

DR. McDANIEL: I will depart a little bit from the announced title of the program and will call on two men to talk briefly on some successful methods of budding and grafting which they have used recently.

One is Mr. Ben Davis of the Ozark Nurseries at Tahlequah, Oklahoma, on his method of performing the modified patch bud. This is used particularly with such thick-barked species as walnut, pecan and some of the other nut trees, persimmons. It is applicable to thick-barked hardwood tree species generally.

### **THE MODIFIED PATCH BUD**

BEN DAVIS II

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This method of budding was developed by Mr. Hoyt Cockrell of Cockrell's Riverside Nursery at Goldthwaite, Texas. I have never heard of this method being used anywhere else until we adopted it two years ago. Mr. Cockrell tells me that they are nearly always 90 to 95 percent successful in their Pecan budding using this method.

The outstanding characteristic of this method of patch budding is that a single blade knife is used, while in other method of patch budding, special knives are required. Another advantage of this method is its speed. Our budding crew was averaging 260 buds per man per 8 hour day, by the end of the season, and for most of them it was the first time to use this method. Some individuals who had done some of this type budding the year before were putting in 400 to 500 buds per 8 hour day. About half of the crew consisted of high school boys who had never done budding of any type. This method is fairly easy to teach, provided the student is reasonably adept at handling a knife.

We used this method of budding on Pecans, Japanese Persimmons, English Walnuts and Black Walnuts. We were especially pleased with the results obtained on budding English Walnuts. We have been grafting these for several years with very poor results. Last summer we decided to try patch budding them, and obtained a 78 percent stand. Because of this, we have decided to quit grafting English Walnuts altogether and use the modified patch bud exclusively.

This method was also highly successful on Japanese Persimmons, although we budded a limited amount of these.

The results we obtained on Pecan budding were not nearly as successful and we got only a 33 percent stand. I think that this was due to the fact that the budding crew was not familiar with the method, and also their lack of understanding of the importance of a *perfect match*. This is especially important in Pecan budding, as it is a very difficult item to propagate at best. On the limited amount of Pecan budding which I did myself, being very careful to match at the top and one side, I obtained something like a 90 percent stand.

By very closely supervising the budding crew and allowing them to become experienced, I believe we will eventually be able to get 90 percent stands and better.

*Procedure:*

1. The knife blade is held on a plane approximately 30 degrees from parallel to the seedling and a cut is made down and inward cutting just through the bark.
2. This will raise a flap of bark which is gripped between the thumb and the knife blade and a downward tear is started.
3. The bark flap should then be pushed back in place to prevent drying while cutting the bud.
4. To cut the bud from the budstick, the knife should be held at the same angle as was used to cut the seedling. A cut is made into the wood above the eyes deep enough so that the bud shield will be nearly the same width as the cut on the seedling.
5. At this point the knife is twisted, causing the wood to split and the knife is drawn down the budstick to obtain the length of shield desired. We found that the larger the shield the better the stand, so it should be a minimum of  $1\frac{1}{4}$  to  $1\frac{1}{2}$  inches long. The shield should be as wide as possible, taking into consideration the size of the seedlings, and the eyes should be nearly centered on the shield.
6. After the shield is cut to proper length, it is cut at the bottom by pressing the knife just through the bark.
7. The shield is then grasped between the thumb and forefinger and popped off with a slight twist. If the shield has a hole in it, it should be discarded.
8. The shield is held between the thumb and forefinger and inserted in the seedling from the top of the incision. At the same time the other hand is used to tear the bark of the seedling downward enough to allow the bud to slide into place.
9. The bark flap is then cut off leaving about  $\frac{1}{4}$  inch to lap over the bottom of the shield. This holds the shield in place while wrapping is begun.
10. The first round of the wrap is started at the top to hold the shield in place.
11. Before wrapping is continued, the bud should be positioned so that it fits perfectly flush at the top, with no gap nor any overlap. The shield must also fit along one side of the incision. If the shield is fitted to the left side, the wrap should be wound clockwise. If it is fitted to the right side, the wrap should be wound counter clockwise. This will pull the shield securely into place.
12. The bud should be wrapped down the seedling and then back up, lapping enough to seal out all air. One eye should be left protruding from the wrap, but none of the cut surfaces should be exposed to the air.
13. The wrap should be cut off as soon as the bud shield has healed on, evidenced by callus tissue around the wound. In our experience this is about 2 weeks.

### Condition of Budwood:

Current season's growth is used. The budwood should have sap enough so that the bark is slipping freely. However, it must be mature enough so that the bark has a dark cast rather than a greenish cast. The wood should be hard and of smooth, round, regular shape in cross section. Wood which has ridges in it under the buds will cause the buds not to conform to the shape of the seedling. For this reason the irregular shaped and soft portion of the budsticks, at the upper end, should be discarded.

### Condition of Seedlings:

Seedlings should be  $\frac{3}{8}$  inch and up in diameter for the ideal budding conditions. Smaller seedlings may be budded, but it is difficult to obtain a good match and the sap is often not good in very small seedlings. To get the proper size, we bud Pecan and Persimmon seedlings in their second summer of growth. The Persimmon seedlings actually get too large and we are going to try transplanting one year seedlings late in the spring to retard growth. Walnut seedlings are budded in their first summer of growth. It is possible that seedlings would have to be grown an extra year farther north, to obtain large enough size.

### Time of Budding:

Budding is begun as soon as the budwood becomes sufficiently mature in the summer. In our location this is about August first or a little sooner. Budding may continue until cool weather drives the sap down so that the bark will not slip.

### Understock Used:

#### Pecan:

Seedlings of Moore Papershell, Riverside Papershell and Native Pecan were used. Moore was found to be the most vigorous, making larger size than Riverside or Native. It also has a more liberous root system. Native seedlings grow very slowly and many of them do not grow large enough in two years to be budded. We plan to use Moore altogether in future plantings, with the exception of some Major seedlings for understock for Northern varieties.

#### Walnut:

Seedlings of Hinds Black Walnut and Native Black Walnut were used. Both English Walnuts and Black Walnuts were budded on both understocks, with equally good results. The Hinds Black Walnut makes a larger seedling than the Native and is therefore easier to bud. There is some question, however, whether this understock would be hardy farther north.

#### Persimmon:

Common Native Persimmon seedlings were used with good results.

### Wrapping Material:

We use the medium weight  $\frac{1}{2}$ " width polyethylene tape manufactured by L. E. Cooke Company. In the past, Cockrell's Nursery

used waxed muslin patches, tied with rubber, but they have since gone to the poly tape.

Knife:

We use a standard single blade knife, the same as is used for T budding.

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DR. McDANIEL: That method essentially I think is in Garner's Handbook. One of the other things it is used for is the Brazilian Rubber Tree in southeast Asia plantations for producing high rubber clones and for succeeding stocks.

I might say the use of plastic wrap which we have used casually in this connection, is one of the most recent developments for assured success in rather difficult budding operations.

What would you say, Mr. Davis, to be the difference in stand comparison between wrapping with plastic and wrapping with the standard eight-inch rubber strip?

MR. DAVIS: If you use the rubber strip you would have to use a waxed muslin patch to seal out the air. We learned this from Mr. Cockrell of Riverside Nursery at Goldthwaite, Texas. He was using the wax patch with rubber, and since then he has gone to poly-tape. We have never used anything but polytape, so I couldn't say from my own personal experience.

DR. McDANIEL: I think it is worth a trial for all who are not satisfied with the budding we get under present methods. I have used the principle with chip budding in summer, shallow chip, and budded successfully sassafras, several magnolias, and persimmons.

The second man I would like to call on is Dr. Richard Jaynes of the New Haven Experiment Station in Connecticut. He will describe his application of the Buried-Inarch Graft on the Propagation of Chestnuts on their own roots. This, incidentally, is about what Garner calls the succulent method whereby the top of a scion or cutting is grafted on the established tree and the lower part of the cutting buried in the ground.

DR. RICHARD A. JAYNES: I might mention before I say anything about the technique that I have used that I don't really know that this would have any commercial application as such. I actually used it three or four years ago when it was necessary for me to be able to obtain roots on either young seedling chestnuts or some sterile older trees we had, because I wanted to make some chromosome counts. I found the only way I could make a satisfactory preparation to count chromosomes was to get roots.

The technique is basically very simple. As a stock plant we used a two or three year old seedling. Actually, Dr. Davis used the older

trees up to 10 or 15 years old, but I think it works easier with the young seedling that are one half an inch in diameter.

We dug a small hole in the soil next to the seedling. We used a scion approximately six or eight inches long, making a wedge-shaped cut on the terminal end of the scion, usually one cut a little longer than the other. A slanting cut is made up into the stock, and the scion, with at least one bud above the ground is inserted. If the scion was eight inches, we would bury about five inches in the ground and have one bud above the ground level, put the scion into the cut in the stock, replace the soil in the hole we had made, wrap the insertion with budding tape or any other wrap, and wax it. If you get a union formed, the upper bud will break and callus tissue forms at the base of the scion, followed by rooting.

We have had approximately 30 per cent to root. I should have said the grafting is done about the first of May in Connecticut and the following fall or the next spring the scion can be severed from the stock, and if you are lucky you have a scion on its own roots.

As I say, I was primarily interested in getting the roots for cytological studies, but it is a way you could propagate certain hard to root species and get them on their own roots. Thank you.

I might say for anyone who is interested further, I have a publication in the 52nd Annual Report (1961) of the Northern Nut Growers Assn., Inc. in which the technique is described in detail.

MODERATOR LEACH: Thank you, Dr. Widmoyer and Dr. McDaniel, Mr. Davis and Dr. Jaynes.

We will have a brief question and answer period. It will have to be brief because we are a little behind schedule. We want to leave some time for questioning the next two speakers. We are ready for the first question.

DR. BOOKER T. WHATLEY: I have a question for Mr. Davis. My question is, Why did you remove the flap?

MR. DAVIS: I am not much of a scientist. I really couldn't say why it was removed, only that flap is no longer needed.

DR. WHATLEY: Now in budding rubber, the flap is retained and it is the opinion that you get a better seal if you use the flap. In other words, insert the scion and then keep your flap on and wrap it up.

MR. DAVIS: One problem we have, you would be likely to break off the eyes if you pressed the flap against the shield.

DR. McDANIEL: I think that would be the principal reason for removing the flap with pecan, but with apple or persimmon it is better with the flap over the bud.

MR. RICHARD FILLMORE: I have a question for Mr. Davis also. I would like to ask him if he is positive that bud heals on the top first.

MR. DAVIS: That is what I was told. In my observation, the callus tissue forms on both sides of the shield on the top first.

DR. McDANIEL: Does the callus come from the bud patch or the stock?

MR. DAVIS: It comes from the stock.

MR. CASE HOOGENDOORN: I would like to ask a question. Why do we have difficulty with budwood on certain items, cherries and I notice. —

MR. VAN HOF: Don't look at me. I can't read your mind.

MR. HOOGENDOORN: I will stay with the cherries. At least I didn't forget. We have difficulty sometimes when budding cherries. You will take the bud and you will remove the wood and what we call the heart and eye also. You remove what you want to keep in there. Why? I know it will happen when you use the budwood too hard. Do you think if the bud is correct that it will still happen?

MODERATOR LEACH: Your question is directed to whom?

MR. HOOGENDOORN: Anyone who wants answer.

DR. WIDMOYER: I am not absolutely certain, Case, if I have the picture on that, but what I envision is that you are using budwood a little too hard and you take some of the xylem or wood from the interior portion of the stick. Is that right, Case?

MR. HOOGENDOORN: Yes.

DR. WIDMOYER: And you want to know if this is as satisfactory as if you were to take out the wood.

MR. HOOGENDOORN: No, by taking the wood out you are also removing the heart of the eye.

DR. WIDMOYER: Well, part of this reason is that you have to remember the buds have a continuity of vascular system with the wood. Consequently, they tear out.

MR. HOOGENDOORN: You can overcome that by cutting your bud lighter and leaving the wood in, and now by that time you have a coarse stick. You come down to a very narrow shield. Lots of times it isn't detrimental at all because you haven't enough sap in that to get the bud to take in the first place.

DR. McDANIEL: I will volunteer. I think in that case it would be better to switch to patch bud or so-called Jones Method of Budding rather than doing it by the Tee Method.

MR. HOOGENDOORN: Jones Method?

DR. McDANIEL: Described in Farmer's Bulletin 1567.

MODERATOR LEACH: One more question.

MR. MARTIN VAN HOF: I would like to ask Richard Jaynes about the insertion in your stock. How long is that wound and how deep do you go into it? Also, is your stock established in the ground?

DR. JAYNES: Yes, they were done in the field. The stocks were established, the cut was actually made in the wood and was probably in the neighborhood of an inch and a half long.

MODERATOR LEACH: Gentlemen, thank you very much for answering the questions. We will go now to the next speaker.

May I introduce now Mr. Ian Mackay, Conard-Pyle Company, West Grove, Pennsylvania, who will talk on Collection, Storage, and Use of Dormant Budwood.