I have been successful, however, in inoculating large groups of plants by cutting the mycorrhizal roots from growing plants, putting them in a kitchen blender for a few minutes and spraying the resulting liquid on plants I wished to inoculate. At this time I am inoculating cuttings in the cutting bench after they have been stuck and are starting to root. You can see mycorrhizal roots on the rooted cuttings when they are lifted from the bench about 2 months later. These mycorrhizal roots (Figure 1) are on the plants for as long as I keep them and perhaps for the life of the plants. I have noticed no detrimental effects as a result of mycorrhizal inoculation. The plants appear to grow faster, are much more healthy, and have much better transplanting percentages than uninoculated plants. I am sure that we are just on the edge of great discoveries about the use of mycorrhizae in the growing of plants.

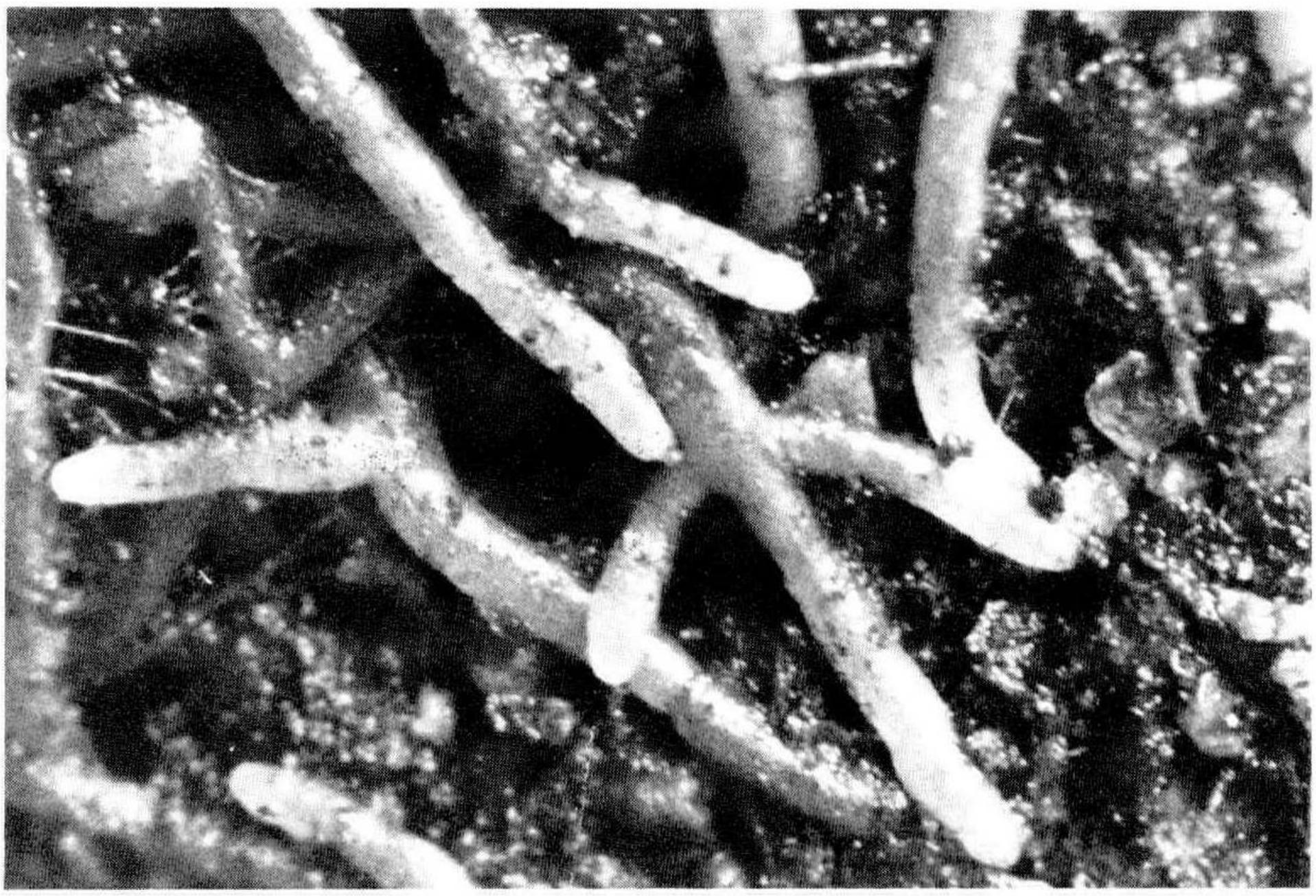

Figure 1. Mycorrhizal roots of *Arctostaphylos uva-ursa*. X 180. Photo by Wm. Snyder.

PROPAGATION OF KALMIA

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Collected plants of *Kalmia latifolia*, sometimes known as mountain laurel, have been used as ornamentals for many years, yet, little has been done to propagate selected cultivars in nur-

series until recently. Even now most kalmias grown in nurseries are propagated from seed since their cuttings are believed by many to be nearly impossible to root.

After working with kalmia for many years we have improved our method to the point where we can produce cuttings of kalmia cultivars in quantity and can expect an acceptable percentage of rooting, usually 60% to 75%.

In our attempts to root kalmia we have used many different rooting media, including sand, peat moss, perlite, pumice sand, decomposed sawdust and fresh sawdust, both of cedar and Douglas fir. We tried every commercial rooting hormone available and even took a try at mixing our own. We have tried rooting cuttings nearly every month of the year. Some cuttings are taken in late October, but most of them are taken in January at which time they root most rapidly for us.

The methods we now use are the result of the experience we have gained from many years of searching.

Bottom heat at 73° to 75°F is supplied by electric cables in greenhouse benches that are six inches deep. Our cuttings are all taken from young plants. Juvenility seems to be very important as our percentage of rooting from young plants is nearly twice as high as that for cuttings from older stock plants. The cuttings are dipped in a Benlate solution and allowed to drain. A double wound is used followed by an "in and out" dip in liquid hormone. Currently we are using FAST ROOT which contains 0.5% 3-indolebutyric acid, 0.5% a-naphthalene acetic acid, and 0.0175% boron. This material is used at the rate of 5000 ppm. Mist is used ten seconds every ten minutes during daylight hours. The rooting medium is composed of 40% fir sawdust, 40% cedar sawdust, 10% perlite, and 10% peat moss. The sawdust should be thoroughly leached before cuttings are stuck.

Our percentage of rooting and the size of the root ball is superior in this medium over another combination we have used.

By the time we are ready to root kalmia our benches have already been used to root rhododendrons. We have tried removing the old medium and putting in fresh medium, as well as sticking our kalmia cuttings in the medium from which the rhododendrons were removed. The results have been noticeably better when we stick them in the medium that has already been used once, and this practice has not seemed to cause us any disease problems. We wonder if this could be the result of the action of mycorrhizae fungi?

We transplant our kalmia in June. Kalmia cuttings root

slowly and we find that when we transplant, a few have callused but have no roots. These are restuck in flats and caried on under mist, but with no bottom heat. By fall most of these will have rooted.

If the above methods are used, and with patience to wait about 5 months for roots to appear, one should be able to root kalmia cuttings with very acceptable percentages.

ROOTING OF TISSUE CULTURED RHODODENDRONS

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Abstract. Rooting of tissue cultured rhododendrons directly from stage 2 can be successful, however, small changes in the growing environment cause variable survival rates. Uneven crop growth also has been a problem. My research has been redirected towards a stage 3 rooting step in culture in an effort to increase rooting percentages and reduce plant growth variations observed.

INTRODUCTION

The steps in tissue culture propagation involve 3 conceptual stages (3). Stage 1 describes the necessary procedures in establishing plant propagules in the culture environment. The important factors in stage 1 include the selection of the appropriate source of explants; choice of the approprate methods of disinfesting all pathogens from the explants, and determining the appropriate chemical and physical environment for growth and establishment of the culture. Stage 2 is the time when the plant propagules are multiplied. The important considerations of this stage are finding the appropriate growth regulator combinations for propagule multiplication (i.e. shoots for rhododendrons, crowns for strawberries, and bulbs for lilies). The number of times propagules are recycled in stage 2 depends on the genetic stability of the crop and the amount of propagation required. Stage 3 is the term used to describe transition period from the multiplication of propagules and establishing them in the soil environment. After stage 3, the plants can be handled in a similar manner used for growing seedlings.

The stage 1 and stage 2 requirements for propagating rhododendrons have been previously reported (1,2) including revision of the inorganic formula. At the present time about 50 rhododendron cultivars have been established in culture. Other