled, the cuttings are treated with a pesticide. Our cuttings are treated with a solution of Morton's soil drench C. It is diluted 1 oz. to 35 gallons of water and the cuttings treated for 10 minutes. We have found this Mercury fungicide to be satisfactory in our operation. Recently we have been experimenting with a new fungicide introduced by Shell Development Company. This material is known as SD 345. Our results thus far have shown great promise for this product when used as a dip or soil drench.

Sticking Operation

The cuttings are removed from dip, drained and placed in a wire bottomed box. The cuttings are then treated with growth regulators and stuck in a 18″ x 18″ x 3″ sterilized flat. Coarse perlite is used as a rooting media. The type of growth regulators used are the Hormodin 1, 2, and 3. We have also adapted the quick dip method using I.B.A. Crystal in 50% alcohol solution. We have found that certain difficult to root varieties can be rooted successfully by using 5000 ppm of I.B.A. alcohol solution dip. After the cuttings are stuck into flats, and before they are taken into the greenhouse they are again drenched with Morton's soil drench C. This insures that our mist Greenhouses will remain free of contamination.

Misting

The cuttings are left in the mist greenhouse to root. The misting in our propagation house is controlled by a light activated interval switch. We have found this control to be more effective than the clock timed control switch The frequency of misting in our greenhouse varies with the sunlight intensity. A photoelectric tube controls the basic mechanism of this operation. On bright days, when evaporation is greatest, the frequency of misting is increased by the light activated switch. On cloudy days when evaporation is lower, the misting is less frequent. We were forutnate to have Mr. Carl Schmidt of Point Reyes, California assemble this switch for our use. Mr. Schmidt obtained the blue prints from the Agricultural Engineering Department of the University of Connecticut, and modified the control to suit our needs.

After the cuttings are rooted, the misting is gradually reduced until no misting is necessary. Normally this operation takes two weeks.

The cuttings are then lifted and planted into our liner greenhouses. As the rooted cuttings are lifted, they are again treated with

Morton's Soil Drench C to insure prevention of disease. Rooted cuttings are potted in 2¼″ peat pots.

In our program we take great measures in preventing disease problems. The following precautionary measures are taken:

1. Disinfecting all tools with Chlorox 1:4 with water.
2. Spraying copper napthanate solution on all exposed wood surfaces.
3. Washing concrete floors of the propagation house daily.
4. Washing cutting benches with Chlorox solution daily.
5. Personal cleanliness of each employee.
6. Periodic drenching of cuttings, and liners with Morton's Soil drench C to prevent contamination.

MODERATOR COGGESHALL:

Our next speaker will be Dr. Harold B. Tukey, Jr., Department of Floriculture and Ornamental Horticulture, Cornell University, who will speak to us on the Leaching of Nutrients from Cuttings and Its Effect on Subsequent Growth. Dr. Tukey!

DR. HAROLD B. TUKEY, JR.: Thank you, Mr. Chairman, Members of the Society, and Guests: It is a great pleasure to be with you at your annual meeting. In spite of the snow, let me tell you I would rather be here than in the northern part of New York, so I thank you for the excuse to come.

LEACHING OF METABOLITES FROM ABOVE-GROUND PLANT PARTS, WITH SPECIAL REFERENCE TO CUTTINGS USED FOR PROPAGATION

H. B. Tukey, Jr.
Department of Floriculture and Ornamental Horticulture, Cornell University. Ithaca, New York

That leaves and other above-ground plant parts, including fruits and stems, may absorb water and nutrients, is now well established. The cuticle layer of foliage, once thought to be continuous and impermeable to the passage of nutrients, has now been found to be discontinuous, with numerous cracks and projections which allow the passage of nutrients in aqueous solutions. That these same plant parts may also give up or lose materials into their external environment is less well understood and appreciated. And yet for at least 150 years there have been reports of this phenomenon, indicating that metabolites, both organic and inorganic, could be leached from foliage by aqueous solutions (2). Despite the considerable experimental evidence and speculation which followed these early reports, the concept of leaching was not fully appreciated. Full and adequate proof was seemingly provided by the use of radioisotopes which conclusively demonstrated that labeled materials, absorbed by plants, could be leached by water, including rain and mist (6,11). The magnitude and diversity of these losses make them important in many aspects of plant science, including plant propagation.

The term "leaching" is herein defined as the removal of materials from plants by aqueous solutions. No distinction is made between