"CHANGE-PURSE" BUDDING OF NUT TREES[1]

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A new technique for budding nut trees, called "change-purse" budding, involves a single cut on the stock which is opened much like the flaps of a change-purse. When properly done change-purse budding has a success rate of 85 to 95%. This budding technique has been used for black walnut, English walnut, butternut, heartnut, and pecan.

In Kentucky the budding is generally done from June 1 to July 20. The time is controlled primarily by the availability of buds in proper condition. When the bud is cut from a current year's shoot, the pith area should be solid and green in color. As growth of the new shoot proceeds the green color of the pith is gradually lost and dark pigmentation increases until the pith is nearly charcoal in color. The ideal shield bud for change-purse budding has green pith and *a large plump bud.* Shields with a yellow pith and *slight* pigmentation will also work but once pigmentation of the pith becomes dark the buds should not be used.

Making the stock cut. The stock cut is made on the south or southwest side of the stem. Choose a smooth area on the stock between buds, preferably where the stem is concave. The concave section of the stem is preferred so that when the bud shield is set in place it will be held more firmly than if set on the convex side of the stem. A single vertical cut is made 3 to 5 in. long, depending upon the size of the stock and the length of the shield bud to be set (Figure 1A). It is very important that the stock cut be made no deeper than necessary to open the slit. If the knife goes in and cuts into the wood tissue lying beneath the cambium, bleeding is likely to occur and the bud will be lost. A thick bladed knife helps avoid cutting into the wood. After the cut is made the stem is slightly flexed to increase the concavity of the stock, a thumbnail is inserted into the center of the slit and flaps are pulled out to open the slit (Figure 1B). A thumbnail does less damage when opening the edges of the flap than a knife blade and there is less chance of cutting into or hitting the wood and inducing bleeding.

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[1] The investigation reported in this paper (82-10-299) is in connection with a project of the Kentucky Agricultural Experiment Station and is published with the approval of the Director.

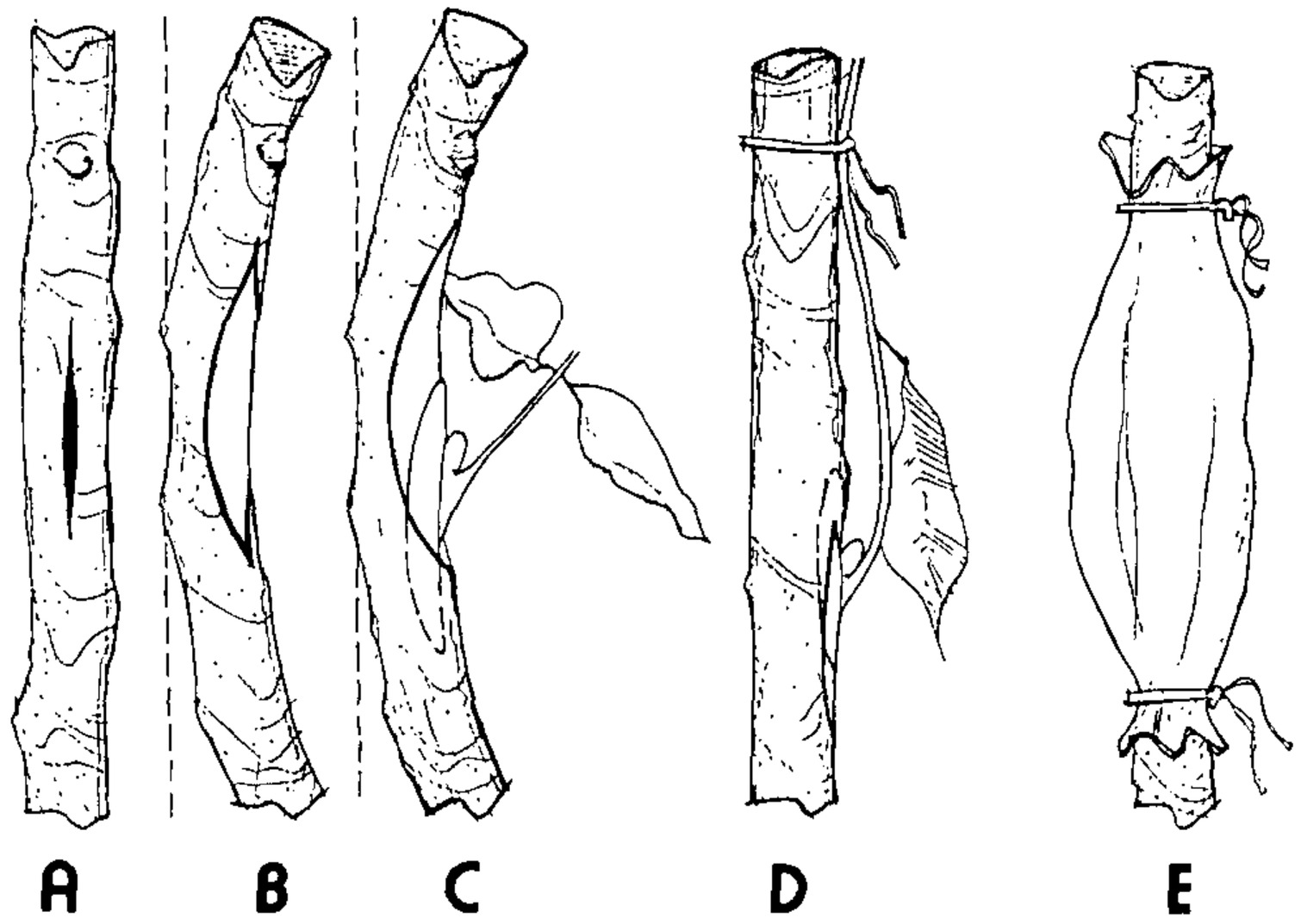

Figure 1. Steps in making the "change-purse" bud. A. Single cut 3 to 5 in. long on south or southwest side of stem. B. Stem is flexed and flaps of cut are opened. C. Bud shield is pushed downward until entire shield is beneath the flaps. D. Bud shield is pushed upward, tied in and leaf rachis tied to stem. E. Entire area is overwrapped with plastic film and tied at top and bottom. The author wishes to express appreciation to Ms. Jan Cervelli for making the drawings.

Selecting the scion and making the bud cut. Select a current year's growing shoot with one or more *plump buds*. The lowest, more mature buds, seldom break and produce leaves but the less mature plump buds are readily forced. Reduce the leaf over each potential shield to 4 to 6 leaflets. If the lower 2 leaflets are quite small use 6 leaflets, or remove the 2 lower small leaflets and retain 4 leaflets above. Leave a ½- to ¾-in. piece of rachis above the upper pair of leaflets. Cut the shield 1¼ to 2 in. in length. If the leaf base is particularly broad and heavy, as occurs on English walnut, two light notches may be cut from the sides of the leaf base so that it will fit better under the bark flaps of the stock. While holding the shield bud by the petiole, remove a *thin* strip of tissue along both sides of the upper half of the shield. This will better expose the cambial region of the shield to that of the stock giving better and faster knitting of the two tissues.

Inserting the bud. With the bud ready for insertion firmly flex the stock to force and hold open the slit. At the widest opening insert the base of the shield, pushing it downward until the shield is beneath the flaps (Figure 1C); then push the shield upward until it meets resistance and the upper portion of the shield has contacted undisturbed internal tissue of the stock. Release the stock and the flaps should pull tightly against the shield, holding it firmly (Figure 1D).

Tieing in the bud. For tieing in, 8 × ⅜-in. budding bands are preferred since the stock may be as large as ¾ in. in diameter and the shield up to 2 in. long. Grafting tape can be used but this necessitates the labor of removing it later. The shield should be firmly bound but not so tightly that the band extends the full limit of its stretch. The bud is not covered and it is not necessary to bind the entire stock cut. With the shield tied in, the leaf is pushed up against the stock and the stump of the leaf rachis left above the upper set of leaflets is loosely tied to the stock with a piece of masking tape or Twistem (Figure 1D).

Closing in the bud. Pieces of polyethylene plastic about 10 × 12 in., or a 1 qt. poly freezer bag slit open is used to close the bud in until it has healed. The leaflets are folded downward along the trunk and the plastic is loosely over-wrapped using 2 to 3 turns to entirely enclose the leaf and shield. The plastic is tied shut at the top and bottom using small budding bands, tape, string, or Twistems (Figure 1E). The plastic prevents drying, maintains the turgidity of the leaf, permits light to enter and allows some photosynthesis to occur in the retained leaf. One-third to one-half of the foliate top of the rootstock is removed at the time the bud is set. This checks top growth and allows more reserves for cambial activity for healing in the bud.

Aftercare. Between 7 and 10 days after setting, the buds should be inspected and those with yellowed or dehisced leaves should be opened, the leaves removed and the plastic retied. At 14 to 20 days the plastic is opened at the bottom to allow some air circulation to acclimate the bud and/or leaves which haven't dehisced to lower humidity conditions. Twenty-one to 30 days after setting the bud the plastic overwrap is entirely removed and the top of the rootstock is broken over or cut off 4- to 6 in. above the bud to force it into growth (if it has not broken yet). The band should also be cut at this time. Once the bud has broken and made 4 to 8 in. of growth the stub may be removed. Keep all rootstock shoots and buds removed.

The success rate using this technique will vary but having vigorous rootstocks and learning to select the proper buds should result in 90% success with English and black walnuts, 80% or more with pecans, and 70 to 80% with butternut and heartnut.

CHRIS GRAHAM: Is the color of the poly important?

LEN STOLTZ: I have only used clear. I feel you would not want to use black, because you want light to help maintain the

leaf so the bud can utilize material stored in the leaf and also manufacture food.

LARGE-SCALE PRODUCTION OF BLACK SPRUCE CUTTINGS FOR PROGENY TESTS

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A program for the large-scale production of spruce cuttings has been ongoing in Ontario for 4 years. This work has been based on preliminary studies by Rauter (7), Armson, et al. (1), Perez de la Garza (4), and Fung (3). The program was initiated in 1979 when approximately ½ million rooted cuttings were produced for operational outplanting (1). This program was so successful that in 1980, it was decided to build a new facility for the production of spruce juvenile cuttings for the Ontario Tree Improvement Program.

The purpose of this new program is to clone spruce seedlings for progeny testing. Seedlings of full-sib origin are grown and, as they develop, cuttings are taken from them and propagated. New cuttings are later taken from the original seedlings and also from the first rooted cuttings. This cycle is repeated until 140 ramets of the same age are produced from each clone. After rooting, these last cuttings are used for progeny outplanting tests in Northern Ontario. Presently both black spruce (*Picea mariana* [Mill.] BSP) and white spruce (*Picea glauca* [Moench.] Voss.) juvenile cuttings are propagated. The 140 ramets per clone can be achieved more rapidly with juvenile black spruce seedlings because they grow faster and cuttings taken from them root faster than juvenile white spruce seedlings.

The objective of this paper is to outline the cultural techniques by which the 140 black spruce ramets per clone are produced.

Production cycle. The first attempt at production of black spruce cuttings for progeny tests in 1980 required 5 cycles of cuttings and nearly 3 years to achieve the 140 ramets per clone objective. Since then our growing techniques have been improved and we have been able to reduce the length of the production cycle. In the cycle described here, 1900 seeds were sown in October 1981 for one progeny test (Table 1). One month later a germination survey showed 45% survival or 850 ortets. A germination rate of 45% for spruce seeds produced by artificial techniques is not unusual. The seedlings were grown