CHARLIE PARKERSON: This brings to a close this portion of this morning's program and the moderator for the second session of this morning's program will be Dr. Charles Heuser of Pennyslvania State University.

CHARLIE HEUSER: Because of the large number of papers still to be presented this morning we are going to move right into the program and we'll hold all questions until the end of the session if there is time.

Our first speaker will be Bill Hamilton who will tell us about container production of sweet fern.

CONTAINER PRODUCTION OF SWEET FERN

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Sweet fern (*Comptonia peregrina* L.) is a deciduous shrub 3 to 4 ft at maturity, with sweet-smelling fern-like leaves. It is found growing naturally from Nova Scotia westward to Michigan and south through New England to North Carolina. Once established in sand, gravel, or subsoil areas, regenerative shoots from its rapidly spreading root system will cover barren areas with vegetation in 3 to 4 yr without fertilization, even under extremely dry conditions. Although not a legume, sweet fern has the ability to fix nitrogen through root nodules and, contrary to legumes, grows better in an acid soil than at a high pH. In areas where it grows naturally, sweet fern is one of the first plants to establish itself.

This species has long been recognized as a very desirable roadside plant, both for aesthetic reasons and for control of erosion on steep banks. Many attempts over the years to establish sweet fern on Massachusetts roadsides by transplanting a square foot of sod containing sweet fern plants and roots have been generally unsuccessful. Attempts to propagate sweet fern from seed have met with very limited success until this past summer when Dr. John G. Torrey of the Harvard Forest in Petersham, Mass. obtained 80% germination using gibberellic acid. I have not been able to root stem cuttings taken from mature plants, but have found that juvenile stem cuttings will root. This aspect of propagation will be covered later. Professor John M. Zak of the Plant and Soil Sciences Department at the University of Massachusetts showed in 1963 that root cuttings planted directly into sandy banks in the spring of the year will root and produce new plants.

My work with sweet fern during the past 5 years has centered mostly around its propagation from root cuttings placed directly

into containers. These root cuttings were obtained in late winter or very early spring by pulling mature plants from the ground and cutting the long horizontal roots into sections. It has been shown that as soon as growth starts (usually in early or mid April in Massachusetts), root cuttings are no longer useful for propagation. They can be collected at an earlier date, however, and stored in a cold room until needed. Root cuttings placed horizontally in containers in May or June can produce very desirable plants with a well-developed root system in one growing season. Some of the factors which, in my opinion, will give the best results in the least amount of time are discussed below.

Fertilization. In my early studies, fertilizer was not used because sweet fern roots have nitrogen-fixing nodules and grow naturally in sand without fertilization. Further testing showed that during the first month or two, before nodulation, fertilization is of great value in getting growth started early. Osmocote has given the best results in my trials. Plants which do not receive this early fertilizer treatment will go through a period of slow growth with yellow leaves until the nodules have formed. After nodulation, normal growth will take place. Moreover, this early fertilization does not seem to inhibit nodule formation. Nodules are, of course, extremely important when the plant is placed into its permanent non-fertile site.

Media. Several tests were made to compare with the growth of sweet fern root cuttings in various combinations of sand, peat, and soil. Preliminary experiments showed that a combinationo of sand and peat gave better results than sand alone or when soil was included. In 1972 four grades of sand were tested. Concrete sand, mason's sand, Shutesbury sand (a fine sand from a sand bank in Shutesbury, Mass.), and dune sand — were used in combination with both Canadian and a native sedge peat. In these trials, Shutesbury sand mixed 50% by volume with Canadian peat produced superior plants when the fresh weight of the tops was compared. More recent tests have shown this medium to be consistently superior.

Size of root pieces. The long horizontal roots of sweet fern will range from 1/16 inch to slightly over 1/2 inch in diameter. The longer root pieces of any diameter will produce substantially larger plants, as will larger diameter pieces of the same length. My tests have shown that to produce satisfactory plants, root cuttings 1/16 inch in diameter should be at least 4 inches long, while 1/8 to 1/4 inch diameter cuttings need to be only 3 inches long. Diameter sizes 3/8 to 1/2 inch can be as short as 2 inches. New growth will often originate from the fine hair-like roots attached to the root cuttings and tests have shown that if these fine roots are removed before planting, a smaller plant will be produced.

Depth of planting. In my experimental work, root cuttings were planted at various depths; some were simply laid on the surface of the medium, others were set into the container at varying depths, as much as 3 inches. Those planted at a depth of 1/2 inch produced superior plants.

Winter storage of container-grown sweet fern plants does not present the problems found with the storage of some other species. The roots are quite hardy from both desiccation and cold injury. I have seen containers of sweet fern which were stored for the entire winter in a partially-heated office building without being watered; these plants survived and grew well the next spring. At 0°fi, with no protection, some plants will survive and some will not, but at 10°fi, the roots are apparently not injured.

Rooting of juvenile stem cuttings. Shoots originating from root cuttings are juvenile growth. When taken as soft wood stem cuttings, using Hormodin 2, they rooted in my tests in 8 days under a mist system. I have also rooted them without mist using partial shade. Juvenile stems up to 3 inches in height root very readily, but as they grow taller, rooting takes longer with less success. I have had poor results with stem cuttings taken from container-grown plants 3 months old and 15 to 20 inches in height.

CHARLIE HEUSER: Thank you, Bill, for a very interesting paper. Our next talk is entitled "Grafting Grape Vines" by Don Ziraldo. Don could not be with us and the paper will be presented by his brother Bob.