

## Rooting Ability of Pine Leaf-Bundle Cuttings Can be Improved by Environmental Control Before their Collection

By

Ryookiti TODA

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*With two text figures*

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It is well known that pine cuttings from some individual trees root more easily than the others. Several authors (1) (2) (3) (5) considered the difference as clonal, and DUFFIELD and LIDDICOET (4) verified it in the hybrid pine cuttings. But THOMAS and RIKER (7) could not find any clonal variation among over 150 different clones. They are of opinion that the different rooting behavior of each individual tree is due more likely to some temporary condition within the parent tree.

The nature of this "condition" is not yet evident. Environment seems, however, to be acting some rôle in this phenomenon, because DEUBER (2) has noticed that the readily rooting cuttings are usually collected from rather suppressed trees. On the other hand, STOUTENYER and CLOSE (6) have shown increased rooting and reduced callus formation when cuttings were collected from plants grown under blue light.

The present author wished to examine whether or not the light quality, exercised on mother stocks, affects the rooting ability of pine cuttings. Results did not give any conclusive relationship, but it became evident that it is possible to increase rooting ability of cuttings by controlling environmental factors under which the mother stocks are to be grown.

In early April, 1951, eight plants of 6-year-old *Pinus densiflora* were picked up. Two twigs were then selected from each plant and were covered with four-layered bags of cellophane, one with red and the other with blue. Their spectrographic properties\* were as follows:

red...transparent for 5900—6500 Å, slightly transparent for 4200—4700 Å.

blue...opaque for longer than 5500 Å, maximum transparency appears on 5000—5200 Å.

In late July and in early December, the bags were renewed and at the same time new covers were set on the other twigs. Red covers were not prepared in December.

On March 31, 1952, each forty leaf-bundles (8) were collected from covered

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\* The author owes Mr. Tadashi FURUKAWA much for the determination of these properties.

twigs and non-covered control, dipped for a moment into the water solution of potassium  $\alpha$ -naphthaleneacetate in concentration of two milligrams per cubic centimeter, and planted in rooting medium (Kanuma soil\*\*) and then placed on a glass house bench.

All twigs covered in April of 1951 had already been killed by the time of preparation of cuttings and provided no living leaf-bundle, and twigs covered with blue bags in July were also seriously damaged so that only a few cuttings were obtained. Some of red covered twigs were broken but remaining ones appeared almost healthy. Many bundles covered in July, both red and blue, had been swollen at their base as shown in figure 1.



Fig. 1. Brief sketch of swelling formed on the base of a bundle covered in July.

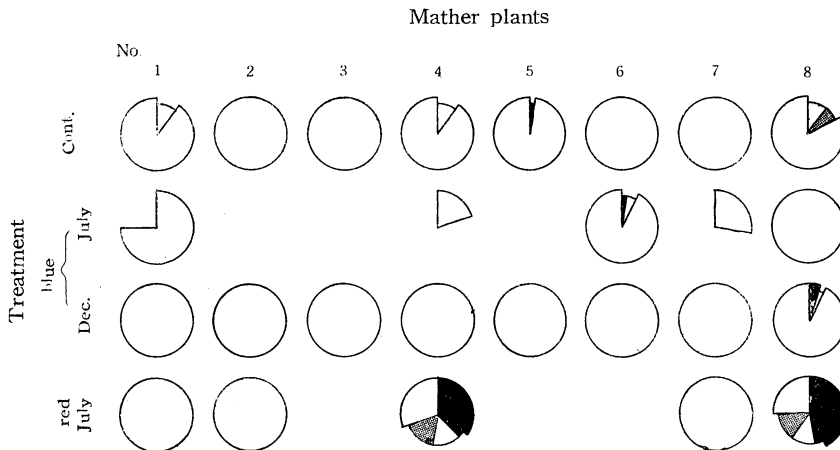


Fig. 2. Percentages of rooted (black) and dead (white) cuttings. Each lot consists of 40 cuttings. Sectors which have short radials represent non-rooted but living cuttings on June 10, and shaded sectors show that injured by the nutrient solution.

\*\* Soil consists of weathered pumice grain.

Cuttings were removed from the medium, examined and replanted if they were alive without root, on May 26, June 10, July 1, July 22 and August 12. Percentages of rooted and dead cuttings as of July 10 and the final results of the remaining non-rooted bundles are shown in the figure 2. Starting from July 10, several leaf-bundles were applied once a week on their needles with mixture of 0.5 % solution respectively of urea and secondary potassium phosphate.\*\*\* This treatment turned out, however, rather harmful. Almost all the treated bundles had died before the next examination and no root started, while the other cuttings rooted to some extent. When applied to rooted bundles, this treatment was by far less harmful.

Highly significant effect of red cover was realized on mother stocks Nos. 4 and 8. This effect, however, can not directly be reduced to the light quality, because the twigs covered with blue bags in July have been extremely weakend, while these covered in December may have suffered little change as they have been in their resting period. Moreover, it remains in doubt why the other stocks have not responded to the covering.

These results, therefore, cannot point out the active factor or factors that increase rooting ability of cuttings. This notwithstanding, the fact has become evident that environmental control can previously increase the rooting ability of pine cuttings.

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## サシホの根付く力はオヤギの環境の 調節で高められる

(摘 要)

戸 田 良 吉

マツのサシホの根付き歩合にあらわれる個体差の少くとも一部は遺伝的でない何かの条件によるらしいとされていたが、サシホを取る前のオヤギの環境条件を調節して根付き歩合をあげられることが確かめられた。

6年生アカマツの枝に、7月に青、赤のセロハン袋を、12月に青の袋をかけて4月まで置き、それから葉束をとつてさしつけた。結果は Fig. 2 に示すとおりで、赤セロハンをかけたものの中にいちじるしい効果が見られる。但し、この効果が赤い光によるということは今回の結果からは云えず、実験をくりかえさなければ何が効いているのかは判らない。