

Benefits of Graftage.

By,

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In this paper the term graftage is used in its more general sense and includes both budding and grafting. Although the practice has been looked upon by some as mysterious and by others as pernicious, yet it is gaining favor, and is now being widely employed as a means of propagating fruits.

In the propagation of such plants as come true to type from seed or may be started readily from cuttings or layers it is rarely used, but for those that do not come true from seed or do not readily strike from cuttings or layers some other means must be employed. It is to meet this requirement that graftage is so generally practiced, and since the apple, peach, plum, cherry, and pear in fact all our orchard fruits belong to this class, they must for lack of a better method be so propagated. I say for lack of a better method, because this has been assailed as being a secondary process.

It is a secondary process, and the stocks or roots must first be grown either from seed or from cuttings, and the cion of the desired variety then attached. Such a process, of necessity, requires time but time so employed is not lost, as upon first thought might be considered. The fact that the top must make a growth, be cut back, and a new start made, may seem to put the plant back to its former starting place, but such is not the case! Although the top has been mutilated and kept back, the roots have been developing and now force the top with renewed energy, and in the case of peaches the top is frequently as large at the end of the first season from the bud, as are the trees which have made a continuous growth. Even cutting the trees back without budding seems to make them more thrifty, and diminishes them so little in size that many prefer to cut seedling peaches back at the end of the first season

and train them from a single bud.

The assailants of graftage find here what they term an insurmountable barrier, by declaring that over rooted plants are better — "that is earlier, longer lived, and more fertile, than graft rooted plants." This declaration however is merely an assumption without proof, as will be shown later by introducing instances in which plants failed to grow upon their own roots, and were successfully grown upon other roots.

While graftage does not give satisfactory results with many ornamentals yet the effects are rarely pernicious, and if confined to fruit trees, the results are usually successful. The mere fact that in a few cases with ornamentals the practice has proven unsuccessful should by no means cause it to be condemned in fruit lines where it has been invaluable in the development of that industry.

The effects of graftage are exceedingly numerous and the influence of the stock upon the cion and vice versa is perhaps one of the most striking, and is of vast importance to the fruit grower. While it is interesting to consider these effects in detail, noting variations produced upon the shape and color of the leaves and flowers; and many other minute yet important variations, in the present treatise, we must give space to only the greater and more noticeable ones, those which seem of the most practicable importance to the general fruit grower; viz., effects upon the size and form of the tree, adaptation to soil and climate, productiveness, time of ripening, and character of the fruit.

Size The most marked effect upon the size of trees is shown by dwarfing. It is a well known fact that apples grafted upon Paradise or Doucin stocks and pears grafted upon quince stocks are complete, and that peaches grown upon

plum and cherries grown upon Mahaleb stocks are complete dwarfs. Examples of dwarfing may be found in any nursery, and in many of the largest orchards of the present time.

Form. The general form of standards may be modified yet not be dwarfed.

For instance if a variety having a very spreading top be grafted upon an upright variety the tree produced will tend to be less spreading, and vice versa. It is also said that the roots of the tree produced will resemble those of both the stock and the parent cion.

Adaptation. Fruits which will not grow in certain climates and peculiar soils are grafted upon stocks which thrive well under those conditions, with highly beneficial results. Tender varieties grafted upon hardy stocks will often stand severe winters better than when grown upon their own roots. The hardy stock tends to prepare the tree for winter in due season and hinders it apparently the remedy for the disastrous effect of the tender stock.

Perhaps too, the hardy stock is better adapted to supplying needed moisture during the dormant period. Peaches which will not thrive in wet, heavy soils, may be grown upon plum stocks, and the result is frequently a thrifty productive tree. Plums grown in light, sandy soils, thrive better upon peach stocks than upon their own roots. Pears are usually grown upon quince stocks, but where the quince does not grow well, the mountain ash is frequently a successful stock.

Productiveness. That the productiveness of the tree may be affected by graftage, is unquestionable. The mere fact that the tree itself is modified, as has been shown, is conclusive evidence that the fruitfulness is influenced.

To be productive a tree during some part of its life must be thrifty.

However, all thrifty trees are by no means productive and it is this class which we shall here consider.

The fruitfulness of the tree may be influenced by checking the flow of

sap, and by modifying the stature of strong trees, as in dwarfing, or it may be influenced by increasing the vigor of trees too weak to bear.

Dwarf trees usually bear at an earlier age than standards, which is due to an insufficient flow of sap. It is a well known fact that checking the flow of sap as in ringing or girdling tends to produce fruiting. Since the stock and cion grow with unequal rapidity, they become of different size; hence the transfer of sap becomes difficult at the union which tends to check the flow as does ringing or girdling. Sometimes varieties which are very vigorous put forth all their strength toward the production of wood and do not fruit. These may be brought into bearing by putting them upon less vigorous stocks which tend to check their wood growth as would root pruning.

Dwarf trees are also advantageous from another and entirely different standpoint; viz., that they are better

adapted to cross fertilization than are standards, which is especially important with many varieties of pears and apples. Fruits are frequently self-sterile, but fertile to the pollen from other varieties; hence, intermixing of varieties becomes necessary; and the more closely they are brought into contact, the more certain will be the fertilization. Dwarf trees may be placed much more closely than standards, and therefore favor cross fertilization, upon which depends the crop.

This fact, too, must not be forgotten when we note the superior quality of fruit grown upon dwarf trees!

Time of Ripening. The time of ripening of early varieties may be extended by grafting them upon the late maturing varieties, and vice versa. Summer varieties grafted upon the Northern Spy are known to have been later in ripening and to have superior keeping qualities while on the other hand Winter apples grafted upon the Early Harvest or Early

Strawberry have been known to ripen as much as three weeks in advance of their season, and to have inferior keeping qualities.

Character of Fruit. The most striking example of modifications in the character of the fruit is found by grafting the sweet apple upon very sour varieties, or upon the Siberian crab, which tends to give it acidity.

With these few points in view, the importance of judgment in the selection of stocks and cions at once becomes manifest. In the selection of cions for best results, they should be obtained, not from any tree of the desired variety, but from the one which is known to bear the best fruit, and from the particular limb which bore the choicest fruit.

Regarding methods of propagation there appears to be little or no effect upon the mature tree. While some favor budding and others favor grafting, careful experiments show no difference between budding and grafting, or

between the whole and the piece-root graft in the mature tree. However, budding is usually employed advantageously with stone fruits, and grafting, with the apple and pear, although either method may be employed upon all.