

# Growing Nut Trees in Minnesota<sup>1</sup>

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## Part IV. Grafting

WEATHER conditions prevailing in Minnesota often lead to poor success with nut grafting. Anyone familiar with grafting methods, however, should find the work interesting. One needs to be patient when failures occur and to persist until some of the named varieties of excellent quality are established. In some seasons a fairly high percentage of success may be gained while in other seasons nearly all grafts may fail in spite of good work and the best care. The best "take" in these studies was 74%, but average for eighteen years was only 33%.

*Cionwood.* The best cionwood is produced by trees in good vigor. Opinions differ as to the best age of wood to use, but in Minnesota one-year wood has given better results than older wood. In all cases completely dormant cionwood has given best results. For Black Walnut the lower portion of shoots is better than the tips. There is less pith toward the base of the shoot and the wood and buds are better matured. For Hickory, however, the tip portion with a well developed terminal bud seems to "take" better than cions having only lateral buds.

*Time to Cut Cionwood.* Authorities differ relative to the best time to collect cionwood. Some prefer cutting in late fall when the wood is well matured. Others prefer wood cut in mid-winter or early spring. Best results here have followed use of wood cut late in March or in early April while it still is completely dormant.

*Coating Cionwood.* As drying of cions after grafts are made is a serious problem here, and often is the principal cause of failure, coating cionwood previous to storage has been helpful. The shoots can be coated rather easily with paraffin, wax emulsion, or water soluble vinyl plastics.

*Storage.* As nut tree grafting is done after warm spring weather prevails, it often is difficult to keep cionwood completely dormant. To keep wood moist and dormant it should be packed in moist moss in containers which can be covered tightly. If stored at about 34°

F. it will keep in good condition until the end of May or later. If cutting cionwood has been too long delayed in spring, storage at temperatures below freezing may cause injury as cold resistance has largely disappeared. Hickory cions from eastern sources shipped in warm cars have been killed when stored for several days at 26° F.

### Grafting Time

Time for nut tree grafting is later than for apple. The Black Walnut requires a daily mean temperature of at least 55° F. for callus to form and the union develop. This temperature usually is not reached before the middle of May in southern Minnesota. For Hickory grafting a fairly satisfactory guide is to wait until buds on stock trees begin to break.

*Stocks.* The most satisfactory stocks for Black Walnut are seedlings grown from nuts of local origin as they are likely to be hardier than those grown from nuts produced where winters are milder. Seedlings four or five years old should be large enough if only the leader is grafted.

Hickory seedlings grow slowly so grafting will not be large enough to graft until at least six years old. Seedlings of local origin are best as they probably are hardy. Shagbark varieties grow best on Shagbark seedlings. Hybrid varieties such as Beaver or Fairbanks apparently will succeed on either Shagbark or Bitter Hickory seedlings. Hicans, hybrids between Hickory and Pecan, have not been tested extensively but seem to succeed well on either Shagbark or Bitter Hickory stock.

*Grafting Methods.* Everyone who has attempted nut tree grafting seems to have their own favorite method which they recommend. Perhaps the reason is that best results follow use of the method which is most familiar and easiest to use. Several methods have been tried here such as cleft, bark, inlay, side and root grafting. All methods have been successful at times, but best results have been obtained from the side (or side-cleft) graft. This graft can be made easily on young wood from three quarters to an inch in diameter. Short cions with only two or three buds are preferred as they are

less likely to dry out before the union can form.

Grafting tape wound around the union helps to maintain pressure on the cut surfaces which is believed to favor callusing. Tape alone, however, has not given good results as it does not satisfactorily avoid drying from sun and warm winds. Best results have followed taping tightly and then covering stock, tape and cion completely with melted grafting wax. Additional protection against drying may be gained by slipping a small paper bag over the graft and tying it securely below. The bags should be left on until shoots develop on the cions. The bags also avoid another difficulty as they prevent removal of the wax by bees. Grafts not bagged may have all wax removed and the graft lost by drying. Bees have removed all wax from grafts even when 10% tobacco dust has been added to the wax.

Root grafting offers promise of success with the Black Walnut. The work can be done in March or April but the grafts require bottom heat and cool temperature above, so the method is limited to places where such facilities are available. Dusting tips of cions and the graft unions with a hormone preparation has increased percentage of success.

### Waxes

Careful work done at the best time seems more important than a good wax, but some waxes or compounds have caused injury and should be avoided. Good results have followed use of grafting waxes sold by seedsmen and others. These waxes have been as satisfactory as waxes with special formulas. A wax highly recommended can be made by heating together equal parts of commercial lanolin and beeswax. Some prefer a wax containing diatomaceous earth known as "Kieselguhr" but this has shown no special value here. Waxes containing linseed oil as a substitute for tallow have severely injured hickory grafts and at times also have damaged Black Walnut grafts. All of the asphalt emulsion grafting compounds used have caused injury or killing during hot weather and their use cannot be recommended for nut grafting. These compounds

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break down and destroy callus and the young tissues forming at the graft union.

*Budding* has been attempted here many times without success. Apparently hot, dry weather in July and August in Minnesota is unfavorable for success with budding.

*Training After Cions Grow.* Cions often will push their buds better if all sprouts are removed from the stock branch as soon as they appear. After enough grafts have grown to form a good scaffold any remaining stock branches should be removed. Where there is no satisfactory leader one of the upper grafts usually can be straightened up. A stick can be tied to trunk or main branches and the graft shoot tied to it with cheese cloth strips or grafting tape. Tying in this way also protects against loss of the shoot in high winds. Training often forms a good framework more quickly than by further grafting.

### Causes of Failure

Failure of some grafts can be expected, but many losses can be prevented if the hazards are recognized and avoided. Many difficulties may be avoided or controlled if seedling trees to be used for grafting are grown in the open where they can be protected against pests. In woodlands the pests more or less commonly found on native Black Walnut and Bitter Hickory seem to prefer the grafted varieties. The large budded Shagbark Hickory seems to be particularly subject to damage.

Principle causes of failures occurring in these grafting studies have been as follows: (1) Winter injury to cionwood, (2) Cionwood not dormant, (3) Dehardened cionwood killed by storage at 26° F., (4) Cionwood in poor condition from weak trees, (5) Cionwood damaged when storage was too wet, (6) Cions killed by a freeze after buds started, (7) Cions killed by hot, dry weather before unions developed, (8) Insects eat buds from cions, (9) Borers destroy established grafts, (10) Squirrels eat all buds on Shagbark Hickory grafts, (11) Cions injured by too hot wax, (12) Wax removed from grafts by bees, (13) Waxes containing linseed oil injurious to Hickory and sometimes to Black Walnut, (14) Break down of asphalt grafting compounds in hot weather destroys callus and cions, (15) Grafting too early in season exposes cions longer to drying conditions, (16) Stock trees too weak, (17) Graft unions broken and shoots blown off by high winds, (18) Grafted varieties not winter hardy.

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