

CHIP BUDDING ON A COMMERCIAL SCALE

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Hilltop nursery specializes in *Malus* and *Prunus* species of fruit trees, raising both nursery and orchard crops on 1500 acres. The majority of our stock is sold on a contract basis, allowing an interval of 2 to 3 years from the time of order to the final delivery of the product.

Chip budding, a recent introduction in our propagation program, may prove to be a dominant factor in increasing future bud stands. We have worked 2 years with this budding technique. It appears to be more costly than conventional T-budding, requiring precise timing and accuracy. Chip budding has possibilities of increasing our winter survival rate in the field.

Understocks for apple are propagated by layering, while peach and cherry rootstocks are started from seed. During the first growing season, apple rootstocks are mound layered with sawdust, undercut in the fall and placed in cold storage through the winter. Early in the spring they are transplanted by machine and grown to suitable grafting caliper. This understock is sprouted to a height of 12 inches at least once prior to budding. Rubbing or removing leaves and branches hardens the green succulent bark and makes it easier for the budder to locate a smooth area to place the bud during the summer. Peach and cherry rootstocks receive the same attention, however they are mostly propagated by seed.

Budding is done by a crew of two, a budder and a tyer. Our budding force consists of 15 to 20 crews. In mid-July, prior to the start of the budding season, each crew is instructed on proper procedure for T-budding or chip budding. The following technique is used with a narrow bladed knife for chip budding:

- Step 1. The first cut is a horizontal cut made at about a 30° angle into the stock.
- Step 2. To make the second cut the budder is trained to hold his knife at a near vertical position, starting about 1-1/2 inches above the first cut and drawing the knife downward along the side of the rootstock to intersect the first cut.
- Step 3. The scion or budwood is held in the palm of the hand and cut in the same manner as the rootstock.

- Step 4. The bud is then slipped into the cut on the rootstock, matching the cambium layers.
- Step 5. The tyer begins wrapping a plastic band on the upper portion of the bud placing his final tie at the base of the cut nearest the ground.
- Step 6. The band is cut with a razor blade and removed after 4 to 6 weeks. The bud and understock then go into dormancy.

In April just as the bud is beginning to break, the understock is cut in a slanting fashion 1/8 inch above the bud. This completes 2 full years of development from initial propagation. Six months later the tree will be harvested and placed in cold storage.

A major problem occurring with chip budding is the need for closer supervision of budding crews. Quite often the tyer will fall behind the budder. Secondly, a chip bud is unlike a T-bud, because the cambium is constantly exposed to the drying summer sun. Therefore the bud is in jeopardy until it is wrapped. Finally chip budding is also more time consuming and more costly than conventional T-budding. Caliper of rootstock and budwood must be matched in size.

Although in its experimental stages, chip budding has proven to be successful, but it has not yet replaced T-budding as Hilltop's major budding method.

HARRY HOPPERTON: Is chip budding really worth it with easy to bud plants like the crabapples? You can T-bud 4000 a day compared to 1000 and you get a 95% stand. In addition, with the chips you have to go back and cut the poly off while with the T-bud the rubber band just falls off.

AL BREMER: I agree with your comments but I still think chip budding has potential for reducing winter bud kill on some plants. I will, however, stay with T-budding for apples and crabapples.

HARRY HOPPERTON: Do you take a thin or thick chip bud?

AL BREMER: Neither, we try to strike a happy medium and much of the supervision for chip budding comes in training the budders to match the size of the stock and scion. We feel it is quite important that they match fairly closely.

DUKE BISCOTTI: I'd like to make a comment on covering the bud. Our growers out in Oregon and Washington have temperatures of 100-110°F and they also felt they were going to experience some damage but as far as I know they have had none. There is apparently some heating and you will see quite a bit of moisture collect under the poly band. The quality of the band

you use is quite important; in fact, we use two, one for summer and one for fall budding.

HUGH STEVENSON: Mr. Howard's buds all seem to be completely covered but some of those that you showed were not covered; do you cover your buds?

AL BREMER: We cover the apples but we don't cover the cherries; if you put tension on the cherry buds it destroys them.

MANUAL GRAFTING VERSUS MACHINE GRAFTING

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Machine grafting has been with us for a long time. From a historical standpoint, M.G. Kains in his book, "Plant Propagation", refers to machine grafting techniques; this book was written in 1916. Robert Garner refers to grafting machines in his classic text, "The Grafter's Handbook". He probably puts his finger on the situation today when he states "grafting machines are more commonly used for vines than for other subjects". He then goes on to state why. Hartmann and Kester also treat the subject in their book, "Plant Propagation: Principles and Practices."

Over a period of time our company has tried a number of grafting machines. The latest one we have tried is the Wahler Graft-Star unit, making what is popularly referred to as the Omega graft. With this unit we were able to produce 5500 grafts in an 8 hour day with a skilled operator. Using an unskilled operator a production level of 3300 grafts per day was reached. This would compare with a 1600-1800 average that we would expect to have made per 8 hour day by a skilled grafter. These grafts were wrapped in the usual manner and placed in grafting boxes for callusing.

We noticed that a browning or oxidation of the machine-cut cambium tissue takes place rather rapidly using this system. My personal feeling is this later reflects on the type of graft stands we secured using this method. It also appears that due to the bruising of the tissue during grafting, an additional several days have to be added to the callusing time.

Our results are as follows:

<u>Apple Cultivar</u>	<u>Grafts Made</u>	<u>Graft Stand</u>	<u>Percent Stand</u>
'Starkrimson'	7,500 Machine Grafts	3,745	49.99%
'Spur Golden'	7,500 Machine Grafts	3,802	50.66%
'Starkrimson'	14,000 Hand Bench Grafts	9,592	68.5 %
'Spur Golden'	14,500 Hand Bench Grafts	9,849	67.9 %