GRAFTING PLANTS

By John Mason and Staff of ACS Distance Education

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CHAPTER 1 INTRODUCTION TO GRAFTING

Grafting and budding are techniques used to combine one plant part with another to encourage growth as a unified plant. Budding is simply a form of grafting that only connects a single bud from one plant to another plant.

Budding & Grafting Explained

Grafting involves joining parts of plants in a way that they will grow together and remain united as one plant. The part of the graft combination which becomes the upper part of the new plant is called the 'scion'.

The part which becomes the bottom part is called the 'rootstock', which is sometimes shortened to stock. All methods of joining two plants together this way are forms of grafting, however, when the scion is only a small piece of bark containing a single bud, the technique is called "budding". Budding is preferred when the supply of planting material is limited.

A natural graft occurred here where 2 branches from the same tree rubbed against each other in the wind,. The bark broke and underlying cambium tissue made contact and grew together, eventually holding firm and forming a permanent, strong link.

Natural Grafts

Although what we call grafting is most usually thought of as an exercise undertaken by horticulturists and gardeners, grafts can occur in nature without the intervention of humans.

Branches, trunks, and roots can become naturally grafted. Where this occurs, it is known as 'inosculation'.

Natural grafts can emerge where two parts of the same plant have rubbed together, perhaps moved by wind. As

the bark is worn and the cambium layer below the bark is exposed, callusing occurs and these conditions allow the parts of the plant to grow together. But it is not just parts of the same plant that can fuse in this way. The limbs of two neighbouring trees of the same species may form natural grafts. Sharing the structural framework with neighbouring trees in this way can enhance the strength of individual trees making them more resistant to wind damage.

Similarly, neighbouring plants of the same species may naturally join roots. Doing so enables them to share nutrient resources. Having a united network of roots may give these plants a better chance of overcoming droughts or tolerating infertile soils. However, it does also expose them to the risk of being invaded by the same soil-based pathogens.

It is likely that observations of these natural grafts led to the first grafting experiments by humans. It is known that the Romans grafted fruit trees and that the Chinese were doing this as far back as 6000 BC. In medieval Europe, grafting continued to be practiced and honed. In more recent times our understanding of plant classifications and plant viruses have helped to expand the knowledge base and develop awareness of the possibilities that grafting offers.

Reasons for Budding and Grafting

Although budding and grafting is a vital part of the fruit tree nursery industry, it can also be regarded as a means of increasing the type and variety of plants that can be grown in gardens in different parts of the world. The main reasons why growers might wish to use budding and grafting are as follows:

- To maintain a variety of plant which cannot be easily grown using other propagating techniques. Cuttings from some plants are difficult to root, others are hard to grow from seed.

- To preserve and replicate specific cultivars. For example, some heritage or heirloom species may be saved from extinction.

- To produce plants which are ‘true to type’. Although some species of plants when grown from seed grow true to type, many other species do not. This means there can be tremendous variation in what the adult plants look like. Grafting ensures that the parent looks like the plant it was grafted from.

- To maintain uniformity of cultivars. Characteristics such as uniformity of leaf shape, flower colour, and fruit size or taste can be preserved. This is especially desirable for commercial fruit orchards or the cut flower industry.

- To produce plants which bear flowers and fruits sooner than those propagated by seed or cuttings. Some plants can take more than 10 years to bear flowers when grown from seed, and several years from cuttings. Grafted plants often flower within a season or two.

- To obtain different “special” growth forms. The rootstock influences the growth shape of the scion. For example, standard roses may be produced by grafting a suitable rose

scion onto a hardy rootstock using a technique known as top-working where it is grafted high up the stem. Similarly, weeping plants like cherries can be produced by top-working onto suitable rootstocks to produce weeping trees more quickly.

- To enhance disease resistance. For example, grafting a scion which is susceptible to root rots onto a rootstock that is more tolerant of root rots can produce a plant which has the desired top growth but greater resistance to disease.

- To produce virus-free cultivars. Researchers have been able to screen out some specific viruses from rootstocks to produce virus-free clones.

- To influence the final size of plants. Grafting a tall-growing plant onto a smaller growing rootstock can produce a stunting effect thereby producing a dwarf variety for use in small gardens or to make fruit picking more accessible. Likewise, a dwarf species might be grown as a bush or taller plant.

- To obtain benefits from “intermediate” rootstocks. Here a scion is grafted to a rootstock, then another scion is grafted to the top of the first scion. If the ultimate tip scion is not compatible with the very bottom scion, it is sometimes possible to graft a different variety in between the two which both are compatible with.

- To produce plants which are tolerant of different soil conditions. In particular, soil pH levels can affect plant growth. You can get some species of the same plant genus that have better tolerance to soil alkalinity or acidity. This makes it possible to select an appropriate rootstock for the prevailing soil conditions. Likewise, some species may have better tolerance for wetter or drier soils so can be chosen as rootstocks to match local soil conditions.

- To change varieties. An existing plant can be changed to a new more desirable variety. The grafted plant can take advantage of the existing established rootstock and does not have to settle into a new planting site.

- To increase the growth rate of saplings. A young plant grafted onto an older more vigorous rootstock can mature quicker.

- To enable one root system to support more than a single variety or branch system. It is possible to graft more than one variety of plant onto a single root system. For example, you could produce two or more types of fruit from one tree.

- To reduce the need for separate pollinating plants. For example, a multi-grafted fruit tree can include male and female plants so becomes self-pollinating.

- To repair damaged trees. If bark is stripped or if ringbarking occurs, it is possible to graft across the damaged section aiding sap flow and hastening healing. Mature and valuable trees may be saved in this way.