FRIDAY MORNING SESSION

December 5, 1969

The Friday morning session convened at 8:30 a.m. in the Windsor Ballroom of the Commodore Hotel. Mr. William Flemer III served as moderator.

CHARLEY HESS: The moderator of this morning's session is Bill Flemer III, but he has been detained. In the interest of keeping our program on time, I'll start the morning session which deals with the propagation of specific plants with a pretty thorough discussion of *Prunus*. Some of the techniques to be discussed with respect to rooting such plants, which are ordinarily rather difficult to root, will hopefully be applicable to other plant species also. To lead off the discussion is Dr. Tehrani who will discuss, "Hardwood cutting propagation of different *Prunus* species."

PROPAGATION OF DIFFERENT PRUNUS SPECIES BY HARDWOOD CUTTINGS

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INTRODUCTION

Clonal propagation of some plum rootstocks by hardwood cuttings is more economical and less time consuming under English conditions than the coventional stooling and layering techniques (2, 4, 7). Garner (7) rooted plum rootstocks by collecting hardwood cuttings in the fall and storing them in insulated bins for the winter months at a basal temperature of 45°F. The cuttings were budded in the first growing season and produced satisfactory trees.

In Ontario, imported Myrobalan plum seedlings have been widely used as plum rootstocks. They were quite variable in vigor and there was no assurance that they were virus-free. Interest in propagating plum rootstocks in Canada has been increased by a recent embargo on the importation of nursery stock from Europe. The present investigation was undertaken to study the feasibility of clonal propagation of different plum and peach rootstocks under Ontario conditions.

METHODS AND MATERIALS

Rootstocks of 'Brompton', 'Myrobalan B', and 'St. Julien A' plum were used in 1967 and 1968, 'Black Damas C', 'Marianna' and 'Michaelmas' prune in 1968. These have previously been described (3, 8).

Sixteen-inch cuttings with a 3/16 inch minimum diameter were taken the last week of November from vigorous shoots

[1]Respectively, Research Scientist and Agricultural Technician

of hedges of the above rootstock cultivars pruned annually (6). The mid-point diameter of the basal cuttings varied from 3/16 to 9/16 inch and the diameter of the thickest second cutting was 8/16 inch. However, higher percentages of basal cuttings had 5/16 to 8/16 inch diameters in comparison to the second cuttings, which were mainly 3/16 to 6/16 inch. Cuttings were put in the rooting medium during the last week of November. They were removed and planted in the nursery the first week in April. In 1967, six replicates of 10 basal cuttings each and, in 1968, three replicates of basal and of second cuttings were randomized when planted in the propagating frames. The base of the cuttings was momentarily dipped in a 500 ppm solution of indole-3-butyric acid (IBA) in 50% ethanol and then allowed to dry for half an hour before planting (1).

The propagating coldframes were prepared by excavating the soil to a depth of 12 inches. A four-inch layer of coarse gravel was laid at the bottom to facilitate drainage and covered with eight inches of a 1:1 peat-coarse sand rooting medium. The thermostatically controlled heating cables were laid on top of the coarse sand (2). To conserve heat the exterior walls of the coldframe were enclosed by fibre-glass insulation.

In 1967, minimum soil temperatures of 45°, 50° and 55°F were maintained in different compartments at the base of cuttings. In 1968, the thermostats were set at 45°, 55° and 65°F. However, from December to March actual temperatures at the base of the cuttings were 48°, 58° and 68°F in each of the corresponding sections of the coldframe. In the 1968 experiment the heat was turned off during the last week of March.

At the time of transfer from storage to nursery, the cuttings were rated from 0 to 5 according to degree of rooting at the base of cuttings. A rating of zero was given to cuttings with no visible roots at the base and a rating of 5 indicated complete coverage of the basal callus with roots.

The cuttings were planted six inches apart in the nursery at a depth of eight inches, in rows four feet apart. Complete randomized block design was used in the storage and in the nursery rows. The established rootstocks were budded in August at a height of five inches to different plum cultivars. The selection of buddable stocks was left up to the budder. After budding was completed, the number of cuttings of each rootstock budded was recorded. The following fall the number of one-year trees established in the nursery was counted.

RESULTS

Bottom temperatures of 50° and 55°F were equally effective in rooting of 'Brompton'. The highest percentage or 'St. Julien A' rooted at 50°F. The rooting response of basal cuttings of the rootstocks, 'Brompton', 'Myrobalan B' and 'St. Julien A' to the three bottom temperatures 45°, 50° and 55°F, is shown in Fig. 1. 'Myrobalan B' rooted very easily after all

treatments. However, with this rootstock, there was a reduction in percentage of cuttings budded in August in comparison to the rooted cuttings at transference to the nursery.

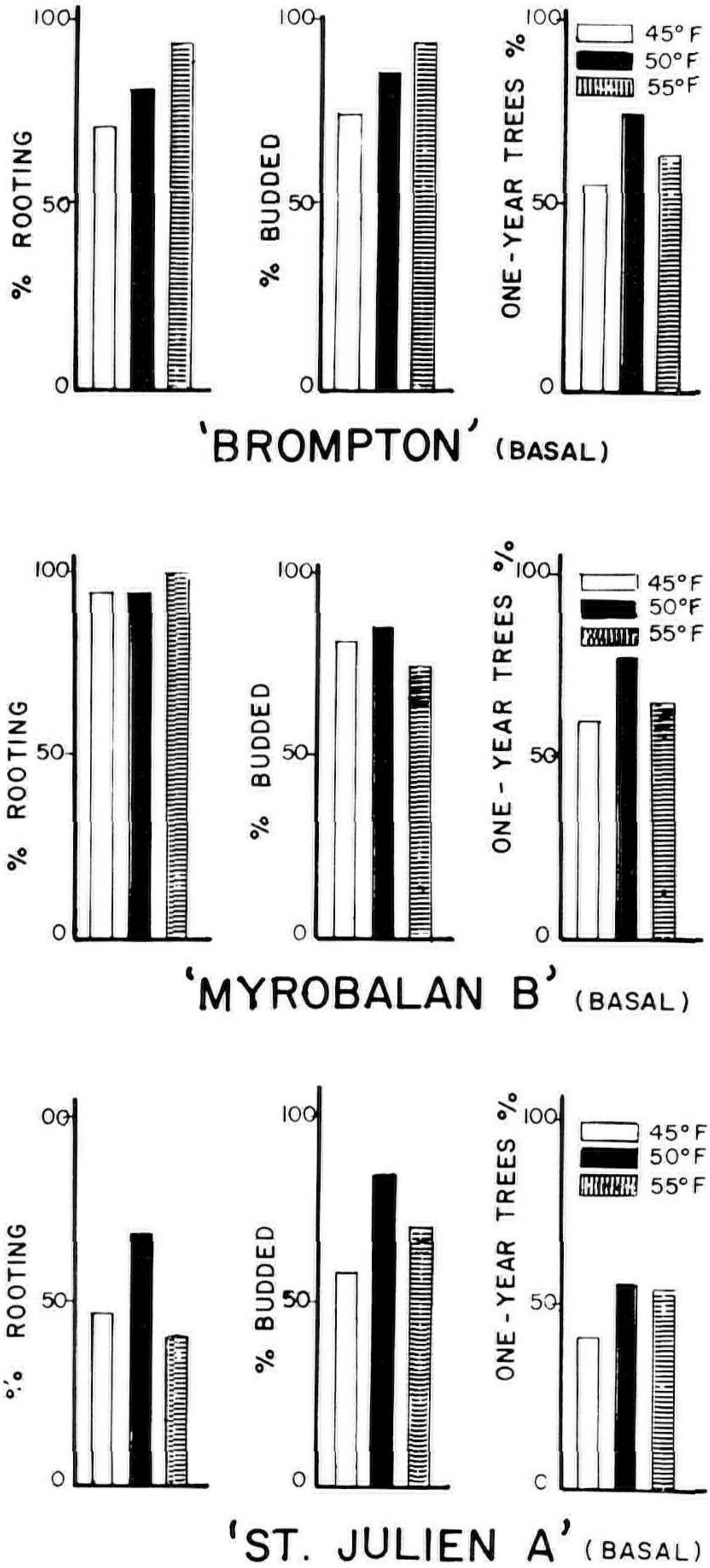

Fig. 1. The response of basal cuttings of three rootstocks to three bottom heat temperatures (1967)

At the end of the second growing season 56.6, 75.0 and 63.3 percent of the 'Brompton' cuttings receiving 45°, 50° and 55°F, respectively, produced one-year budded trees. The percentage of one-year-old trees on 'Myrobalan B' was very similar. However, with 'St. Julien A' the percentage only ranged from 40 to 55 percent.

The rooting response of the basal and second cuttings of 'Brompton', 'Damas C', 'Marianna', 'Michaelmas', 'Myrobalan B' and 'St. Julien A' to bottom heat treatments of 48°, 58° and 68°F, is shown in Fig. 2. No significant differences were observed in rooting of basal and second cuttings of 'Marianna', 'Michaelmas', 'Myrobalan B' and 'St. Julien A', irrespective of basal temperatures. However, 'Brompton' basal cuttings rooted better ($P<0.01$) at 48° and 58°F than at 68°F. The second

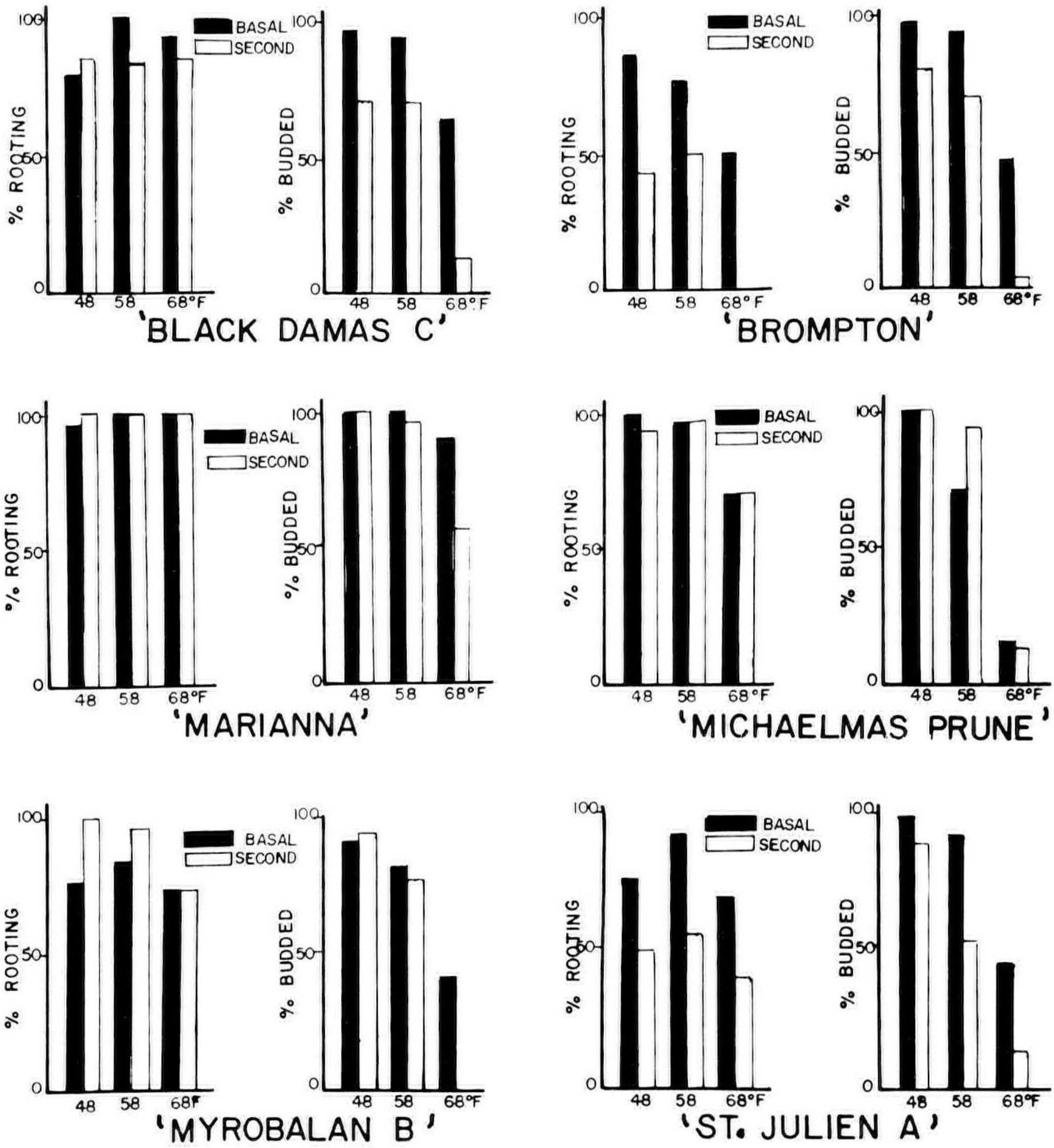

Fig. 2. The response of basal and second cuttings of six rootstocks to three bottom heat temperatures (1968).

cuttings of 'Brompton' rooted significantly less than basal ($P<0.01$) at 48° and 58°F and no rooting occurred at 68°F. The basal cuttings of 'Damas C' rooted better at 58° and 68° than at 48°F ($P<0.01$), but no differences attributable to temperatures were observed in second cuttings.

In general, rooting of the basal and second cuttings of rootstock cultivars at 68°F were inferior to other treatments; the only exceptions were the basal cuttings of 'Marianna' of which 90% were budded in August. At 48°F no differences were observed in any rootstock between the percentage of basal and second cuttings which were budded in August ($P<0.01$). The 58°F treatment of 'Damas C,' 'Marianna' and 'Michaelmas' prune were not statistically different from the 48°F treatment. However, the results with 'Myrobalan B' at 58°F were inferior to those at 48°F.

DISCUSSION

This study shows that clonal propagation of plum rootstocks by hardwood cutting is practical under Ontario conditions. Cuttings given basal temperature treatment during winter can be planted in the open nursery in the spring and budded during the first season of growth. Direct planting in the spring without such bottom heat treatment did not produce any rootstocks in the two years it was tried (unpublished).

All cuttings, irrespective of their thickness, were satisfactory for budding in August. The 16-inch cuttings used in this study provided an original stem adequate for budding. These long cuttings made it unnecessary to bud on secondary branches and avoided the risk of crooked stems.

Percentage of cuttings rooted at the time of transference to the nursery is not necessarily the best criterion for determining successful establishment of the cuttings in the nursery. Both 'Brompton' and 'St. Julien A' had a rather low percentage of cuttings striking root during storage. However, many of the unrooted cuttings struck root after being transplanted to the nursery and by August the percentage of cuttings suitable for budding exceeded the percentage which had roots on removal from storage.

It has been reported that one month of high basal temperatures in the spring (5) suffices to root some plum rootstocks. In this research, a bottom heat of 70°F caused the below ground portion of the cuttings to leaf out early in the spring. Such cuttings, even though they had rooted adequately could not be successfully transplanted to the nursery. Under Ontario conditions, a temperature of 45° to 50°F at the base of the hardwood cuttings was satisfactory for rooting, without encouraging early spring bud-burst. By starting the treatment in late November, a long period for root initiation is provided. At this temperature range, the thickness of the cutting and its location on the shoot were unimportant.

Recently it was reported (5) that 'Myrobalan B' and 'St. Julien A' rooted better when dipped in a 5,000 ppm solution of IBA and given a bottom heat of 70°F. This needs to be investigated further to see whether, at the temperature range of 45-50°F recommended here, the higher concentration of IBA will have any beneficial effects.

SUMMARY

Basal temperatures of 45-50°F in a coldframe was optimal for rooting of hardwood cuttings of 'Black Damas C', 'Marianna', 'Michaelmas' prune, 'Myrobalan B' and 'St. Julien A' plum, and peach rootstocks. Cuttings obtained in late November were successfully budded the next August and produced saleable trees the following year. When this optimum temperature was used both basal and second cuttings gave similar rooting and eventual establishment.

LITERATURE CITED

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CHARLEY HESS: Are there any questions at this time?

CASE HOOGENDOORN: What are the advantages of raising these understocks from rooted cuttings rather than seedlings?

G. TEHRANI: There is an embargo on these seedlings and they cannot be imported into Canada any longer. Also most of the important viruses of *Prunus* are seed transmitted and by taking cuttings from clean stock you get away from these viruses. Another point is that it takes 2 years to produce seedlings and we have had many problems with the germination of these seeds when giving the cold treatment in the field. I believe this is the surer way and cost studies have shown it to be cheaper.

ED MEZITT: Do you leave these cuttings exposed to the weather outside?

G. TEHRANI: Yes, the upper portion is completely exposed to the air temperature.

PETE VERMEULEN: At what point did you differentiate between basal and second cuttings?

G. TEHRANI: The basal cutting was taken directly from the main stem and the second was taken above this.

RALPH SHUGERT: Have you tried taking cuttings and sticking them directly in the field row?

G. TEHRANI: No, I haven't because of the wet soil conditions at the time we were taking the cuttings but I personally don't think they would root.

CHARLEY HESS: Thank you, Dr. Tehrani. I'd like now to introduce the moderator for this morning's session, Mr. Bill Flemer III, President of the American Nurserymen's Association.

MODERATOR FLEMER: Our next speaker of the morning is Dr. J. N. Cummins of Cornell University who will speak on, "Increased production of rooted *Prunus* cuttings with a preplanting soak of Benomyl."

INCREASED PRODUCTION OF ROOTED PRUNUS BESSEYI BAILEY SOFTWOOD CUTTINGS WITH PREPLANTING SOAK IN BENOMYL[1,2]

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INTRODUCTION

Decreasing damage caused by fungi and other microorganisms is among the principal means of improving methods of propagating woody plants by cuttings. Softwood cuttings under mist or in propagation boxes provide particularly favorable conditions for the growth and spread of fungus diseases. To produce important economic benefits, a fungicidal treatment should meet three conditions: (1) the treatment must appreciably reduce the incidence of disease; (2) the treatment must not be harmful to the plant material being propagated; and (3) the treatment must not interfere with the rooting/establishment process.

Under intermittent mist, cuttings of many species of *Prunus* are susceptible to *Botrytis cinerea* and a number of other pathogens. Selection and utilization of asexually propagated rootstocks for peach, plum, apricot and sweet and sour cherries depends in part on development of disease control systems.

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[1]Approved by the Director of the New York State Agricultural Experiment Station for publication as Journal Paper No 1751.
[2]Benomyl is the coined common name for 1-(butylcarbamoyl)-2-benzimidazole carbamic acid, methyl ester (duPont fungicide 1991 or Benlate). Appreciation is accorded the E.I duPont de Nemours & Co for providing the benomyl used in this work The technical assistance of Miss B. Oakes is gratefully acknowledged
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