

The Agricultural Experiment Station  
OF THE  
Colorado Agricultural College

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**Top-Working Fruit Trees**

BY

O. B. WHIPPLE

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# The Agricultural Experiment Station

FORT COLLINS, COLORADO

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# Top-Working Fruit Trees.

O. B. WHIPPLE

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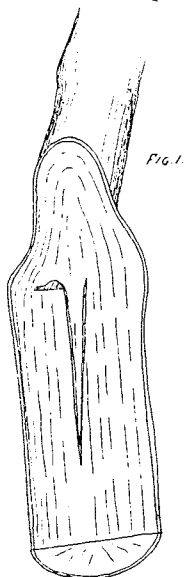
It is becoming more and more apparent that certain localities and soils are peculiarly adapted to growing particular kinds and even varieties of fruit. Commercial fruit-growing localities are making their reputation by being able to grow a few varieties well. So each new fruit country must go through an experimental stage when a host of varieties is being tested to determine those best adapted to its peculiar conditions. Then in the growth of each new fruit country there comes a time when the grower will have to solve the problem as to what to do with the undesirable varieties. Shall he pull them out or graft them over to better varieties? Systems of grafting-over old trees have long been practiced and experience has proven that, if properly done, top-working brings quicker returns than the replanting of young trees. It is not uncommon to see a fairly good crop on the three-year-old top of a top-worked tree. Trees properly worked-over give tops as desirable and sometimes more so than trees of the same variety grown from first-class nursery stock.

Top-working as a means of establishing a weak-growing variety on a stronger root system than its own is now coming into favor. The Rome (Beauty) when on its own roots is, on the best soil, an indifferent grower; but, when worked on some strong-growing stump, it makes a very satisfactory tree. Some varieties of apple, susceptible to attacks of root rots, could, no doubt, be successfully grown on roots of varieties which are apparently resistant. The Northern Spy seems to be a striking example of an apple tree root free from the attacks of woolly aphid and is sometimes planted and later worked over to other varieties. Broken and diseased limbs may be saved by grafting, and progressive fruit growers who desire to test new varieties can best do it by grafting a few cions into bearing trees.

Some years ago the fruit grower looked upon the practice of grafting as a mysterious art and upon the man who went about doing the work as a sort of a wizard; as a matter of fact, it is so simple that any careful orchardist can and should do it himself. All of our common fruit trees can be easily grafted or budded. The apple and pear may be intergrafted upon each other and the same may be said of the peach, plum, apricot and almond. But in practice, we do not carry on such wholesale mixing, it may be said that the apple and pear never make a good union. While such combinations may unite, the union may not be perfect enough to make a good top. We would not expect the top-working of apple to pear or vice versa to be a success. The writer has seen peach grafts start very vigorously upon apricot, and plums upon peach trees. I have observed

plum trees top-worked to peach with perfect unions and the ten-year-old tops bearing excellent crops of fruit. In this case, the combination seemed to result in a dwarfing of the peach top, though the growth is by no means stunted. So in practice, we stick largely to the intergrafting of different varieties of the same kind of fruit.

To understand the principles underlying graftage, the orchardist should know how the stems of our fruit trees grow. He should understand that growth in diameter only takes place in a very small region between the bark and sap-wood. This part of the stem is called the cambium. In this thin layer of tissue the cells are still active and capable of diversion while the activity of each succeeding layer, on either side, grows less and less.



When the limb is split to insert a cion the cleft does not grow together along its entire length, as some may think. The cells in the cambium layer may produce a growth that may, to a certain extent, fill up the cleft and cover over the stub but the tissues of the stock and cion only make a true union where the cells of the cambium layers of the two come in contact. Fig. 1 is a pen drawing of a section through a stub grafted two years before. The stub was kerf-grafted and shows that no union has taken place between the woody tissues of the stock and cion.

The important point in grafting is to see that the cambium layers of the stock and cion are matched at some point.

When growth is active we say the bark "peels." Budding is done during this period, not only because the ease with which the bark separates from the wood simplifies the work of inserting the bud, but as growth is more active, the tissues of the bud and the stock are more likely to unite.

#### TOP-WORKING OLD TREES

In the working over of old trees it is well to bear in mind that trees which show a poor growth in the orchard are seldom worth the time it takes to graft them. This is very often true in the case of some varieties of apple. For instance, I have never yet seen a yellow Transparent stock grow a top worth the space it occupied. The same is almost invariably true of tops on Wagner, Duchess, Missouri (Pippin), Wealthy and Hyslop crab. In fact, it seldom pays to top-work any crab. Figs. 2, 3 and 4 are from a series of photographs of a Transcendent crab apple tree, the first showing some grafts one year old and some just set; the second figure, the same tree one year later (quite a promising tree); and the third figure the result at the end of the third season, almost the entire top blown off by a heavy wind. The grafts were Winesap and were set in a kerf, not a cleft. As a rule the weaker growing varieties are very unsatisfactory stocks upon which to work other kinds.

Then the wisdom of top-working stone fruits would almost seem questionable. While good tops may be grown on either peach, plum, apricot or almond, it is doubtful whether these tops will bear much

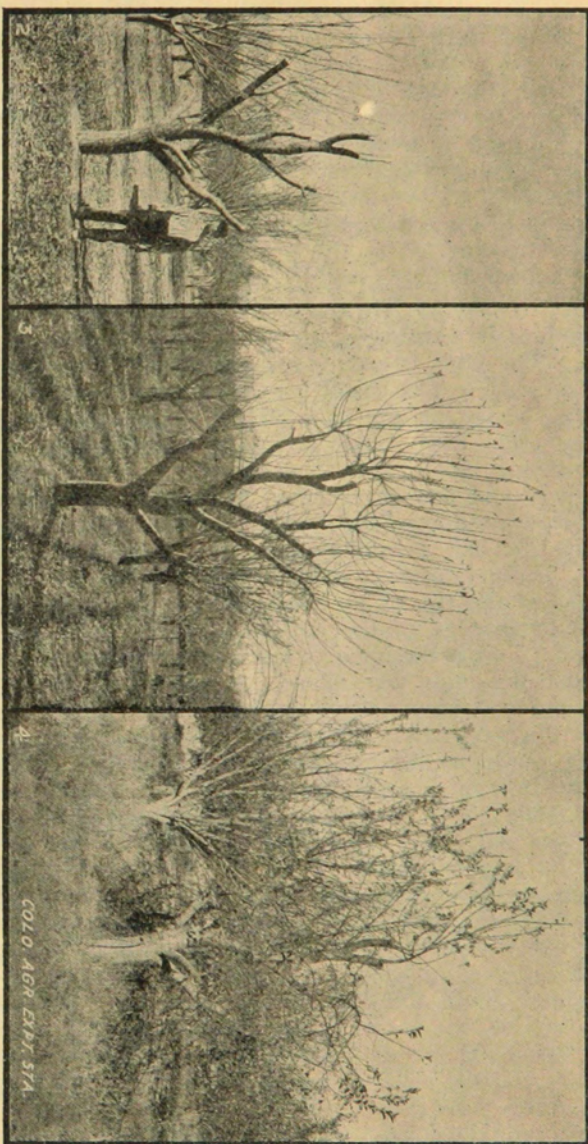


Fig. 2. An attempt at working over an old Transcendent Crab Tree, showing about as good a selection of stubs as is possible with such a subject.

Fig. 3. The same Tree one year later, with quite a promising top, but the enlargements at the base of the unions show that the union is not perfect.

Fig. 4. As the top grows heavier the unions are not strong enough to hold it and this is too often the result by the third or fourth season.

quicker returns than young trees set in the place of the old ones. Still we would not care to discourage a practice most successfully

followed by some growers, but will say that only strong-growing young trees under the most favorable conditions are worthy of such an attempt at renewal.

#### METHODS OF GRAFTAGE

Various methods of graftage may be employed in changing over the top of the old trees. Some method of cion-grafting is generally used, although it is not uncommon, in stone fruits especially, to bud into new growths. Of the methods of cion-grafting two are commonly used in the West; cleft-grafting and kerf-grafting. Those who have practiced grafting in the East as well as in the West, claim that the wood of Western fruit trees is much more brittle and that on account of excessive splitting, cleft-grafting is more difficult in the West. This has led to the introduction of a new system which is locally known as kerf-grafting.

*Cleft-Grafting.* The operation of cleft-grafting is very simple. The limb to be grafted is sawed off squarely leaving a smooth solid stump. The stub is split down about two inches with a grafting-chisel or knife. The chisel is removed and the cleft is wedged open with the wedge on the back of the knife or one provided for the purpose. The cion should be cut to contain three buds and should be of strong, well-matured wood of the previous season's growth. The lower end is then trimmed to a wedge leaving the first bud a little below the top of the wedge, and cutting the edge of the wedge opposite the bud a little thinner than the other. The cion is then driven firmly into place with the lower bud to the outside and a little below the top of the cleft, being sure to bring the inner bark on the outer edge of the wedge in contact with the inner bark on the stub. This is the important step in grafting, as it is between these parts that the union takes place. Sometimes the inexperienced grafter makes the mistake of setting the cion flush with the outer edge of the stock. On large stubs with thick bark it would be almost impossible to set a cion more illy matched than in this way. Some advocate setting the cion on a slant, the point of the wedge toward the center of the stub. This insures a contact of the cambium layers where they cross and is a good suggestion, since a point of contact is sufficient for a good union. With a cion properly set in each edge of the cleft—providing the stub is large enough—the wedge is removed. This allows the cleft to tighten on the cions, the greater thickness of the outer edge of the wedge-shaped portion of the cions insuring greater pressure at this point. With the removal of the wedge the cleft should hold the cions firmly in place. Wax should now be applied to all cut surfaces, even to the tips of the cions. Special pains should be taken to see that the stub is well covered between the cions and the cleft waxed as far as it extends down on the sides of the stub. This prevents drying out and it is quite important that it be thoroughly done.

*Kerf-Grafting.* This system of grafting differs little from inlaying. The stub is prepared as for cleft-grafting, but instead of splitting, saw cuts are made on opposite edges of the stub and trimmed

to thin V-shaped grooves with a saddler's knife. The cion is then trimmed to fit, driven firmly into place and waxed as in cleft-grafting. With a little practice the cions may be set as firmly as in cleft-grafting. It is claimed that this method has the advantage in speed and that the cions are not as easily blown out in early summer. Cions are lost by both methods and if properly performed, one is probably as good as the other. It does have the advantage in that more cions may be set in large stubs and thus hasten the process of healing. The same care must be used in setting the cion to insure a union. The latter system seems especially adapted to working with stone fruits where splitting is even more noticeable than in the apple and pear. Sharp tools which give a smooth cut surface are essential in all grafting work.

*Bark-Grafting.* Some advocate another method of grafting known as bark-grafting. In this case, the stub is cut as before, the cion is cut with a long bevel on one side and slipped between the bark and sapwood. It is generally necessary to slit the bark at the point of insertion and very often the bark is removed from the base of the cion up to the top of the sloping cut. The stub is bound with waxed string or other material, to hold the cions firmly and it is then waxed as in the cleft-grafted stub. The system really has no advantages over the others, unless when compared with cleft-grafting in working large stubs.

*Terminal-Grafting.* Another style of grafting sometimes employed is that known as terminal-grafting. This work is generally done in the latter part of June or just as soon as new growth that has matured enough to show a terminal bud may be secured. On old trees, such wood may be found in June. A twig that has completed its growth may be picked out by the presence of a well-formed terminal bud at the tip and full grown, or practically full-grown terminal leaves. The cions are cut three or four inches long and the leaves practically all trimmed off. There are different ways of inserting the cion. The most common method is to cut a vertical slit in the bark of the stock, trim the lower end of the cion with a long sloping cut on one side, and then slip it under the bark at an angle of about 45 degrees with the slit. The cut surface of the cion should rest upon the wood of the stock. It is not necessary to wrap or even wax the wound.

The cions start into growth the same season but the top of the stock is left until the following spring. The method seems to work well. It may prove a practical way of supplying lower limbs on young trees headed too high. When one neglects to remove the top when such grafting is done in the lower part of old trees, these cions readily form fruiting wood, generally bearing the third season. It is a suggestion that it would be the proper course to take as a means of getting specimens of new varieties in the shortest length of time.

#### CHOOSING THE STUBS

There is much to be gained by the proper selection of stubs into which cions are to be set. A too common practice is to remove the whole top the first year and graft all the stubs. It is surprising

that some good results come from such a practice. More often, however, this proves too much for the tree and it fails even after the grafts have made a good start. They may linger two or three years and then die from no other cause than the severe cutting back, though the growers are prone to attribute it to some other affliction. The cutting away of the greater part of the top seems to give good results and may even be advisable in top-working stone fruits. The pear will stand much more abuse in this respect than the apple. A far better plan in all cases, is to cut away only enough limbs to set cions for a good top. This will generally be about half of the tree, as six stubs will, in most cases, provide for a good top. The working of more stubs results in too dense a top or necessitates their removal later. The remaining limbs may be shortened but some foliage is needed to protect the stubs and trunk from sun-scald as well as to supply nourishment. If the stubs are well chosen the remaining limbs will do much to protect the young grafts from wind and especially from being brushed out by passing teams and orchard machinery. It is well to choose inside limbs for grafting as they are best protected, but care must be taken not to contract the head of the tree too much. It should be borne in mind that top-worked trees tend to grow upright, but it is a difficulty which may be largely overcome by judicious pruning.

After the cions have made one year's growth much of the remaining top may be removed, but it should seldom all be removed from old trees before the second year. If some stubs have met with accidents or have failed to start the cions, or if the shape of the tree or a scarcity of scaffold limbs has prevented a full top being placed the first spring, it may be completed the second.



Fig. 5. Showing proper selection of stubs.

While we sometimes see grafts doing nicely in stubs six inches in diameter, it is very doubtful whether such grafts will make a strong union or a long-lived tree. The wisdom of working limbs over three inches in diameter is to be doubted. In the choosing of stubs the grafter should remember that large wounds properly made, heal more readily than large stubs. Choose the smaller limbs for grafting even though the later removal of the top may necessitate the cutting of larger limbs lower down. It is better to raise the head of the tree than to work large stubs. Fig. 5 showing a two-year-old top on a pear tree will illustrate this point; notice the large wounds below the grafted stubs.



## SEASON FOR GRAFTING

The ideal time for grafting is just as the buds are beginning to swell. While cions may be set earlier, there is danger of their drying out before a union is established. Should one care to prolong the season, it is better to run late than to begin early. The opening of the season will vary from the first of March to the first of April or even later in some parts of the state, and may be extended until the first leaves are practically full grown. Good results cannot be expected from cions set later than this. Some go through the orchard in winter and remove the tops of the stubs that are to be grafted, cutting them at least a foot above where the cions are to be placed. This saves some time, and by hauling the brush out before the grafts are set it saves some of them from being knocked out by careless men in removing it later. When ready to graft, the stub is recut from a foot to eight inches lower.

## PROTECTING THE BODY

Since the removal of any considerable part of the top often exposes the body of the tree to the direct rays of the sun, it is well to whitewash the trunk and main branches. The whitewash reflects the rays of the sun and by such an application many cases of sun scald may be avoided. A good whitewash may be prepared by using one pound of good quicklime to each gallon of water. The addition of a pound of salt to each three gallons of the wash tends to make it stick better. This can best be applied with a spray pump. A good coating can only be secured with two applications, the second to follow as soon as the first is dry.

## CION-WOOD

In this connection it is well to say a word about the selection of cion-wood for grafting. The man who is interested in his bearing orchard has early learned that the individual trees in the plantation show a great variation, especially in productiveness, and very often in the size, color and quality of the fruit. Some of this variation may be accounted for in various ways, but after all, we are coming to believe that, environmental conditions being equal, no two trees are alike in bearing habits. It is a natural variation. There are trees that never bear well and cions from such trees will, no doubt, produce trees very much like them. In the selection of grafting wood it is well to bear this in mind. Mark your favorite trees and select cion-wood from them.

The wood used should be one year old, strong and well matured, but not overgrown. The terminal shoots from trees that have made a growth of from twelve to eighteen inches make excellent cions. The question is often asked as to the use of watersprouts. The term watersprouts may mean different things to different people. By watersprouts we generally mean rank growth from adventitious buds; and such growths with immature tips, weak buds far apart, and pithy centers make very poor cion-wood. Otherwise, any new wood with well developed buds, comparatively close together, may be used

for cions. The statement sometimes made that watersprouts never produce fruit is erroneous.

Cion-wood should be gathered in the fall, preferably as soon as the leaves have fallen, and stored until spring. The object is not to avoid winter injury, as some think, but to keep the cions in a dormant condition. Few realize that buds complete the resting period early in the winter and may, under favorable conditions, begin to swell before the first of January. While the unobserving man may say there is no difference in the buds of the young growth in early December and in February there may be quite a marked difference in some climates. Our open winters in the Middle West are especially liable to start early growth. The object of keeping the cions dormant is to allow time for a partial union before the buds are started into growth by the warm days of the grafting season. Cions with buds well swollen often throw leaf surface before a sufficiently strong union has been made to support them. The result is the exhaustion of the stored-up food supply and moisture of the cion to a point which may cause its death.

The cions may be stored in sand in a cool corner of the cellar or buried out of doors. The main object is to keep them cool and moist and away from fluctuating temperatures. An excellent plan is to bury them on the north side of a building or in some spot shaded most of the day. They need not be buried deep, from twelve to eighteen inches being sufficient in a well shaded spot.

#### GROWING THE TOP

It would hardly seem wise to leave the subject of top-working old trees without some comment on future treatment of the grafts. The setting of the cions is only the first step in working over the tree. Should we stop here, a most miserable failure or, at least, a poor top would be the result. Many a good catch is ruined by neglecting the pruning the first two seasons. During the first season the grafts should make a very rank growth and they will require some pinching back to save them from becoming top-heavy and consequently easily blown out. The common practice is to head-in the rapidly growing shoots when they have attained a length of from eighteen inches to two feet. This forces branches from below and if growth becomes too heavy these may need cutting back before the season is over. This pruning insures stockiness of the new growth and throws much of the energies of the top into a good union. The growth of suckers or watersprouts from the stock should not be allowed to any great extent. Should the stubs be exposed to the direct rays of the sun it is well to leave some of this growth, pinching it back to cause it to form a dense shade. Unless needed for protection it is well to rub the sprouts off as fast as they appear.

The following spring the system of pruning should resemble very much that of pruning young trees. The growth of the grafts should be cut back to usually not over eighteen inches in length. They may be cut even shorter if the growth has not been satisfactory. If all three buds have started from a cion, it is well to remove all but one to avoid crowding. As a rule the growth from the lower

bud will be the strongest and should be retained. Should the formation of the top allow it, a second growth may be left. If the grafts have been set in near the head of the trees they will require some pruning in reference to spreading the top. The general tendency is for the top-worked tree to grow too compact. Cut the grafts back to one of the strong outside branches started by the first pinching back and it will give them a start in the right direction. What shall we do where two cions start in the same stub? Should the stub be less than three inches in diameter one should be removed at this time. Keep the stronger, or if there should be little difference, the one best situated to help make a good top. Cut the other off close, even to removing a small corner of the stump on that side, the wound will heal better. Should the stub be over three inches in diameter there is some argument in favor of leaving the extra graft another year. It will help callous over the stub, and may be removed the following spring leaving a comparatively small wound. If left longer, or until the two grow together, the result is a bad crotch and sometimes a pressure which may actually split the stub.

Subsequent pruning will consist in such cutting back as will help form a stocky and well shaped top. They will demand the same attention as young trees. Spread the top by pruning to outside buds or branches and do not pay too much attention to the small wood. Some of the small branches may require cutting out or clipping back, but remember, in it we have the start for early fruiting wood.

#### TOP-WORKING YOUNG TREES

There is a growing conviction among the fruit growers that better results may come from planting vigorous young trees of some strong, growing kind to be later worked over to the desired variety. In the opening remarks on this subject, mention was made of the desirability of working weak growing kind on stronger root-systems, as well as top-working as a means of lessening loss from attacks of root rots and woolly aphis. The embarrassment of growing the orchard to a bearing age only to find some of the trees not true to name may be avoided by this plan of starting the young orchard. Then every fruit grower has observed that few trees of the same variety are alike in bearing habit and character of fruit. No doubt, many growers have some particular tree in their bearing orchard which is better than all others, that is nearer their ideal. By choosing grafting wood from this tree, a young orchard may be grown as near like it as is possible. There are productive and unproductive trees in every orchard and the careful selection of cions from productive trees will avail much as means of building up a fruitful orchard.

In top-working young trees it is a common practice to set the trees where they are to grow and after the scaffold limbs are well formed, to graft or bud into these the future top. Some Eastern men have advocated purchasing two-year-old trees in the fall (trees in which the head is already formed) to be grafted over indoors in December. In the West, and especially on a large scale, this system

would hardly seem practical. The method of grafting in this case is whip-grafting.

#### GRAFTING

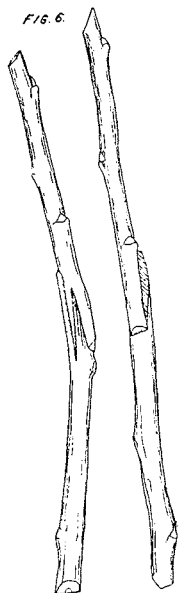
In grafting young trees in the field it is probably well to do it as early in the life of a tree as possible. As soon as a good strong framework can be secured the tree is ready for top-working. The small size of the stubs make cleft-grafting difficult and kerf-grafting almost out of the question. Some growers, however, report good success in cleft-grafting young trees after two year's growth from a yearling whip. In this case the stubs must be bound with waxed cloth or other material to hold the cion firmly, and then waxed as in cleft-grafting larger stubs.

Another style of grafting, known as whip-grafting, is well adapted to working these small stubs of young trees. The process is well illustrated in Fig. 6. With this style of grafting it may be possible to set the cions after one year's growth in the field, but it is doubtful whether much time will be gained by such practice. The cion should be as near the size of the stub as possible, if anything, a little smaller. The cambium of the stock and cion is matched only on one side, paying no attention to the other. The joint should be well wrapped with waxed cloth and to be doubly sure all air is excluded, may be painted over with a warm wax.

In grafting young trees it is a common practice to remove all of the top, placing cions in those arms one wishes to keep. It is always well to work a few extra stubs as accidents may befall some of the cions. The season for top-grafting the young trees is the same as for old trees. While top-working the old trees tends to hasten the bearing of the cions, it is doubtful whether top-working young trees induces earlier fruitfulness.

#### BUDDING

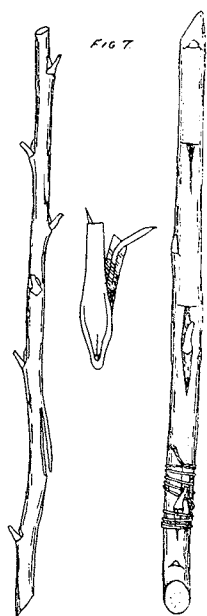
This is no doubt the simpler method of putting a new top on young trees. While the process of budding is a little more delicate than that of grafting, the average man can, with a little practice, get very satisfactory results. Buds should be placed as soon as the top is well formed, setting one or two in each scaffold limb that is to be retained. The buds are generally set from six to twelve inches from the main stem, depending on the formation of the head. Trees two years old when set may generally be budded the following fall, and should yearling whips make a strong growth, the arms may be large enough to receive buds in September. Any stem as large as a lead-pencil may be budded quite easily. Arms in which buds fail to start may be grafted the following spring. Should arms fail to appear in the proper place it is quite possible to supply them by setting buds directly into the body of the young tree. When the



buds begin to push into new growth they will require about the same care as young grafts. They will need some pinching back to strengthen the stem and to overcome the tendency to become top-heavy. With the possible exception of young trees budded in late spring, all growth from the original stock should be removed as fast as it appears.

Buds may be set during the month of June or early July, or in August and September. For June budding the bud-sticks are cut as soon as well matured wood may be found. Good firm wood with well developed buds may generally be cut from bearing trees in the latter part of June. As soon as buds set in June or July unite with the stock, the bandage is cut and the part of the stock above the bud is removed. In spring-budding it is well to leave some of the new growth which springs from the arms below the bud. This takes the surplus sap and helps nourish the roots until the buds are well started. Wood from buds set in the spring may not mature well in our climate and is susceptible to winter injury during severe winters. With careful watering it is possible to mature the wood properly, but where practical, fall budding should be given the preference. In the case of peach trees, June budding is preferred where attacks of twig borers often destroy in early spring, buds set the previous fall. In the apple and pear it is probably more convenient to bud in the fall. Then, too, arms which are large enough to bud in early spring were large enough the previous September, so one really gains rather than loses time by budding in the fall.

In fall budding the buds are taken from the current year's growth. Buds may be inserted in wood of one, two or three years' growth. The stiffness of the bark of the other wood makes budding difficult.



The heavy bark not only makes the insertion of the bud difficult, but in drying out it curls away from the bud exposing it to the air. The simplest form of budding is that known as Shield-budding or T-budding. The position for the bud is chosen with reference to the prevailing wind, protection from the sun's rays, or to best form the top of the tree. The most important factor should determine where the bud should be placed. It is well to place the bud on the shady side of the stock, if possible. Should the locality be subject to strong prevailing winds, the bud should stand more wind if placed on the side of the stock toward the wind. A T-shaped incision is made in the bark and the corners of the bark below the transverse cut raised to facilitate starting the bud. The bud is then cut from the bud-stick by starting the knife half an inch below the bud, cutting under and to about the same distance above the bud. This gives a long bud which is especially desirable in our dry climate. In cutting under the bud, the knife should be run deep enough to leave a small shield of wood. Fig. 7 will show the various steps in the process of shield-

budding. A simpler method of lifting the bud, at least for the beginner, is to start the knife as before, and cut sharply into the wood to about one-third the diameter of the stick and then upward under the bud making a tongue about an inch long. The knife is then run across the tongue half an inch above the bud, cutting through and lifting the bark at this point. The bud is then grasped between the thumb and first finger and lifted, leaving the wood on the stick, as shown in the same figure. While the removal of the wood from under the bud is no particular advantage, the method is simpler and gives the inexperienced budder a larger per cent. of good buds. The writer has lifted thousands of buds in this manner with the best of success. It is difficult to cut buds in this way from some varieties of cherry and plum trees with thin bark, but it works well on the apple, pear, peach, apricot and the heavy-barked plum. The bud is then slipped into place as shown in the figure and well wrapped with raffia or soft wrapping twine. About four wraps below and three above, so spaced as to close the whole opening, is sufficient. In wrapping, the common practice is to start below, and by crossing over the first end and running the last end under, the bud is wrapped without a knot. The tying material is usually cut in the desired lengths beforehand, and if raffia is used, it should be kept moist, as it ties better.

If on healthy young wood, the buds will unite within ten days or two weeks. Then the wrapping should be cut by drawing a knife across it on the side of the stock opposite the bud. Should the stock be making a slow growth, there need be no hurry about cutting the tie. The only thing to be guarded against is that the wrap does not cut into the bark. This pressure interferes with the flow of sap, and tends to throw the bud into premature growth, this often means a loss of the September bud. The bud set in August and September should remain dormant over winter. The following spring, just as soon as the buds on the top of the stock begin to push out, the original top of the stock is cut away. Should the stock be cut off too early in the spring, or too close, there is danger of the stub drying out to the injury of the bud. Some recommend the practice of leaving a longer stub to which the young growing shoot from the bud may be tied until it is well established. This saves some buds from being blown out, but necessitates a second cutting in mid-summer to allow the stub to heal over.

We have said that buds for fall budding should be taken from the current year's growth. The common practice is to cut the terminal growth from bearing trees. The leaves are trimmed off at once, leaving a small part of the leaf-stalk to handle the bud by. Bud-sticks trimmed in this way may be stored in a cool, damp place and kept for some time without injury. The leaf-stalks, however, will loosen and drop off in many cases if stored over ten days. Of course, this does no harm, but some budders miss the little handle in inserting the bud. The first few buds at the base of the stick are generally poorly developed and should be discarded while those near the tip are too immature to be used. As a rule not over half of the new growth cut in early September will carry buds suitable for budding. The sticks should be carried in a damp cloth to avoid drying out.

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