other words, there is something in the extracts that would block rooting, it will also show up.

In extracts from the red, or easy-to-root variety we had four areas in the chromatogram which promoted rooting. In extracts from the difficult-to-root white variety there were three segments which inhibited rooting and one which promoted it.

MR. WELLS: Thank you very much, Charlie. That is very complete and clear.

Is it possible to take leaves of a plant which will root easily as a vigorous soft-growing shoot and to extract from those leaves in a simple manner and freeze that material and use it on a dormant cutting? Have you done that?

DR. HESS: No. You have to first separate these components and purify them. If you use the total extract you will have both inhibitors and promoters present. Whatever effect you will get will be the net between the activity of inhibition and the activity of promotion. So far in all lyophillized extracts we have been successful in getting the stimulating effect only after we have purified and separated promoters and inhibitors.

I doubt if it will be possible to take an extract of an easy-to-root plant and apply it to hard-to-root one until it has gone through some steps of purification. This would be a nice direct application but it needs a little more purification before it is possible.

MR. WELLS: Cannot a balance of cofactors be transmitted to the same type of cutting but at a different stage in its growth?

DR. HESS: It may be possible with a combination of leaching to remove the inhibitors from a hardwood cutting and then the application of an extract from a leafy softwood cutting to get promotion. I still say I am afraid you will have to do some purification of the extract from the softwood cutting before you will get the desired effect.

MODERATOR LANCASTER: Gentlemen, if any more of you have questions, keep them in mind for the question box.

We will carry on with our program, going on to a panel discussion on quick dip application methods. Dr. Hess is going to give us some preliminary results on some work he has done. (Applause)

A COMPARISON BETWEEN THE QUICK DIP AND POWDER METHODS OF GROWTH SUBSTANCE APPLICATION TO CUTTINGS

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Last year, as you will remember, we had a briel discussion as to whether the concentrated dip or the talc method would be better for the application of root promoting chemicals. As a result of this discussion we decided to see if there were any differences. We ran two experiments, one with *Taxus* and Pfitzer junipers and another one with *Rosa manetti*. In these tests we used talc and a concentrated dip at a con-

centration of eight-tenths of a per cent indolebutyric acid. The concentration was the same for both the talc and the concentrated dip.

We found very little difference in the per cent rooting between the no treatment, the concentrated dip, or talc applications. We did find some difference in the quality of rooting. We found that with no treatment we had an average of 6.2 roots per cutting. With the concentrated dip treatment we had 9.5 and with talc 6.5 roots per cutting. With the Pfitzer the same response was obtained, i.e. 4.4 roots per cutting with no treatment; 10.4 with concentrated dip, and 7.2 with the talc application.

In the rose, no treatment averaged 10.6 roots per cutting, the concentrated dip treatment averaged 30.7, and the talc averaged 11.9 roots per cutting. We had quite a significant increase from using the concentrated dip treatment.

We believe that the increased response we are getting from the concentrated dip is the result of more uniform application, since the liquid can surround all of the cuttings as soon as they are dipped into the solution, and in addition more of the root promoter is retained on the cutting than with talc treatment. You will remember that with the Pfitzer and the *Taxus* we had an increase of only three roots per cutting when the concentrated dip was used. These stems are somewhat rough when you compare them to the rose. With the rose, you remember, we had a very large difference in the rooting response of cuttings treated with concentrated dip as compared with talc. Apparently, the smooth rose stems did not retain the talc but did retain the liquid from the concentrated dip treatment. In additon, the hormone in the concentrated dip is in a form which is ready to go into the cutting, whereas in the talc, it is essentially a dry chemical and takes a while before it goes into solution.

Both methods gave us approximately the same per cent rooting. The results differed only in the number of roots produced. Whether a concentrated dip treatment is better than talc is difficult to say, because you do have some disadvantages from the use of a concentrated dip. For example, the alcohol may evaporate off and you will have water left. When this occurs the root promoter that will precipitate out of it is in the acid form which is not very soluble in water. Also, light can destroy the active chemical in the concentrated dip solution faster than it can in a talc carrier. All these factors have to be taken into consideration when deciding upon which method of application is to be used. Thank you very much.

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MODERATOR LANCASTER: Thank you, Charlie, for a very interesting discussion.

We will now go right on with our panel discussion on the quick-dip method for applying hormones to unrooted cuttings. The first gentleman we are going to hear from is Mr. Harvey Gray of the Long Island Agricultural and Technical Institute, Farmingdale, New York. Mr. Gray! (Applause)