

# HOME COURSE IN SCIENTIFIC AGRICULTURE

## FIFTEENTH ARTICLE. THE PROPAGATION OF PLANTS.

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**I**N addition to using the natural means of reproduction of plants by seeds, bulbs, etc., man has developed several artificial ways, of which the principal are cuttings, layering, grafting and budding.

A cutting is a detached portion of a plant inserted in soil or in water for the purpose of producing a new plant. This method of propagation is considered most important. The most common form of hardwood cuttings consists of a straight portion of a shoot or cane nearly uniform in size throughout and containing two or more buds. At the lower end it is usually cut off just below a bud, because roots develop most readily from the joints. At the top it is usually cut off some distance above the highest bud. A heel cutting consists of the lower portion of a branch, containing two or more buds, cut off in such a manner as to carry with it a small portion of that branch forming the so called "heel." A mallet cutting is produced by severing the parent branch above and below a shoot, so as to leave a section of it on the base of the cutting. The principal advantage



Photo by Long Island agricultural experiment station.

DWARF BARNITZ PEAR GROWN ON QUINCE STOCK.

In the use of heel and mallet cuttings lies in the greater certainty of developing roots. The principal drawback is that only one cutting can be made from each lateral branch.

When it is desired to make the largest number of cuttings from a limited supply of stock, cuttings are made containing but one bud each. Such cuttings are commonly started under glass with bottom heat either in greenhouse or hotbed.

Cuttings are usually made with two or more buds. The cuttings are made while the wood is dormant during the fall or early winter. As fast as made they are tied in bundles of twenty-five or fifty (butts all one way) and buried bottom end up in a trench and covered to a depth of two or three inches with sand or mellow soil. Cuttings may also be kept over winter in a cool cellar buried in sand, sawdust or moss.

The following spring cuttings are set about three inches apart in a trench with only the topmost bud or buds above the surface. The soil is then replaced in the trench and thoroughly packed. In planting, the cuttings should be exposed to light and air as little as possible. After being planted the cutting should develop roots and put forth leaves, and by the next fall or spring it should be ready to put out.

Herbaceous or soft wood cuttings are exemplified in the "calips" used to increase the numbers of house plants. This method of propagation can be employed in the winter time under glass. Herbaceous cuttings may be made from the leaf or stem.

Leaf cuttings are commonly employed in multiplying plants having thick, fleshy leaves containing a large quantity of plant food either in the body of the leaf or its larger ribs. As a general rule, in preparing slips the leaf area should be reduced to a minimum in order to lessen evaporation.

Usually an inch of broken stone or coarse gravel overlaid with one and one-half to three inches of sand will be found ample for all soft wood cuttings.

Short cuttings of the roots may be used in the propagation of many plants, especially those which show a natural tendency to sucker.

A layer is a branch so placed in contact with the earth as to induce it to throw out roots and shoots. Layering frequently proves a satisfactory method with woody plants which do not readily take root from cuttings.

All the common pomeaceous fruits, the stone fruits and the citrus fruits

are now multiplied by grafting or budding. A scion is a portion cut from a plant to be inserted upon another (or the same) plant, with the intention that it shall grow. Except for herbaceous grafting the wood for scions should be taken while in a dormant or resting condition. The time usually considered best is after the leaves have fallen, but before severe freezing begins. The scions are tied in bunches and buried in moist sand, where they will not freeze and yet will be kept cold enough to prevent growth. Good results often follow cutting scions in the spring just before or at the time the grafting is to be done. If cleft grafting is the style to be employed this practice frequently gives good results, but spring cutting of scions for whip grafting is not desirable.

The stock is the plant or part of a plant upon which or into which the bud or scion is inserted. For best results in grafting it is essential that the stock be in an active condition.

Cleft grafting is particularly adapted to large trees when for any reason it becomes necessary to change the variety. Branches too large to be worked by other methods can be cleft grafted. A branch one or one and one-half inches in diameter is severed with a saw. Care should be taken that the bark be not loosened from any portion of the stub. Split the exposed end with a broad thin chisel or grafting tool. Then with a wedge or the wedge shaped prong at the end of the grafting tool spread the cleft so that the scions may be inserted.

The scion should consist of a portion of the previous season's growth and should be long enough to have two or three buds. The lower end of the scion which is to be inserted into the cleft should be cut into the shape of a wedge, having the outer edge thicker than the other. In general it is a good plan to cut the scion so that the lowest bud will come just at the top of this wedge, so that it will be near the top of the stock. To make this contact of the growing portions doubly certain the scion is often set at a slight angle with the stock into which it is inserted.

After the scions have been set the operation of cleft grafting is completed by covering all cut surfaces with a layer of grafting wax.

Whip grafting is almost universally used in root grafting. It has the advantage of being well adapted to small plants only one or two years of age, and it can be done indoors during the comparative leisure of winter.

The graft is made by cutting the stock off diagonally—one long smooth cut with a sharp knife, leaving about three-fourths of an inch of cut surface. Place the knife about one-third of the distance from the end of the cut surface at right angles to the cut and split the stock in the direction of its long axis. Cut the lower end of the scion in like manner, and when the two parts are forced together the cut surfaces will fit neatly together, and one will nearly cover the other if scion and stock are of the same size. A difference may be disregarded unless it be too great. After the scion and stock have been locked together they should be wrapped with five or six turns of waxed cotton to hold the parts firmly together. It is in root grafting that the whip graft finds its distinctive field.

The roots are dug and the scions are cut in the fall and stored. The work of grafting may be done during the winter months. When the operation has been performed the grafts are packed away in moss, sawdust or sand in a cool cellar to remain until spring.

In ordinary propagation by means of whip grafts the scion is cut with about three buds, and the stock is nearly as long as the scion. The graft is so planned as to bring the union of stock and scion not very far below the surface of the ground. But where the trees are required to be especially hardy in order to stand severe winters and the roots used are not known to be so hardy as the plants from which the scions have been cut a different plan is adopted. The scions are cut much longer, and the roots may be cut shorter, and the graft is planted so deep as to cause roots to issue from the lower end of the scion. When taken up to be set in the orchard the original root may be removed entirely.

Budding is one of the most economical forms of artificial reproduction, and each year witnesses its more general use.

The operation of budding is simple and can be done with great speed by expert budders. The work has usually to be done in July, August or early September. The bud should be taken from wood of the present season's growth. Since the work of budding is done during the season of active growth the bud sticks are prepared so that the petiole or stem of each leaf is left attached to serve as a handle to aid in pushing the bud home when inserted beneath the bark of the stock. This is what is usually called a shield bud and is cut so that a small portion of the woody tissue of the branch is removed with the bud.

The stock for budding should be at least as thick as the ordinary lead pencil. The height at which buds are inserted varies; the nearer the ground the better. When the bud is made a ligature is then tightly drawn about, above and below the bud to hold it in place until a union shall be formed. Bands of raffia about eight or ten inches long make a most convenient tying material. As soon as the buds have united with the stock the ligature should be cut in order to prevent girdling the stock. This done, the operation is complete until the following spring, when all the trees in which the buds have "taken" should have the top cut off just above the bud.

The one objection to budding is that it causes an unsightly crook in the body of the tree unless the tree is planted deep in the orchard.



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### GREEN RUNS FOR SUCCESS.

Certain professional poultry philosophers are preaching that poultry does as well on a bare yard as on a clean, green sod run.

If their theory is not they at least add proof to the belief that the fowls aren't all dead yet.

There must be vegetable growth to take up the poison of fowl droppings, or the sick ground becomes a breeder of tuberculosis and cholera germs and incubator of tape, round and gape worms.

When greens are fed by hand they are not always before the fowl, may



Photo by C. M. Barnitz. ON GREEN VELVET SOD.

not be what it needs nor be there when it needs them nor in the shape to render them so digestible as when a fowl can pull them at pleasure, not speaking of the expense and bother of furnishing them in the unnatural way.

Growing greens attract worms and bugs, which make the fowls exercise and are necessary to their health, and this animal protein is much superior to even cut bone and to beef scrap and blood meal. The latter two products are often only dead rot, fit only for fertilizer.

But why argue with hot air high brow?

Cast not thy pearls before swine. Nature's habitat for fowls is the green sward, with the green tree to afford shade and shelter from sun and storm and the crystal spring and natural and vegetable life for food and refreshment.



Photo by C. M. Barnitz.

### A TUBERCULOUS SMELTER.

ment, and the fancier who sticks close to nature has the fowls of vim and vigor and wins the long green.

Geese, ducks, chickens, turn grass into greenbacks. Grass saves grain, and the wise poultryman provides plenty of land, so that the ground is never eaten bare and thus a menace.

Our pictures tell the story. The first shows one of our yards.

Our flocks are known for vigor, egg capacity, and we are compelled to go elsewhere for subjects for post mortems there is so little disease.

The second shows a neighbor's bare yard. On this polluted yard he lost 58 of 108 chickens from tuberculosis and has quit chickens for keeps.

### DON'TS.

Don't sit down and cry over a failure. Hens don't cry when eggs don't hatch. They cackle and lay some more and try, try again. Go thou and do likewise.

Don't be a pessimist. When it's cloudy, crow like a rooster; when others knock, be a bully booster.

Don't work without system, but beware of these get-rich-quick poultry systems.

Don't let envy make life's cup bitter. Let not malice poison the chalice. If you would have life one sweet song, then help your fellow man along.

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