

GRAFTING, OUTDOORS, DECIDUOUS AND BROADLEAF

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While grafting is described as any method which permits actual cambial contact between compatible plant parts, I will refer in this paper to grafting as the placing of a scion upon an understock, this then excludes budding.

The reason for graftage is largely the same in or outdoors; mainly propagation of desirable characteristics, such as shapes and forms, unusual colouring of leaves, abundance and quality of fruiting, and the slowing or speeding of growth. Our nursery grows strictly ornamental plants and my remarks will deal with a number of trees which we propagate by graftage. Before going into details, I will briefly describe our methods:—

1. Splice grafting and its variant whip and tongue. 2. Triangling when understocks are larger than the scion. This is generally the case. We like to have a well established understock to give us the desired vigorous growth. In many cases we rather wait a year to get this more vigorous growth. 3. The last method we use is bark grafting, when the season is well enough advanced so that the bark parts easily. This method would entail the storing of scions. We cut most of our scions the day before we want to graft them.

Tying is done with raffia triple X grade. Wound covering is a tar asphalt emulsion. It can be diluted with water but once dry it will not wash off. There is enough flexibility to prevent cracking when the plant expands. Care has to be taken that enough of it is put on so the first rain does not wash it off. It cannot be used when freezing.

We start our grafting as soon as the frost begins to go out of the ground but we do not graft during frosty weather. Not only did we experience poor results, but also had quite a few nicks and cuts on the grafter's hands. Knives used are one-sided sharpened to facilitate the straight and flat cut which makes grafts so much easier to fit. They are kept razor sharp.

Team work is carried out where possible. For instance, when triangling or whip and tongue grafting; the grafter does the fitting of the scion and understock and is followed by a tier. Three or 4 grafting teams are served by a waxer. Stocks are cut level before grafting. Scions are either 3 buds or bud pairs.

In chronological order we start with *Fraxinus excelsior* varieties which are grafted at 6' stem or above. *F. e. globosa*, *F. e. pendula*, *F. e. compacta*, *F. e. jaspidea* are some of the varieties we graft. Points for *Fraxinus* are that a bud is left on the understock at its highest point. This is called a drawing bud. Without it, grafting is not successful for Ash.

Ulmus varieties. Despite Dutch Elm disease we still grow 2 hybrid Elms for trees and intermediate stem. On this we

graft: *Ulmus glabra pendula* and *U. glabra unbraculifera* at 6' and 7½' heights.

Robinia pseudoacacia is the understock we use at ground level for such varieties as *R. p. tortuosa*, *p. fastigiata*, its yellow form Friesen Gold. *R. hispida* and the form *R. Idaho*. On 6' stems we graft *R. p. inermis* the globe and also the pink flowering forms such as *R. hispida*.

Prunus avium is used for 6 and 4' standards of Jap. Cherries and a large number of *P. serrulata* and *P. subhirtella* forms are grown. To mention a few beside *P. serrulata* Kwanzan, *P. serrulata* Amanagawa, Fugenso, Hokusai, Kiku-Shidare, Miyako, Shogetsu and Takasago. One year heads are normally saleable. Again a drawing bud greatly helps success. *Prunus tomentosa* stems are used together with *Prunus nigra* for 4' stems of *P. triloba* and *P. cistena*. Again heavy stocks are preferred ¾" thick if possible. The frost is out of the ground now and we turn to the items we like to graft with a little sap flow.

Euonymus europaeus 4' and 6' standards are used for the evergreen forms such as *E. vegetus*, *E. Gaiety*, *E. coloratus*. The only caution here is to take off leaves. Also we have also done a few *E. alatus compactus* with success.

Caragana arborescens with its pendula form is grafted at 4 and 6' standards. And also *C. pygmaea* at the same height and the same understock.

Malus pumila standards or the intermeidate J. Fischer is used for such species as *M. sargentii*, *M. Echtermeyer*, and other slow growing forms such as Dorothea. J. Fischer is an eating apple, I brought from Europe and which among others proved to be the fastest and most compatible intermediate.

Gingko biloba and its cultivars such as the Fastigate male, "Mayfield" and "October Gold" are grafted at ground level and give acceptable takes.

Sorbus aucuparis is used at 6' for *S. aucuparis pendula*. We have also used *S. intermedia* as understock, when we found that trees 7-8' caliber were grafted on it. Very seldom will *S. aucuparia* as understock reach these sizes under our conditions.

We reach now the time when sap flows fairly well and to our experience we get best results to graft:

Morus alba pendula on to *M. alba tatarica* at 6'. Triangling proves to be better than any other form of grafting.

Quercus pedunculosa is used as understock for *Q. pedunculosa fastigiata* and stocks exceeding 1" caliber are proving best. A point is not to graft too low on the stock where the bark is very thick but 4 to 5" up from the neck. The main point is to make sure that the thick bark is not mistaken to be a good fit, but that cambium lies on cambium. *Q. petraea columnaris* is done on the same understock.

Fagus sylvatica forms *F. s. pendula*, *F. s. pendula purpurea*, *F. s. asplenifolia tricolor*, *F. s. atropunicea*, the redleaved, and the better form Spaethiana, Rohani cutleaved and purple. *Fagus*

is our last spring item and beside grafting fairly high 6-8" off the ground, we found 2 and 3 year old wood has given best results, provided good buds are retained. While results with *Fagus* are only in the 25 — 30% success range, most of our other graftings are very successful, usually in the higher 80%.

Aesculus hippocastanum is used in the summer as soon as scions are available and are inserted on the side of the stock into a T cut, well waxed, and if carried out early enough so that enough callus is formed, very successful. Waxing and defoliating is a necessity. Not only the forms of *A. hippocastanum* such as *A. h. plena*, *A. h. carnea*, *A. h. brioti*, but also *A. h. parvifolia* can be propagated and much more successful than by budding.

After care of grafted plants consists of cutting off the raffia tie after the graft has knit well and shows signs of growth. Staking of too vigorously growing grafts to prevent blowing out by high winds, and where necessary, pinching for bushier growth are carried out. The wound covering is taken off on a cool day, when it does not stick.

MODERATOR CANNON: Our next paper, "Four Years of Nut Grafting Chestnut", will be presented by Dr. Richard A. Jaynes.

FOUR YEARS OF NUT GRAFTING CHESTNUT

RICHARD A. JAYNES AND GEORGE A. MESSNER¹

Several clones of chestnut have been selected and named because of desirable characteristics of blight resistance, form, vigor, and nut bearing. Many of these, selected primarily for orchard traits, are Chinese chestnuts, e.g. Nanking, Orrin, and Crane; others, selected largely for ornamental or forest use are complex hybrids between the Chinese, Japanese, and American chestnut, e.g. Clapper, Sleeping Giant, C9. Unfortunately large scale propagation of these or other chestnut clones has never proven feasible in the United States. Spring grafting with dormant scions has met with limited and variable success. Budding has failed, and the rooting of cuttings by many methods has invariably met with complete or nearly complete failure.

In 1963, Moore (4) described before this group a promising method he called the nurse-seed graft. The technique involved the grafting of a dormant scion into a germinated nut from which the root and shoot had been removed. Substances in the cotyledons of the nut presumably stimulated root formation from the scion near the area of contact. In 1965 one of us reported (3) the results of 450 nurse-seed grafts of chestnut using several clones and seed sources. Although roots were readily formed they did not arise from the scion, but differentiated from the seed nut near the surface of the cut petioles. Since the nut is more than a "nurse" — it contributes the root

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