

greater ease, such as selection of material for orders, weeding, spraying, irrigation, fertilization, and transportation. Initially our intention was to build a one and 5-gallon canning machine. However the type of one-gallon canning machine we contemplated would turn out 50,000 gallons per day and present equipment would be inadequate to haul canned stock out to the beds fast enough. Consequently we had to build the horse before the cart — hence the tractor.

PERCY EVERETT: Our next speaker, O. A. "Jolly" Batcheller, is head of the Department of Ornamental Horticulture at Cal Poly, Pomona, California, and his problem is to train young people that are interested in horticulture to take over and to bring forth new ideas and to be able to operate the complex mechanisms Conrad Skimina has just shown us, as well as the more simple mechanisms. Jolly is going to introduce two of his students who will present papers on work in propagation they are doing.

I visited Jolly one time over in his working area. Of all the darndest little gadgets that fellow had worked up. I imagine he's going to show you some of those little gadgets today. Now I would like to introduce Jolly "Whistler" Batcheller:

## CHALLENGING TECHNIQUES IN PLANT PROPAGATION

O. A. BATCHELLER

*California Polytechnic College  
Pomona, California*

The advances made during the last 50 years in the production, handling, and germination of seed are well known to all of us. The quality and quantity of seed has become a constant and reliable factor. In the area of cutting propagation we have also made great strides by use of special rooting media, hormones, and mist. The one area where little has changed in the process of growing plants is that of transplanting and the handling of the seedling or cutting once it is rooted and is ready for transplanting. This is still the same process of carefully lifting the individual plant, carefully placing this in a container, and surrounding the new roots with potting soil. There has been little change, if any, regarding the soil, with the exception that it is now sterilized and perhaps more carefully prepared. It still is a loose, pliable mixture with just enough moisture to form a ball when held tightly in the hand, and yet of such a structure that it will break if this ball is dropped a few inches on a hard surface. Soil is still handled much as it has been over the centuries—wheelbarrow, shovel, trowel and by hand. Even hoppers with vibrators attached have been tried, but the difficulty of measuring out exact quantities is still a problem and usually necessitates over-filling of the container with the excess being scraped off. In the planting of new seedlings and rooted cuttings this is

not feasible and the placing of young roots into a dibbled hole has a tendency to misshape or crowd the roots.

A year ago our advanced plant propagation class explored all possibilities of improving the present system and came up with the idea of using soil, not as a semi-dry, loose solid, but as a slurry. Taking a page from the plastering trade, it is possible to mix and move the desired soil mix under pressure through heavy hoses. With this in mind, it is also easy to meter out exact amounts of the material to uniformly fill containers to a consistent level. Because of the semi-fluid nature of the mix, it is possible for it to flow between and around roots or ball and make immediate moist contact with all roots. This is aided by a slight vibration which can easily be provided at whatever point is desired. The removal of the excess moisture in the soil mix (such as the University of California mix) is done by the use of a partial vacuum. This not only reduces the moisture content to a desirable growth condition, but it also firmly holds the cutting or seedling in place at its desired position and depth.

I am sure you realize that no funds, or time, are available at California State Polytechnic College for research and, therefore, it has not been possible to actually establish a working model of the proposed operation. However, the process was studied by a group of senior students in the Mechanical Engineering School and all of the suggested mechanical ideas were found to be already in operation in other fields. No phase was considered in any way to present a problem.

I would now like to turn the presentation over to my students, Steve Hillmer and Mitchell Hoyles, who will give a brief demonstration of the principles and some of the units they have developed while working on their senior project (undergraduate thesis).

## **MECHANIZED POTTING**

STEVE HILLMER

*California Polytechnic College  
Pomona, California*

The handling of rooted cuttings and seedlings is perhaps one of the most difficult aspects of the nursery industry to mechanize. The plants are small and tender; their roots are not well established, and are quite fragile. Machines are generally too rough in their operation to handle these small plants.

In the past it has always been not only more economical, but safer, to handle the transplanting of these small plants by hand. As has been pointed out, rising costs of labor, and a disappearing labor pool increasingly lead us to mechanize wherever possible. There have appeared numerous potting machines for transplanting larger plants into sizeable containers, and several semi-automatic machines to aid in trans-