

## THE BOLIVAR PIT METHOD OF ROOTING SOFTWOOD CUTTINGS

F. L. (STEVE) O'ROURKE  
*USDA Point Four Program*

During the past fifteen years a number of methods have been developed to prevent wilting of leaves of softwood cuttings while in the propagation medium. Water sprays, mist nozzles, fans, insulated opaque chambers with lights, humidified air, etc. have all been used more or less successfully for certain plants under specific conditions. Some systems have been comparatively simple and some rather complex, but all have been designed to lessen hand labor and eliminate detailed attention to the cuttings during the rooting period.

A very simple system which was devised in the tropics may prove quite valuable to temperate zone plant propagators for the rooting of cuttings during the summer season. It consists merely of a pit in the ground covered with burlap or cotton cloth which is kept constantly wet by a manually controlled rotary type "lawn sprinkler." The cost of construction and maintenance is slight and the production of rooted cuttings has been highly satisfactory.

The Bolivar pit method was first developed about 1951 by Mr. R. K. Malins-Smith, a citizen of the British West Indies who was trained in cacao propagation in Trinidad and subsequently hired by a syndicate of Ecuadorian cacao growers to propagate cacao clones from cuttings at Hacienda "Bolivar," Province Los Rios, in the cacao belt of Ecuador. Preliminary reports of the Bolivar pit method were published in the Fourth (1952) and the Fifth (1954) proceedings of the Interamerican Cacao Conference. The system takes its name from the Hacienda "Bolivar" where it was developed, but is also a tribute to the memory of the great liberator of South America SIMÓN BOLIVAR, under whose peerless leadership and wise direction nearly the whole of a continent was freed from European domination.

A pit approximately 20 feet wide is excavated to a depth of 20 inches. In poorly drained land it may be necessary to place tile beneath the pit to carry off excess water. Six to ten inches of stone or coarse gravel is placed in the bottom of the pit and lightly covered with sand. Then six to eight inches of a rooting medium, selected according to the locality and the availability of the material. In the tropics sawdust, rice hulls, and coffee parchment are commonly used, but in the temperate zone sand, vermiculite, or peat moss will serve. The prime consideration is that the selected medium be porous and well aerated so that water will pass through quickly and easily.

Wires, preferably copper, are strung horizontally at ground level in order to support strips of cotton cloth or burlap. The burlap or cloth may be used several times if first treated with a one per cent solution of copper naphthenate. Any ordinary rotary type "lawn sprinkler" may then be attached above the center of the pit to a 3/4" pipe brought in either through the ground or from overhead to suit one's convenience. The lawn sprinklers will operate on very low water pressure. They are manually controlled by a valve placed at any convenient location.

At the Tropical Agriculture Experiment Station near Quevedo, Ecuador it was found that a long rectangular pit divided into a number of square compartments was more efficient to construct and operate than several circular ones. The 20 foot wide pit was divided into square compartments by placing boards at 20 foot intervals. A sprinkler controlled by an individual hand valve was mounted above each compartment so that each square could be operated as an independent unit.

A board or movable cradle may be suspended over the pit to allow the propagator to set cuttings without stepping in the rooting medium. In the tropics, however, the workmen usually work bare-footed in the medium. As soon as a section of the compartment is set to cuttings the burlap is stretched across and wet immediately.

The aftercare of the Bolivar pit is quite simple. The maintenance operator is merely instructed to keep the burlap wet at all times. Usually turning on the sprinkler for a minute or two once every two or three hours will suffice unless the day is extremely hot and sunny. As long as the burlap cover is wet the cuttings will not wilt or suffer from heat. After the cuttings form roots the frequency of watering and the amount applied are decreased little by little and later the burlap strips are gradually pulled aside to harden the rooted cuttings to light and air. In all probability temperate zone propagators may be able to overwinter rooted cuttings in the Bolivar pits if a light porous mulching material is used over the cuttings and above the earth at the sides of the pit.

The pit method of propagation takes advantage of the insulating power of the earth to maintain a fairly constant temperature. It thus avoids the rapid fluctuations of temperature with attendant changes in relative humidity that cause water loss from leaf tissue in aboveground propagating structures. Proof of the value of the pit over box-type propagation frames beneath lath houses is that at both the Hacienda Bolivar and at the Tropical Agricultural Experiment Station at Quevedo, Ecuador the number of well rooted cacao cuttings were increased by more than 25 per cent by use of the Bolivar pit.

Other advantages on the Bolivar pit are the cheapness on constructions and the use of only a small quantity of inexpensive and easily obtainable material. Neither electricity nor high water pressure are needed although there is no reason that an electronic leaf and solenoid valve apparatus could not be used if the propagator wished to make the unit strictly automatic.

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MODERATOR MEAHL: That is the paper on "The Bolivar Pit Method of Rooting Softwood Cuttings" by Steve O'Rourke. I am not personally familiar with the work that has been done with this pit, but it may be some of you may have comments about the procedure. Perhaps you have tried something of this sort or perhaps you have questions which someone in the room might be able to answer.

MR. ROSCOE A. FILLMORE (Fillmore's Valley Nursery, Centreville, Nova Scotia): It seems to me that this method is similar to the method that Mr. Hancock uses except that Mr. Hancock roots the material in sandy soil. It appears to me there is a considerable amount of labor expended on that pit.

MODERATOR MEAHL: I think that the observation of a similarity is correct. Undoubtedly, Mr. Hancock will comment on that when he speaks to us a little bit later.

MR. EVERETT CONKLIN (Rutgers University, New Brunswick, N.J.): How much space was there between the top of the rooting medium and top of the burlap?

MODERATOR MEAHL: As given in the paper, it may be made flexible. It struck me if I used the maximum figures given here, there would be no space left. I would say in such a case it would be necessary to dig the hole deeper or use less material to fill it.

Two years ago Mr. Leslie Hancock of the Woodland Nurseries, Cooksville, Ontario described in detail his method of rooting softwood cuttings in salt and protected by moist burlap. It was an interesting and informative discussion. Today Mr. Hancock has some additional comments and ideas to express about his propagation technique.

MR. LESLIE HANCOCK: Mr. Moderator and Fellow Propagators: Before I speak about my subject, I would like to pay tribute to what we heard this morning. After hearing Dr. Skinner, I wondered why we were standing on the platform beside him. After all, creators of new plants like that make the world progress. We propagators merely multiply them. I think any of you who have ambitions to be producers of new things should take courage like I am going to, even in a small way, to do what Dr. Skinner has done. Such an example of perseverance and endurance, and under such difficult conditions, I have seldom heard of.

## THE BURLAP CLOUD METHOD OF ROOTING SOFTWOOD CUTTINGS IN SOIL

LESLIE HANCOCK

*Woodland Nurseries  
Cooksville, Ontario*

Since the Burlap-cloud method of rooting summer softwood cuttings in ordinary soil was described here two years ago, and fully reported in the 1953 Proceedings, my remarks this evening will be very brief. Specimen blocks of rooted cuttings from this year's crop are to be seen with the exhibits.

This year we set up an electronic mist control section for comparison with our ordinary burlap covered frames. The only difference from our standard method was that the misting apparatus and full sunshine was substituted for the burlap shade. However, this was not fair to the intermittent mist method. The new bed should have been on higher, more completely drained land, and the recommended wind baffles should have been used. Next year, we will insure perfect drainage and have burlap strips attached to both sides of the frame, which can be fastened up vertically during the hot part of the day.