

HOME COURSE IN SCIENTIFIC AGRICULTURE

FIFTEENTH ARTICLE. THE PROPAGATION OF PLANTS.

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IN 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 BARTLETT 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 greenhouses or hotbeds.

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 "slips" 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 staple 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 pomegranate 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 scion 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 begun 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 planted 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 inserting it 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.

IT HAD TO HAPPEN

By H. C. TILLMAN.

"Oh! I wish we never had thought of having that old picture taken."

Maud Clark was in real distress as she said this and threw herself down on the comfortable old sofa and finished the cry which she had begun when she had sent Jack the note. She was very miserable and very proud.

"The mean, hateful thing. Just as though he could make me do anything."

There was no doubt that she was very mad—or pretended to be. She arose and walked over to her window. The lights and the ever-passing crowd would at least attract her mind from the hateful picture and the more hateful things that it had brought.

"There are plenty of men," she mused in a half-conscious way, as she turned and walked back to the sofa. Just then her eye chanced to fall on the picture of Jack that had hung in the place of extreme prominence over her mantle for over two years. He was so good looking and had such an elegant expression that anyone would have liked him. She was sure of that. Their love had been a rather peculiar one. He was very poor and she was very rich and pride had them waiting for him to make a little money before they married. Her parents had never objected in the least and in fact they were in favor of the match. Until three days ago they had been getting along so smoothly, and just as they had about determined not to wait any longer the crash came, and all about a little picture. How she hated that picture. After satisfying herself that she had done the right thing, she bundled up all of his notes and the picture over the mantle and addressed them to Jack Croyleston—being careful in the little note she inclosed to be as sarcastic as she could. Then she began crying again.

Jack Croyleston was sitting in his office when the messenger boy handed him a note. He sat for a moment when he read it and then began pacing the floor. George Coles found him still pacing up and down, half an hour later.

"Hello, what's the trouble, Jack? Clients not coming fast enough to suit you?"

"No—worse than that. Read that," as he shoved the note across the table to George.

"Well, of all the fools. Don't you know you can't boss a woman. At least not until you marry her."

"Yes, I know it now."

Wiley was very busy the next morning when there was a knock on the door and Maud Clark walked in.

"Mr. Wiley," she began, and Wiley might have expected a proposal from the bluish which accompanied it, "have you the negative you took of Mr.—Croyleston and me the other day?"

"Yes, Miss Clark, I think it is here."

"Could I get it, please. I want to break it."

"I'll have it for you in a minute," said the kind photographer.

A moment later there was another rap at the door and Jack Croyleston walked in.

"I beg pardon," he stammered.

"Certainly," was the cool reply.

Wiley was gone longer than Maud had expected. She was having a hard time trying to keep her eyes off of Jack. He was seated in the far end of the room and was pretending to be very deeply interested in his morning paper.

"Oh, I wish he would hurry up with it," Maud was finally forced to say.

"With what?" was Jack's response.

"The—er—nothing—the—nothing. I mean the negative."

"Is that what you came for, too?" Jack asked in a cool tone.

"Why—yes—I believe it was."

"So did I," Jack said as he looked her full in the eyes.

"What were you going to do with it?" she asked, letting her eyes drop.

"Break it—what else?"

"Oh, how could you, Jack—Mr. Croyleston."

"How could I what?"

"Why—break it." And Jack could stand it no longer.

"Maud, let's not break it at all. I'm sorry."

"No, Jack, I was foolish." And Jack had crossed the room and she was in his arms. They heard Wiley coming and both were very much interested in some new photos when he entered.

"I am sorry I kept you waiting, Miss Clark. I had a hard time finding it, but here it is. You can break it if you want to, but I think it very pretty."

"Never mind the wait," Maud started, but Jack interrupted her.

"You can fix me up two dozen—and have you a proof?"

Wiley looked a bit puzzled and handed him a proof.

"I want to show this to your parents," he said to Maud as they closed the door. "Wiley is a clever man. Two dozen? Why, we will send that many to George and the others after we are married."

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Left a Clue.
Sunday School Teacher—"Now, Kate, how did God know that Adam and Eve had eaten the apple from the tree of knowledge?" Small Kate—"I guess he found the peelings in the orchard."

Sunday the Day of Rest.
Sunday is the common people's great liberty day, and they are bound to see to it that work does not come into it.—Beecher.

Mule Starting.
Ancient methods for inducing momentum were as varied as they were usually ineffective—watering the mule to change his mood, putting a carrot on a pole just beyond his reach, causing him to sneeze with pepper, twisting his tail (the latter voltage of his heels), building a fire under him. A modern method is to borrow an automobile, 60 horsepower, hitch a chain to the balky mules with their load and yank them up the street in a reluctant but lively canter.—Jackson News.

He Being the Man.
Ethel—"Kitty hasn't a thought for anything nowadays except her new car. She's perfectly in love with it." Jack (sadly)—"Another case of man being displaced by machinery."

Nothing New About This.
"I consider that whatever belongs to my husband belongs to me."—A woman witness in a Jersey City trial. The general feminine view and in practice the usual condition.

Must Learn in Hard School.
No man can learn patience except by going out into the hurly-burly world, and taking life as it blows.—Henry Ward Beecher.

Cocoon Butter Industry.
Marseilles annually exports about \$10,000,000 worth of cocoon butter, the business having been developed since 1897. Most of it goes to England, Holland and Scandinavia.

One Opportunity.
The society for the prevention of useless noises might make a start by reducing the number of cheers from three to one.—Athol Globe.

Choice of Words.
"What is that man's occupation?" "Well," replied Senator Sorghum, "it depends on your point of view whether you say he is conducting a campaign of education or is just a plain lobbyist."

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