The Oklahoma Cooperative Extension Service
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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Four-Flap Grafting of Pecans

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The first extensive use of the four-flap graft on pecans in Oklahoma was during 1975. Sometimes called the "banana" graft, this technique is one of the easiest ways to convert small seedling pecan trees and branches of larger trees. The necessary cuts and "fits" of the four-flap graft are not as precise as for most other pecan propagation methods; therefore, it is a good method for beginners.

Optimum stock (trunk or limb) size for grafting is 3/8 to 1 inch diameter. Nurserymen commonly produce seedling trees of this size from planted nuts in two or three years.

You may begin grafting when the bark slips freely. Slipping is when the bark will separate easily from the wood. Normally, this is late April in southern Oklahoma and early May in the northern parts of the state. Four-flap grafts can be installed during the same period of time as the common bark graft. Due to heat, grafting season usually ends by early June. Grafting is most successful on cool and cloudy days. Avoid days with high temperatures and drying winds.

The four-flap graft allows much cambium contact between the scion and the stock. This cambium contact is necessary for callus formation and subsequent successful graft union. This graft works best when the graftwood (scion) is slightly larger than the stock (trunk or limb).

Definitions:

Scionwood - (Graftwood, Propagation wood) mature dormant shoots usually of the previous season's growth.

Scion - A section of scionwood to be grafted onto a stock. It is from a known variety one or two years old, 3/8 to 1/2 inch in diameter and 5 to 6 inches long.

Stock - A trunk or limb on which the scion is grafted.

Cambium - A thin layer of cells located between the bark and wood; capable of dividing and forming new cells. For a successful graft union, it is essential that the cambium of the scion be placed in close contact with the cambium of the stock.

Callus - A mass of cells that develop from and around wounded plant tissue. It occurs at the junction of the graft union, arising from the cambium of both scion and stock.

Grafting - The process of inserting the scion into the stock.

What you need:

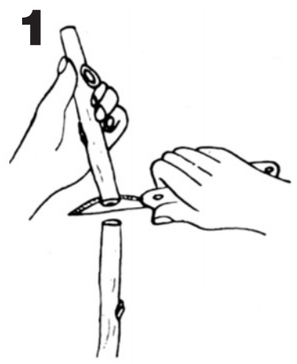
Stock trees—Select healthy, vigorous trees measuring 3/8 to 1 inch diameter where the scion, or graft, will be set. When using cold hardy rootstocks, it is best to graft at least 18 inches from ground to preserve the cold hardy characteristics of stock. Grafts can be performed much higher and if cattle graze in area, grafts would be best at 6 feet or higher.

Tools — hand pruners, loppers, grafting knife, ice chest to store graftwood

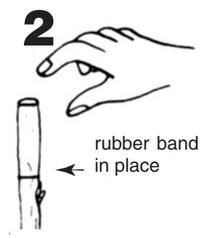
Supplies — household aluminum foil, fold top sandwich bags; small rubber bands, masking or grafting tape, and amber shellac.

Procedure

1. Select a point on the stock that is free of damage with no budscars. When using cold hardy rootstocks or native seedlings, grafting at a height at least 18 to 24 inches off the ground will transfer cold-hardiness from the stock to the scion. Cut the stock straight across with sharp pruning shears at the point you desire to make the graft. The graftwood should be slightly larger than the stock.



2. Next wrap a small lightweight rubber band around the stock and leave it 3 or 4 inches from the top cut. The rubber band will be useful later in the grafting procedure. It should fit snugly with moderate pressure on the stock. Remove or cut back to approximately six inches all lateral growth on the stock.

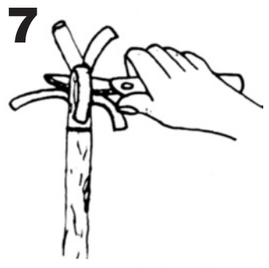


3. Make four vertical cuts 1 1/2 inches to 2 inches long and equally spaced (quartered) around the circumference of the stock . Make the cuts through the bark only.

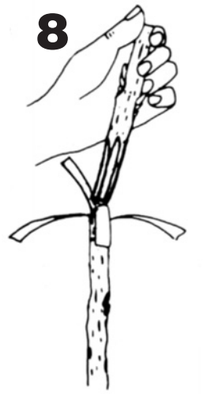
4. Choose a smooth, straight scion slightly larger than the stock. Cut to about six inches in length with two or three buds remaining. With a sharp knife, cut the scion on four sides. Start the cut about 1 inch to 2 inches from the bottom end. The cut should be made through the bark.
5. The end view will be square.

6. Without touching the inside of the flaps, pull the four flaps of bark down. This will expose 1 1/2 inches to 2 inches of the stock.

7. With sharp pruning shears, cut and remove the exposed stock (plug). Be careful to not cut or damage the four flaps.

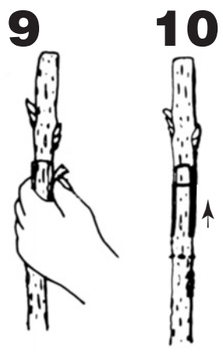


8. Insert the scion upright on the stock.



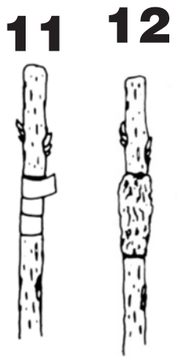
9. Pull the four flaps in place to cover the four cut surfaces on the scion. Align the flaps to cover the cut surfaces as much as possible. The more cambium tissue that is touching increases the chances of a successful graft union.

10. Move the rubber band up around the flaps to secure them in place. Locate the band near the end of the flaps. The rubber band will serve as a useful extra hand while you adjust the flaps and prepare for the next step.



11. Wrap the cut areas with masking or grafting tape. Make sure that the tape is firm but doesn't pull too tightly to move the flap alignment.

12. Cover the tape with a piece of regular household aluminum foil, shiny side out. The foil will reflect heat from the graft.



13. Clip or tear the corner of a folded top sandwich bag and carefully slip it down over the stock making sure to not break off primary buds. The scion will protrude through the bag. The plastic bag helps prevent moisture loss.

14. Tie or tape the bag to the scion immediately above the foil and to the stock below the foil. Rubber bands, budding strips, string, masking tape or other tapes may be used to secure the bag in place.
To further reduce moisture loss, some grafters paint the scion with a water based amber or orange shellac to aid in prevention of moisture loss.
Another helpful strategy to protect the graft is attaching a bird perch below the graft that extends up above the graft union. The perch can be a bamboo stake or a stick that was removed from the rootstock. This provides birds with another area to sit without wiggling and loosening the graft union.

American Method

A new twist to the Four-flap Graft is the "American Method". First developed in Oklahoma, the grafting procedure remains the same through steps #1-10. At step #11, instead of grafting or masking tape, one-inch duct tape is used to secure the graft union, going from below to above the flaps or graft union. Steps #12 and #13 are eliminated, so no foil or plastic bag is used. The American Method is finished with regular school glue applied to the tip of the scion wood and a bird perch put in place.

After Care

Keep growth on the stock in check throughout the first summer by removing the growing tips. It should be done several times during the growing season. This will cause a trashy or bushy trunk to develop, resulting in increased tree diameter and overall vigor. The growth on the stock can be used as a "throttle" to regulate the growth rate of the graft. If the graft is growing slowly, remove more of the lateral growth on the stock. Normally, all the growth on the stock below the desired height of the bottom limb will be removed in two or three years. Also, if any rootstock shoots are shading or competing with the graft, tip back to allow the graft to be the most dominant.

Should the graft make excessive growth that is vulnerable to breaking, the shoots can be loosely tied to the bamboo stake (bird perch) to keep from blowing out. The shoots can also be tipped back if growth is excessive.

The bag and foil will have served their most important purposes by late July and August and may be removed at that time.

If multiple wraps of the masking or grafting tape were made or more durable tapes were used, the tape should be cut soon after vigorous scion growth begins. This will prevent girdling of the stock and scion.

The rubber band serves only as an aid (extra hand) during application of the graft. A lightweight rubber band will normally deteriorate during the summer, causing no unnecessary constriction or girdling. If a heavy, thick rubber band is used, it may be necessary to cut the band after vigorous growth begins in order to prevent girdling.

Reference

Vanerwegen, Jerry. 1975. A New Grafting Procedure. Pecan South, Vol.2, No. 2.