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Rabbit and Mouse Control In the Orchard

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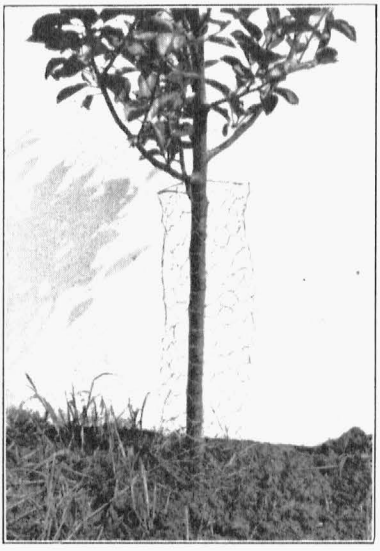

Fig. 1.—An apple tree two years after transplanting in the orchard showing one-inch mesh poultry wire used as a protector.

Fig. 2.—A two-year-old apple tree trunk wrapped with gunny sack strips 6 to 8 inches wide to prevent injury by rabbits.

Fruit trees of all kinds under Missouri conditions are subjected to more or less serious injury each year by rabbits and field mice during the winter. This injury is generally great enough to warrant the protection of all young fruit trees against danger for at least the first six or eight years after transplanting. Such injury to young fruit trees should therefore be anticipated and guarded against. In fact the protection of young fruit trees from rabbit and mouse injury every fall

should be given careful consideration and made a regular orchard practice, just as spraying is done to prevent injury by insect pests and diseases.

Rabbit injury generally occurs higher up on the tree trunks than that produced by field mice. The injury by rabbits usually ranges from a few inches to as much as 12 or 18 inches above ground, while that of field mice is generally found near the base of the tree trunks, on the trunks slightly below the ground, or on the large main roots of the trees just beneath the soil. Mouse damage is usually more severe and higher on the tree trunks during a hard winter with deep snow than during mild ones. The extent of the injury by both rabbits and field mice varies from slight scratches in the bark to complete girdling of the tree trunks. Serious rabbit injury, however, is more likely to occur on trees from one to four years of age. Field mice may girdle and kill both old and young trees if proper precautions are not adopted.

USE WRAPPERS AGAINST RABBITS

The only safe way to prevent rabbits from gnawing the bark of the trunks of young fruit trees is to wrap the base of the tree trunks from the ground to a height of about 18 to 20 inches or the space between the ground and the lowest branches. Where the branches are less than 18 inches above the soil the wrappers should include both trunk and branches to a height of about 18 or 20 inches. Various kinds of wrapping material may be used. Some of the most common are one-inch mesh poultry wire, galvanized window screen wire, galvanized wire netting having 3 or 4 meshes to the inch, old newspapers, gunny sacks torn in strips 6 to 8 inches wide and cornstalks. Wood-veneer wrappers, patented wire wrappers, tarred paper and building paper may be bought and used.

One-Inch Mesh Poultry Wire Wrappers.—The wire used ranges in height from 18 to 24 inches and is cut into strips from 12 to 20 inches wide. Experiments and observations at this Station extending over a series of years have shown that one-inch mesh poultry wire netting 18 inches high cut into strips 18 inches wide is usually best for the protection of fruit trees from rabbit injury in the average Missouri orchard. The wire wraps are bent into cylinders placed around the tree trunks and pushed into the ground an inch or two. The laps of wire are then fastened by pushing the cut ends through meshes near the edge of the opposite side and bending the protruding ends over, forming a loop or hook. Fastening thus at the top, middle, and bottom is usually sufficient to hold the wire cylinder firmly in place. The tree trunks are therefore enclosed in a cylinder-shaped protector, the rim of which is several inches distant from the tree trunk all the way around. When the pro-

tectors are so prepared and placed around the tree trunks they are wide enough to accommodate the trunks without doing injury by rubbing and peeling the bark. The only care required during the following eight or ten years is to observe the wire wrappers once or twice each year to see that they are properly in place and not pushed against the tree trunk, in which case the rabbits might be able to injure the trees through the wire meshes. The wire funnels may usually be made to stand away from the tree trunks without the use of stakes as spreaders, although stakes are sometimes employed. Rarely, however, will the one-inch mesh poultry wire wrappers require any material expense for maintaining. They should be removed in from eight to ten years to prevent girdling.

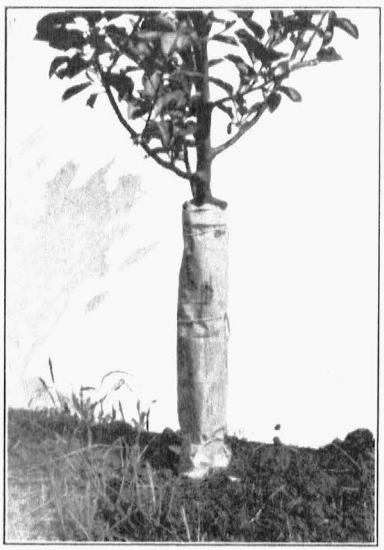

Fig. 3.—The trunk of a two-year-old apple tree wrapped with old newspapers to prevent injury by rabbits.

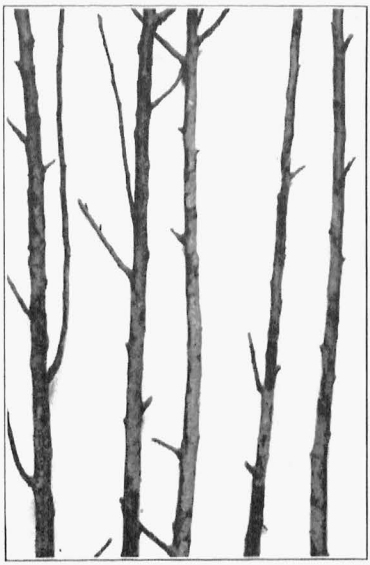

Fig. 4.—One-year-old apple trees so seriously injured by rabbits that it was necessary to cut the trees back to stubs three or four inches high in the spring as growth was starting.

Gunny Sacks as Wrappers.—Gunny sack wrappers are usually made by tearing gunny sacks into strips about 6 to 8 inches wide. To wrap the tree begin at the bottom allowing the wrap to fit close down against the soil and wind the strip around the trunk and upward to a height of 18 or 20 inches. One tie at the top with binder-twine is sufficient. A better wrap is usually obtained if considerable pressure is employed in the wrapping process, making the strips fit closely to the

tree trunk. There is no danger of field mice being able to make nests about the tree trunk from the gunny sack material if the strips are wrapped tightly and tied securely at the top.

Newspapers as Wrappers.—Old newspapers are frequently used as protectors against rabbits. The paper strips consisting of two or three thicknesses should be 18 to 20 inches high and about the same number of inches in width. Allow the paper to come down in close contact with the soil and wrap it snugly around the tree trunk, causing the paper to fold over and around the tree trunk in a smooth and closely fitting manner. Three ties with binder-twine, one at the top, one in the middle, and one at the bottom are sufficient to hold the paper wrap securely. Tarred paper and building paper are also sometimes used; but tarred paper should not be used as it may do injury to the tree trunks.

Wood Veneer Wrappers.—Wood-veneer wrappers are bent into a cylinder shape, placed around the tree trunks and pushed into the soil an inch or so as in the case of the poultry wire protector. As a rule, ties with binder twine or bailing wire at the top, in the middle and at the bottom are sufficient.

Corn Stalks as Wrappers.—Corn stalks cut into lengths about 18 or 20 inches long may be placed around the trunks of the trees in sufficient numbers to afford protection against rabbits. Two or three ties are made similar to that described for old newspaper. It is more difficult to perform the wrapping work in the case of corn stalks than with the other wrappers. Since newspapers wrap with less difficulty and can usually be obtained cheaply at print shops or offices, if not available at home, they are preferable to corn stalks.

COST OF WRAPPERS

One-Inch Mesh Poultry Wire.—The cost of wire wrappers consisting of one-inch poultry wire 18 inches high and 18 inches wide is approximately $2.25 per hundred wrappers. The labor cost for wrapping will average about 83 cents per hundred trees. The total cost for wrapping 100 trees, therefore, with one-inch mesh poultry wire 18 x 18 including labor and wire is about $3.08.

Gunny Sacks.—The original cost of gunny sacks to wrap 100 trees is about 97 cents and the labor cost for making the strips and wrapping is about 83 cents, making a total of about $1.80. The unwrapping in the spring will cost about 50 cents per hundred. The entire cost, therefore, when gunny sacks are used would, for the first year be about $2.30 per hundred trees. The gunny sack strips will last about 2 or 3 years if properly handled and stored when not in use. Since the cost of wrapping and unwrapping amounts to about $1.33 each year the grower would

spend, in three years, $4.96 for labor and wrappers which is $1.88 cents more than the cost of poultry wire wrappers including labor. The poultry wire wrappers also have the advantage in that they will last 8 or more years without additional cost for material or labor and they also furnish protection throughout the year. This is an important consideration, as trees are sometimes injured by rabbits during the summer or early fall.

Cost of Other Wrappers.—With the other types of wrappers such as newspapers and cornstalks the labor involved is all the cost that need be considered. As with the cost of gunny sack wrappers the labor expense per year, including wrapping in the fall and unwrapping in the spring will amount to approximately $1.33 per hundred trees.

Fig. 5.—A 12-year-old apple tree girdled by rabbits. Enough of the cambium, or growing layer near the wood, was left to make bridge grafting unnecessary. The wounds were painted with white lead and raw linseed oil and they were practically healed over during the following season with no apparent injury.

Wood veneer wrappers will usually cost more than one-inch poultry wire. The expense for the labor of wrapping in the fall and unwrapping in the spring will amount to approximately that given for corn stalks.

WHEN TO WRAP AND UNWRAP

The wrappers should be placed around the tree trunks about the time the leaves drop in the fall. All the wrappers except wire should be removed early in the spring as growth starts. Wrappers like newspapers, gunny sacks, cornstalks, building paper, wood veneer, etc. wrapped around the tree trunks may form a harbor for insects and diseases if

left on the trees during the spring and summer. The bark of the tree trunks when so inclosed will not develop normally. The permanent wire wrappers do not have these disadvantages and may remain around the tree trunks without attention except to see that they remain in place until the trees are six to eight years old. The permanency of wire wrappers and the saving of labor in wrapping and unwrapping each year makes them the cheapest in the long run. Protection to the tree trunks is also afforded all the year round. This is important because rabbits may do injury even in the summer time. Wire wrappers should be removed as soon as they begin to bind, otherwise they may girdle the trees and kill them. This will be especially true if the wrappers are neglected or forgotten.

REPELLENT WASHES NOT ALWAYS EFFECTIVE

Many repellent washes like blood from a hog or rabbit, whitewash, undiluted lime-sulphur solution, home-made and laundry soap suds, coal tar, gas tar, axle grease, paint, various oils, and other substances are often recommended as washes or paints for fruit trees to prevent injury by rabbits, field mice, and fruit tree borers. All of these materials may work well during mild winters and when the rabbits and mice are not very numerous or hungry. If snow has been on the ground, however, for a week or more and the rabbits or mice need food badly, serious injury may be done to the trees where washes of the above character have been applied.

INJURIOUS REPELLENTS

Investigations and observations carried on at the Missouri Experiment Station for many years have shown that such substances as paint, coal tar, gas tar, axle grease, concentrated oils and combinations of such materials may do serious injury to the tree trunks and even cause the trees to die. A great many factors may be involved in the amount or degree of injury which may be done to the trunks of fruit trees. Most of these substances very greatly in their chemical composition or makeup. The vigor of the trees may cause a difference, and the season of the year or time of application as well as the method of application and the quantity applied may explain the great variations in the severity of damage done to fruit trees. To be on the safe side, therefore, the grower should not use such substances, as there are others which may be used with as good results without danger of harm.

WASHES WHICH ARE NOT HARMFUL

If a repellent and poisonous wash is desired, use whitewash, soapsuds or dormant strength lime-sulphur and add lead arsenate at the rate

of about 2 pounds to 50 gallons. These washes may be applied with a sprayer which facilitates the work. Greater concentrations may be made and the repellent applied by means of an ordinary paint brush. There is no danger of these washes doing injury to the tree trunks, no matter when or how applied.

Government Whitewash.—A thick, heavy whitewash made according to the so-called Government formula has been employed with more or less success on fruit trees to prevent sun scald, attack by rabbits, field mice, and fruit tree borers. The ingredients and method of preparation are as follows:

Stone lime---½ bushel	Spanish whiting (plaster of Paris)----------½ pound
Salt----------1 peck	Glue----------1 pound
Ground rice--3 pounds	
Water-------5 gallons	

First slake the lime with warm water and then strain it through a fine sieve or strainer. Dissolve the salt in warm water, boil the rice flour to a thin paste, and dissolve the glue in boiling water. Mix the ingredients in the following order and stir well: Pour the salt solution into the lime, then the rice paste, and next stir in, boiling hot, the Spanish whiting and glue, and finally add 5 gallons of hot water. Stir thoroughly and let it stand for a few days. It should be applied hot with a brush.

PRUNED BRANCHES PREVENT RABBIT AND MOUSE INJURY

When the apple trees reach an age of from eight to ten years they are not likely to be seriously injured by rabbits. The same holds true with other fruit trees such as peaches, cherries and plums. To minimize the liability of injury, however, the grower should continue to keep the trees wrapped which may grow near fence rows, ravines or other quarters of the rabbit. For the parts of the bearing orchard located more distant from the haunts frequented by the common cotton-tail rabbits serious injury may often be prevented by commencing the regular pruning work shortly after the leaves begin to drop in the fall, leaving on the ground near the trees the branches removed. These furnish food for both rabbits and field mice and they may be fonder of the tender bark on the pruned branches and shoots than that on the tree trunks, which is thicker and tougher. As a result the rabbits and mice do little or no injury to trees eight or more years old when a sufficient supply of fresh pruned branches may be found on the ground near the bearing fruit trees. To prevent mouse injury it is also necessary to keep dead grass and weeds cleared away from the tree trunks during the fall and winter particularly.

ENCOURAGE HUNTERS

During the fall and early winter hunters may be encouraged to destroy the rabbits. They may often lessen the injury to a great extent. Where the work of hunters is very thorough, practically all of the rabbits may be destroyed although they are likely at any time to come into the orchard from distant woodland thickets and other places which furnish food and protection from their natural enemies. Hunters should, however, be warned to guard against starting fires in dead grass and weeds and injuring the trees with gun shot wounds.

DESTROY HARBORS

Rabbits may also be largely prevented from doing serious injury to fruit trees by burning or otherwise destroying near orchards, as completely as possible, harbors along fence rows, ravines, in wood lots and rank growing bunch grass on waste land. The destruction of such harbors may prevent depredation by rabbits and at the same time mean much to the fruit grower by enabling him to combat insects and diseases more effectively.

CONTROL OF FIELD MICE

Cultivate and Remove Rubbish From Near Tree Trunks.—Good cultivation of both young and old orchards, from early spring until about the middle of July or August first, will not only tend to prevent serious injury by field mice but will generally do much toward making the trees more vigorous and healthy and consequently more profitable. Trash, litter, and dead grass and weeds which may form a harbor for the meadow mouse should be kept away from the tree trunks. Sod orchards generally suffer worse from mouse injury because more mice are likely to be present and better nesting places are usually found near the tree trunks. Where cultivation cannot be practiced on account of soil washing or for other reasons, hoeing a strip a few feet wide around the tree trunks to keep the space cleared of weeds, litter and mulch will help materially in preventing injury.

Mound Soil Around the Tree Trunks.—After cleaning away dead grass and mulch material from the base of the tree trunks in the fall before freezing weather, the soil may be mounded about them to a height of from 4 to 6 inches. While mounding is not absolute proof against injury, generally there is much less on mounded than unmounded trees. This will be especially true during winters of light snow fall when the mounded soil extends above the snow. The mounded soil should be removed early in the spring and level cultivation maintained if possible during the growing season. On account of the labor involved mounding

is not generally practiced, but it may be employed on a small scale with good results.

Use of Mechanical Protectors.—Galvanized window screen wire and other types of wire screen having meshes of about one-fourth inch, if cut in strips and placed around the tree trunks as previously described to prevent injury by rabbits will also protect the trees against injury by mice. Wire protectors, therefore, serve a double purpose.

Injury by field mice is not as common as rabbit injury, but many trees are destroyed by mice without the grower knowing the cause. This is true as the mice usually work at the base of the tree trunk or slightly beneath the soil and the injury is not noticeable. Sod orchards generally show much worse damage than orchards receiving clean cultivation. Hence the necessity of guarding sod orchards against mouse injury. Timely attention making use of some of the suggestions mentioned will generally prevent serious damage. Where cultivation can be practiced and litter kept away from the trunks of the fruit trees there will be little need usually for the use of one-fourth inch mesh wire as protectors to prevent injury by field mice.

Poison the Mice.—In commercial bearing orchards where mice are abundant and a real factor to contend with in preventing injury, poisoning is believed to be the most effective and satisfactory method of control. There are various formulas recommended. Most of these, however, have been developed and recommended by the Bureau of Biological Survey of the United States Department of Agriculture. The following preparation has met the requirements for use as a permanent poison bait in stations or catches placed in the orchard and also for general use:

"Mix together, dry, ½ ounce of powdered strychnine and ½ ounce of baking soda. Sift the strychnine-soda mixture over 1 quart of rolled oats, stirring constantly to insure an even distribution of the poison through the grain. Thoroughly warm the poisoned rolled oats in an oven and sprinkle over them 6 tablespoonfuls of a mixture of 3 parts of melted beef fat and 1 quart of melted paraffin, mixing until the oats are evenly coated. When the grain is cool it is ready for use.

"If larger quantities of the bait are needed, use in the proportion of 1 ounce of strychnine, 1 ounce of soda, 8 quarts of rolled oats, and 1¼ pints of the beef-fat-paraffin mixture. In applying the coating it is very important that the beef-fat paraffin mixture be hot and the poisoned rolled oats thoroughly warm, otherwise it will not be possible to obtain an even coating.

"Teaspoonful quantities of the poisoned rolled oats should be placed in the small containers or stations described, well distributed over the infested area. The poisoned bait may also be scattered along runways and within entrances of burrows, a teaspoonful at a place. In orchards where mice are abundant it is advisable to place one "poison station" under each tree."

Poison Stations.—Investigations made by the U. S. D. A. have also demonstrated the value of wooden poison stations or catches. These

may be made easily and cheaply at home and full directions of the Biological Survey follow:

"Square pieces of 1-by-8-inch boards are cut for the tops and of 1-by-6-inch boards for the bottoms. A depression to contain the poisoned bait is made across the bottom board with a chisel or, if made at a planing mill, by a group of circular saws. The two walls of the station are cut from 1-by-1½-inch strips into 6-inch lengths. The whole is fastened together with four nails. Mice are attracted to these poison stations and have often been observed running around them.

"Drain tiles of 1½ inch diameter or larger serve fairly well as poison stations, although they absorb moisture too freely in damp places and thus result in moldy baits. Another type of poison container, made of glass, which has found a ready market in fruit-producing sections of Virginia, is designed to allow the mice free access and yet prevent rain or standing water from getting in and the bait from spilling out.

"Mice will enter wide-mouthed bottles and glass jars for food when it is scarce naturally, but not so freely as they do the wooden stations. Tin cans, though far less effective than wooden, glass, or tile containers, may be used temporarily in emergencies.

"Poison stations should be set close to the base of the tree to escape cultivating machinery, and should be lightly covered with vegetation, prunings, or some other material that will afford shelter for the mice. They should be on high ground to avoid standing water and so placed that there will be a circulation of air to aid in keeping the baits dry and in good condition for long periods. The stations should be examined and refilled as required. This should be done at least twice a year—late in fall, again during the winter, and preferably also in spring. With poison stations properly placed, a maximun of protection is furnished at a minimum of labor and expense."

TREATMENT OF INJURED TREES

Where rabbits or field mice have gnawed the bark of the tree trunks practically all the way round but have not peeled it to the wood except in spots here and there, bridge grafting as a rule is not needed. An application of house or barn paint (white lead and raw linseed oil) applied to the wounds only, will generally prevent drying and assist materially in healing the wounds. Trees which appear to be badly damaged by girdling will frequently heal their wounds quickly if paint or grafting wax is used properly in covering the wounds.

If the injury occurs in winter the wounds should be protected by a coat of paint or grafting wax to prevent drying. If bridge grafting is required it should be done in the spring as soon as the bark will peel freely. During the growing season, the grafting operation should be performed as soon as the wound is found.

Trees from one to two years old, inclusive, which have been completely girdled or the bark removed down to the wood all the way round are usually handled most successfully by cutting them off a few inches above the graft and allowing one sprout to grow from above the graft.

The best time to cut the trees back is just as growth is starting in the spring. With trees from three to five years of age, it is usually advisable to saw them off near the ground, and cleft graft the stub to the desired variety; while for the trees five or more years old, bridge grafting is generally the best method to employ.

Bridge or Repair Graftage for Fruit Trees.—The operations of bridge grafting are as follows:

1. Cleanse and cut away all irregular tissue to form a straight wound on both the top and bottom of the girdle or injury. The girdled area may be painted with either white lead and raw linseed oil or grafting wax.

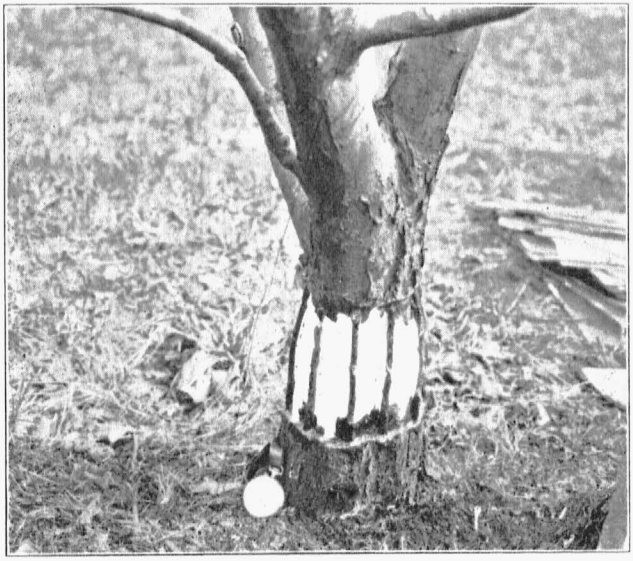

Fig. 6.—A girdled apple tree about 14 inches in diameter with the scions in place bridging the girdled area. Note that the rough, irregular edges of the bark bordering the wound have been trimmed back evenly, and the girdled area has been painted with white lead and raw linseed oil. The wounds made in inserting the scions are covered with grafting wax, which may be used to cover all wounded parts.

2. Cut a slit just beneath the bark and slightly into the wood at opposite points at the edge of both the top and bottom of the girdle. This may be accomplished by pushing a grafting knife upward beneath the bark and then downward beneath the bark.

3. Select strong, vigorous scions of the current season's growth. They should be a little longer than the girdle is wide. Both ends of the

scions are whittled to a wedge shape, making the wedge about 1½ inches long.

4. Insert the base of the scion into the lower slit.

5. With one hand holding the base of the scion in position, bend the scion until the upper end may be inserted in the upper slit. When both wedge-shaped ends of the scion have been inserted, the scion itself should be slightly arched. The spring in the arched scion will assist in holding it firmly in place.

6. Small brads or tacks may be used to fasten the ends of the scion in place.

7. Insert more scions at intervals of 1½ to 2 inches until the injury is covered or the tree trunk has been surrounded, if completely girdled.

Carefully wax the wounded tissue where the scions were inserted. Wax or paint may be used as a covering for the girdle. Rewax or paint once or twice each year or as often as necessary to keep the cut surfaces and wounds covered until they completely heal over.

Any kind of a fruit tree that may be propagated by grafting can usually be successfully bridge grafted. Apples and pears, however, are more often bridge grafted than other kinds of fruit trees. Peaches graft less readily than the fruits mentioned, but the plum and cherry should lend themselves fairly well to this method of graftage.

Making and Applying Grafting Wax.—Many formulae have been evolved for the making of grafting wax, most of which are good and effective. The formula which has been used for years by the Missouri college of Agriculture is as follows.

Common resin	4 pounds
Beeswax	2 pounds
Beef Tallow	1 pound

A harder wax may be made by using 5 pounds of resin, 2 pounds of beeswax and 1 pound of tallow, while a softer wax may be prepared by increasing the amount of tallow in the standard formula from 1 pound to 1½ or 2 pounds. Melt all of the ingredients in a vessel over a slow fire, stirring thoroughly. Lump resin should be pulverized before using. When the resin, beeswax and tallow are dissolved and thoroughly mixed, remove from the fire. After the mixture has cooled somewhat and is of the right consistency for use with a brush, it is ready to apply. The wax may be stored for future used in the container in which the ingredients were melted.

Grafting wax is also frequently prepared and stored as follows: Heat over a slow fire and mix thoroughly the ingredients mentioned

above. After the mixture has cooled slightly, pour it into a vessel of cold water. Grease the hands with tallow to prevent the wax sticking to them, and as soon as the wax is cool enough to handle remove it from the water and pull and work it as in preparing molasses candy. The working should be continued until the wax becomes smooth and changed to a lighter color, after which it is usually too stiff to pull readily. The wax may then be rolled into balls of suitable size and stored until desired for use. It will keep indefinitely. To use the wax after it has cooled, remelt by means of heat. Paraffin may be substituted in the same amount and used successfully instead of beeswax in the formula given above.

Charcoal wax is popular among some growers. The formula and method of preparing are as follows.

Resin	5 pounds
Beeswax	1 pound
Powdered wood charcoal	½ pound
Raw linseed oil	1 gill

Melt the beeswax and resin, add the charcoal and stir vigorously to prevent the formation of lumps. Then add the linseed oil and stir again, after which the wax is ready for use.

The application of grafting wax should leave the wounds air and water tight. Its uses may be enumerated as follows:

1. To keep out all diseases, rots, cankers, etc. and insects such as the borers which infest wounds.
2. To keep the cut surfaces moist and fresh, for if they are allowed to dry out the graft or bud cannot grow.
3. To prevent an excessive flow of sap from the wounds.

The best and most efficient method of applying grafting wax is with a brush. The wax should not be hot enough to injure the wood, but must be warm enough to run freely into crevices and cracks. A good melting pot consisting of a small cup or basin inserted in the top of a kerosene burning lantern may be purchased from orchard supply houses. An improvised equipment may be used, however, by building a small fire in an old tin pail, the bottom of which has been punctured with nail holes to give a draft, and suspending a small basin over the top. The heat required may also be obtained by using an alcohol lamp, which is very convenient.

Paraffin may be used instead of the grafting wax made from resin, beeswax and tallow. The following advantages are claimed for it: It requires no preparation for use other than melting, hardens quickly, is cheap and easily obtained and may be used to cover the entire scion as well as all cut or exposed surfaces. During the spring and early summer the ordinary form known as "paro-wax" used for sealing jars of jelly and

jam is satisfactory. In the hottest weather, paraffin of at least 60°C. melting point is required.

Wax Tape and String.—Waxed tape and strings are often needed by the fruit grower to repair injuries to the trees, to hold wrappers in place and for other purposes. Waxed tape may be prepared by tearing cotton cloth into strips about ½ inch wide, making the strips into rolls and then soaking in hot grafting wax. When the cloth is thoroughly saturated with the wax, remove the rolls and store for future use.

Waxed string is prepared by soaking in hot grafting wax the balls of twine to be used. When the twine is completely saturated with the wax the balls should be removed. After cooling, the string is ready for use or storage.

Fig. 7.—An apple tree bridge-grafted about eight years ago. Most of the scions covering the girdled area have grown together and the wounds will soon be completely covered with new wood.

THIS CIRCULAR AT A GLANCE