alum did not greately enhance the titer or prolong the antibody level.

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ROOTING GREENWOOD CUTTINGS WITHOUT SUNLIGHT UNDER FLUORESCENT LAMPS

OVER a century ago, improvement in heating devices led to the change from opaque structures with some glass-covered openings to the greenhouse of the present. The improved illumination thereby obtained seemed to compensate for the increased fuel requirement and more frequent watering and more constant care this change entailed. For many years, though fuel and labor costs have increased markedly and new types of illumination have been developed, there has been no essential change in the type of house used for growing plants, and propagation of plants has been carried on in the same houses, or slight modifications of them, as are used for growing. High fuel costs in winter and excessive insolation in summer have been accepted unquestionably.

Recent studies made at the U. S. Plant Introduction Garden of the Division of Plant Exploration and Introduction, U. S. Department of Agriculture, Glenn Dale, Maryland, indicate the desirability of investigation of the possibility of using opaque structures for the rooting of cuttings. Such structures if partly or wholly underground could be heated economically in winter and also could avoid the high temperatures which are often a source of difficulty in the summer.

Some experiments conducted during the summer of 1942 indicated that more rapid rooting of cuttings of *Weigela floribunda* (Sieb. and Zucc.) C. A. Mey, *Ligustrum ovalifolium* Hassk. and *Chrysanthemum morifolium* Ram. could be obtained in a basement darkroom under continuous illumination from a 100 watt mazda lamp than in conventional propagation equipment in a greenhouse. In a continuation of these experiments using more efficient lighting equipment, particularly good results were obtained with small detached propagation cases of opaque material, each fitted with a single 30 watt fluorescent lamp. These cases were approximately six feet in length, two feet wide and three feet high, and the lamp was placed 10 inches above the rooting medium, which in this instance was a coarse grade of vermiculite. Automatic control of the bottom heat in the rooting medium was provided by means of a lead-sheathed soil-heating cable controlled by a thermostat. The small amount of heat given off by the lamp was absorbed largely by the air space above it and did not raise the temperature of the air around the cuttings. In other experimental frames using lamps of higher wattage, the cuttings were protected from heat by means of a glass partition between the cuttings and the lamp. Both the white and the daylight quality lamps have been used successfully. The operating cost was low because of the high efficiency of the fluorescent lamps.

Uniform relative humidity (approx. 80 per cent.) was maintained easily within the cases because of the constant light and temperature (75° F.). In the conventional greenhouse, on the other hand, the constant fluctuations cause serious difficulty in maintaining a uniform humidity.

The results obtained in rooting cuttings in these frames have been exceptionally good, and have surpassed those in similar propagating frames within an ordinary greenhouse, when the rooting medium and the temperatures have been the same in both locations. The cuttings tried include those of various species of *Citrus, Cinchona, Severinia, Hibiscus, Bougainvillea* and unrooted divisions of *Cymbopogon citratus* DC.

In comparing rooting under 16-hour daily photoperiods with that obtained under continuous illumination, the responses were often superior in one or the other day-length according to the individual species. The difference was negligible with cuttings of some plants. These responses can be changed by treatments with growth substances in some manner not explicable at present. For instance, cuttings of the Chinotto orange, *Citrus Aurantium* Linn. var. *myrtifolia* Ker-Gawl., following a treatment by dipping the bases in a 50 per cent. solution of ethyl alcohol containing five mg of potassium indole butyrate per ml rooted heavily under a 16-hour photoperiod in only two weeks, but rooting was slight and greatly delayed under continuous illumination. Moderate and approximately equal rooting of untreated cuttings was obtained in both day-lengths. On the other hand, the identical treatment of growth substance on cuttings of rough lemon, *Citrus Limon* Linn., produced a heavy rooting response under continuous illumination, but rooting was inhibited under the 16-hour photoperiod. As with the Chinotto orange, the rooting of the untreated cuttings was practically equal under both periods of illumination.

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