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Pollination of Tree Fruits and Nuts

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THE POLLINATION OF TREE FRUITS AND NUTS

by

John C. Snyder[1], Extension Horticulturist

Many varieties of fruits and nuts are self-unfruitful. Fertilization does not take place when they are "selfed," or pollinated with their own pollen. They must be pollinated with pollen from other varieties—hence the term cross-pollination. Others are partially self-fruitful and may or may not produce fruit when selfed. Because of this uncertainty, these too must be cross-pollinated if a set of fruit is to be assured.

Trees producing pollen used in cross-pollination are known as pollinizers. Some pollinizers are popular commercial varieties, whereas others are of value chiefly because of their pollen. Obviously, selecting suitable pollinizers is a problem only when varieties requiring cross-pollination are involved. But when cross-pollination is needed, we dare not assume that just any pollinizer is suitable. Such factors as blooming date, intersterility, and viability of pollen must be considered also. Some pollinizers are good for one variety and some for another.

The arrangement of varieties in an orchard to secure pollination is a problem only when self-unfruitful, or partially self-unfruitful, varieties are set. When self-fruitful varieties are planted along with those requiring cross-pollination, the situation is taken care of by planting them in alternate strips. In this case, the self-unfruitful strip should not be more than four rows wide, and half that width is safer. Another common practice is to place a minimum of one pollinizer in every third space of every third row. By this plan, every ninth tree is a pollinizer and every self-unfruitful tree borders a pollinizer. This plan should provide adequate pollination, but it reduces the efficiency of orchard operations.

With highly self-fruitful varieties, such as Golden Delicious and Jonathan apples, the number of pollinizers may be less than stated

[1] The photograph on the cover was taken by Mr. R. G. Satterwhite of Wenatchee. The author wishes to acknowledge the able assistance of L. R. Bryant and R. L. Webster, Washington Agricultural Experiment Station, Pullman; F. L. Overley, Tree Fruit Branch Experiment Station, Wenatchee; L. P. Batjer, U. S. Department of Agriculture, Wenatchee; David H. Brannon, Extension Entomologist; and W. A. Luce, Extension Service, Yakima, in preparing this bulletin.

above. Providing too much pollen on such varieties encourages overloading, which usually leads to alternate bearing. Providing less pollen tends to set moderate loads, and, as a result, the trees are inclined to bear regularly. It can hardly be considered safe to plant highly self-fruitful varieties in solid blocks generally; but, in locations where insect activity is good, reducing the pollinizers to a bare minimum might be considered.

Some mature apple orchards do not contain enough pollinizers. In these, relief can be obtained in three or four years by grafting. One pollinizer branch on each tree is usually adequate. Using yellow varieties offers some advantage in keeping the fruit separate during harvest. Lengthening the pollen-shedding period by grafting a relatively early-blooming variety in one tree and a later one in the next increases the chances of having pollen available when needed. See Table 1, page 15.

To be most effective, pollinizer branches must be placed where insects are most likely to visit them. They must be placed not only where it is warm but also out of the wind. In most orchards of the state, the northwest side of the tree should be avoided. In general, a position rather high on the south or southeast side is preferable.

Obviously these branches are valuable primarily as pollen producers. Therefore they must not be dwarfed out by other branches, nor should they dominate major fruit-producing branches. As a rule, laterals arising rather high on leaders make satisfactory grafting stocks; the leaders themselves represent too much bearing area on the tree.

It is a good practice to mark the pollinizer branches with paint to protect them from pruners. Early thinning or removal of all the fruit is recommended as a means of ensuring regular blossoming on them.

WHOLE TREES VERSUS POLLINIZER BRANCHES

Whole trees offer some advantage in keeping the fruit separate during harvest. With individual branches, a continuous effort must be made to keep them growing enough but not too much. With whole trees, on the other hand, there is the objection that, as they reach full size, the set of fruit sometimes becomes too heavy during favorable seasons. This trouble, particularly characteristic of sweet cherries, need not be serious, inasmuch as the size of the pollinizer can be reduced by pruning.

ROLE OF INSECTS IN POLLINATION[2]

Fruit pollen is carried by insects, but that of filberts and walnuts is carried primarily by the wind.

Bringing honey bees into the orchard increases the total number of pollinating insects, but domestic bees are by no means the only natural carriers of pollen. "Wild" or "solitary" bees do considerable pollination in Washington orchards. Most of them are smaller than the honey bee and are scarcely recognized as bees at all. They do not live in large colonies, nor do they store up large quantities of honey. These and others, such as the leaf-cutter bee and syrphus fly, work more freely during cool weather and probably do more good than is generally believed. Obviously the orchardist has little or no control over the number of these insects visiting his fruit blossoms. Their influence upon pollination, which is considerable, is quite stable.

The management of pollinating bees is a specialized job that requires an understanding of bee nature. First of all, bees do not travel far. They have been known to travel freely over a radius of two miles, but shortening this distance increases their efficiency. A bee can make three or four short trips in an hour, but can hardly make more than one long trip in the same time.

The distance the bees are from the orchard will not necessarily determine whether they work on your trees or your neighbor's. Once they start feeding on a certain kind of blossom, they continue to feed on it until it has stopped blooming, even though in the meantime another kind may come into bloom nearer the hive. They also prefer certain kinds of blossoms, and unfortunately some of our fruits are not their favorites. The fact that the sugar content of some nectars is greater than that of others accounts at least in part for this preference.

The activity of a healthy, normal colony is determined largely by the temperature within the hive. The location of the hives in the orchard, therefore, is an important matter, not so much from the standpoint of traveling distance, but more from the standpoint of keeping them warm and protected from the wind. *Select a site exposed to the sun and protected from the wind throughout the day.* The early morning sun is especially desirable.

It is not necessary to distribute the hives singly throughout the orchard. Placing them in groups of eight or ten in warm, protected

[2] Orchardists using bees for pollination are urged to keep in touch with their Deputy Bee Inspectors, Apiculture Division, State Department of Agriculture, through the county agent.

places not only promotes optimum activity, but also facilitates bringing them into and taking them out of the orchard. Once they are located, they should not be disturbed until pollination is complete. The relation of the time of bringing the bees into the orchard to the time of blossom development is very important in determining whether they start working in the immediate orchard or in a neighboring one. *The best time is just as the first blossoms open.* Placing them in the orchard earlier encourages the bees to go elsewhere, and delay may mean the loss of suitable weather for pollination.

In general, one colony with five frames of bees and brood to the acre is adequate at cherry blossom time. These usually build up to six frames by apple blossom time. On this basis, the colony contains 60,000 bees at cherry blossom time and 75,000 at apple blossom time. In areas where pollinating weather usually is favorable, one colony to two acres may be adequate; and, in particularly unfavorable areas, two colonies to an acre may be required.

Scientists have tried to force bees to distribute artificially collected pollen. Traps designed to force the bees to pass through pollen when leaving the hive have been tried. Obviously, before leaving the hive for a load, she tries to free herself of any clinging material. However, if she can be made to pass through pollen, she has no choice but to carry a certain amount of it.

Experimental work shows that pollen placed in traps at the entrance of the hive soon disappears. Part of it is carried into the hive, some is fanned out, and some clings to the bodies of the bees. In any event, it is necessary to renew the pollen frequently. How frequently can be determined by inspection. Obstructions of any kind, be they traps, brush, or boards, at the entrance of the hive may hinder the much-desired free activity of the bees. It therefore behooves orchardists who attempt to use traps to make sure that the traps function properly lest they not only fail to aid but actually hinder pollination. Some well-informed beemen of the state are of the opinion that traps do more harm than good.

COMMERCIAL HAND POLLINATION OF APPLES

There are many hindrances to effective insect pollination. Cool weather, rainy weather, and windy weather are among the most serious. In Washington orchards, these factors frequently threaten satisfactory pollination. To ensure satisfactory pollination, human aids of various kinds have been found to be profitable in certain instances. These vary from doing the complete job by hand to placing bouquets in the orchard.

Fig. 1.—Results of artificial pollination in a Delicious planting belonging to Ralph Sundquist, Yakima. *Left*—Pollinated by natural carriers. Note the upright position of the branches. *Right*—Pollinated by hand and by natural carriers. Note how the load of fruit pulls the branches downward.

Commercial hand pollination of apples is now past the experimental stage. Growers whose orchards are in locations where pollination by natural means is uncertain consider it good insurance. (See Figure 1.) Those who, for one reason or another, are short of pollinizers also find it profitable. Artificial pollination generally should be considered as a temporary expedient to be used only until natural sources of pollen can be established. Seriously to consider setting a complete crop by hand with the idea of reducing thinning costs overlooks the fact that considerable fruit may be set by natural

means other than bees. Such a practice would be most dangerous, to say the least.

COLLECTING THE POLLEN

One of the first steps in successful hand pollination is the collection of the pollen. It obviously must be obtained from suitable varieties. Self-fruitful varieties generally are satisfactory, and partially self-fruitful varieties may be satisfactory for certain varieties. (See Table 2, page 17.) Delicious, for example, is suitable for Winesap, but not for itself.

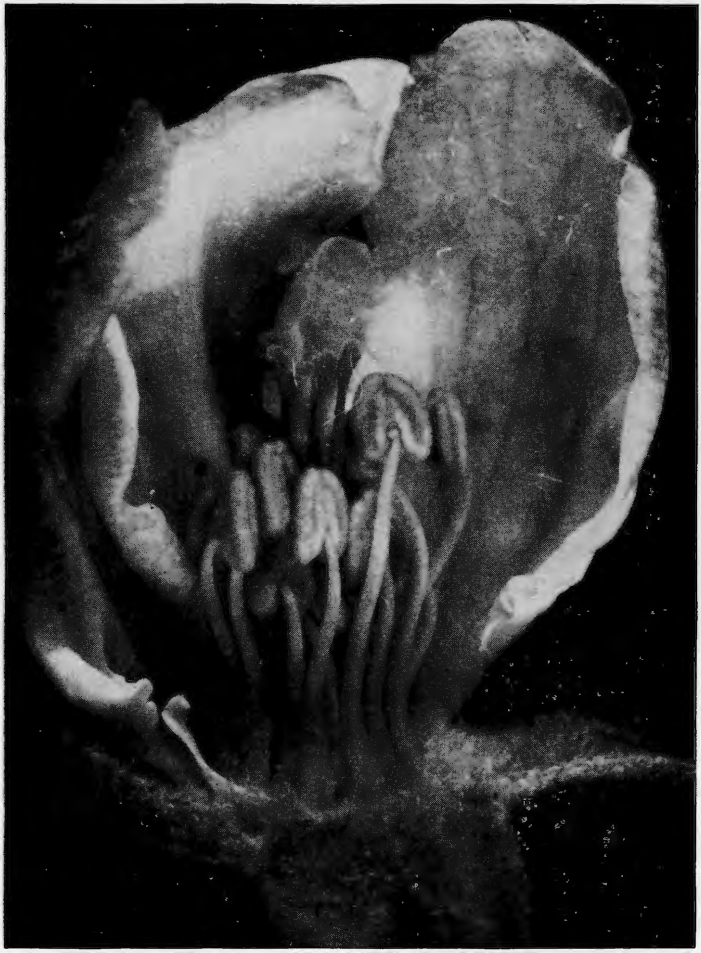

Fig. 2.—Apple blossom in "balloon" stage with petals in foreground removed. Note the opening between petals in background, which have started to unfold. It is at this stage that pollen should be collected A later time is satisfactory, provided that the pollen sacs (anthers) are still closed. Note also the five parts of the pistil surrounded by the stamens.

Fig. 3.—Apple blossom in which the early anthers have already shed pollen. Pollen should be collected before many of the anthers have shed pollen. Note the five parts of the pistil.

Pollen grains are alive. They may be thought of as seeds. Like seeds, they must be allowed to ripen if normal germination is to be expected. In nature, pollen is left on the blossoms until the pollen sacs or anthers open. Artificially, if we delay harvesting until this stage, part of the pollen is lost. We therefore try to harvest pollen *just before the first anthers open. The "balloon stage" is considered ideal* (Figure 2). In this stage, the petals start separating and exposing the inner parts of the flower. Only during hot weather are any pollen sacs open at this time (Figure 3).

There are several methods of removing blossoms from the tree. A recent and common one is to provide collecting receptacles, such

as a widemouthed fruit jar that can be carried from branch to branch (Figure 4). It is usually attached to the waist; both hands are left free. This method not only ensures fresh blossoms but also makes it unnecessary to prune off branches during the blossoming period. Of some significance also is the fact that removing blossoms aids in the thinning operation.

Another method is to delay pruning the pollinizers until it is time to collect pollen; the collection is then made from the prunings. The pruned branches are placed on a table in the orchard, around which those who extract the pollen sit (Figure 5). This method is sometimes modified so that only spurs, instead of pruned branches, are placed on the table. A disadvantage of this delayed-pruning method is that pruning during blossoming tends to weaken the tree.

Fig. 4.—Extracting pollen. A fruit jar is fastened to the belt of the extractor by means of a wire frame bearing a hook. A circular piece of eight-mesh wire cloth the size of the fruit jar cap has been put on in place of the cap. Once the blossom is pressed against the cloth the anthers are easily removed with one or two swipes.

REMOVING THE POLLEN FROM THE BLOSSOMS

Eight-mesh hardware cloth is commonly used for rubbing off the anthers. The hardware cloth is substituted for the fruit jar cap when a fruit jar is used for collecting pollen. When a box is used, a piece of this cloth is fastened rigidly over the top.

The stem of the blossom is grasped between the thumb and forefinger, and the blossom is pressed against the cloth so that the

Fig. 5.—A group of women extracting pollen. Small branches with blossoms in the balloon stage are placed on a blanket before the women. Blossom-bearing branches are cut and placed here only as fast as needed. They are not allowed to wilt before the pollen is extracted.

stamens stick through the cloth. With one or two swipes, the anthers are pulled loose and drop into the jar. (See Figure 4.)

CURING THE POLLEN

Green pollen should never be held in quantities nor at temperatures that permit heating. For curing, place it not over one-eighth inch deep in trays. Slick, stiff paper is preferable for making the trays. Curing requires approximately 48 hours at 68° to 70° F. Excessive heat may cause serious injury. Because of the danger of overheating, the curing trays should not be placed in the direct rays of the sun. Enough ventilation to keep the humidity about the same as that of a living room is desirable. When curing is complete, the pollen sacs are open, and pollen dust can be seen on the walls of the tray.

HANDLING CURED POLLEN

The pollen is ready to use as soon as it is cured. If it cannot be used immediately, it should be kept where it is dry and cool. The lid of the pasteboard carton in which commercial pollen is shipped should be perforated to keep the pollen from becoming moist. If dry storage at about 34° F. is not available, the household refrigerator

may be used. For refrigerator storage, do not perforate the lid. How long pollen can be safely stored is not definitely known. It may be held for several days, but the sooner it can be used after curing, the safer.

Various attempts have been made to dilute pollen with a carrier in order to reduce the cost of application. Wheat flour, corn starch, powdered charcoal, fuller's earth, talc, and lycopodium are among the materials that have been reported to give good results for diluting apple pollen in New York.

METHODS OF APPLYING THE POLLEN

Efforts are being made to develop laborsaving methods of distributing pollen. Dusts and liquids containing pollen have been applied experimentally by airplanes and conventional spraying equipment. Bombs in especially prepared mortars have been tried, also. With the many immeasurable factors at play in fruit pollination, there is danger of prematurely crediting success to hoped-for laborsaving methods. At the present time, these methods are highly experimental and should be considered only on an experimental basis. The proved method at the present time is hand application.

In apple and pear blossoms, the enlarged end of the pistil, of which there are five parts, is known as the stigma. Soon after the blossom is fully open, a sticky fluid appears on the stigma. It is at this time that at least one pollen grain should reach most, and preferably all, of the five parts of the stigma. (See Figure 2.) In the case of Delicious and other self-unfruitful varieties, failure to place at least one pollen grain on each stigma usually results in misshapen fruit. How long the pistil remains receptive varies, but it is generally believed that it is first receptive when the anthers begin to shed pollen. For practical purposes, *pollen may be applied to a single blossom during a period of approximately 48 hours, beginning when the blossom is nearly open.* The pollinating period in a given orchard may be extended over a longer time by starting when a good sprinkle of blossoms is out on the south sides of the trees and coming back a second time to cover the other sides. The choice of blossoms to be pollinated is determined by the stage of development of the individual blossom and not by whether or not the blossom is a "king bloom."

There are numerous ways of applying the pollen. Some growers use a small brush with fairly stiff bristles, others the rubber end of a lead pencil, and still others simply the bare finger. As a result of ten or more years of experience, a No. 4 pig-hair brush has been adopted

Fig. 6.—Applying artificially collected pollen to an apple blossom. A No. 4 pig-hair brush is being used. Note that the brush is directed toward the center of the blossom so that all five parts of the pistil receive pollen. Blossoms are ready for pollination as soon as the petals are open. Note that the petals are cupped; this condition shows that the blossoms are fresh.

quite generally (Figure 6). Some growers, to make the pollen go farther, prefer to place a rubber band halfway down on the bristles and cut the bristles off square, one-fourth inch below the band. Others prefer to allow the bristles to spread out in order to ensure that all parts of the pistil are treated, even at the cost of extra pollen.

The pollen, which is usually carried in a small vial or a wide-mouthed bottle, must be convenient at all times. The bottle is commonly fastened in the shirt pocket and kept stoppered with a light cotton wad when not in actual use. Both hands are thereby left free for applying the pollen.

With practice, pollinators become so skillful that the pistils are reached with ease (Figure 7). Some prefer to make two "hits" for each blossom, one to get aim and the other to apply the pollen. *One dip in the pollen bottle is enough for six to eight blossoms.* Ordinarily it is best to start out with about one-fourth ounce of pollen and add to it as necessary.

Fig. 7.—Artificial pollination of apples. Attention is directed mainly to the section of the tree least attractive to insects in the event that the entire tree cannot be covered. An experienced pollinator can cover a tree in from an hour to one and one-half hours. Approximately two volume ounces of pollen an acre are required.

The number of blossoms to be pollinated depends on several factors. If labor is scarce, there may be time for covering only the windy side or the north side of the tree. In some cases, because work is faster from the ground, it may be advisable to work only from the ground. The proximity to pollen that may be brought in by natural means is a factor, also.

In general it must be assumed that artificially applied pollen reaches only blossoms you touch. It is true that, if insects are working freely while you are working, they must further spread some of the pollen that was applied by hand. They are sometimes credited with spreading this pollen when in reality the improved set above the number of blossoms actually touched is due to other factors. For example, in many orchards, insects bring considerable pollen from other orchards. It is safe to assume also that, with partially self-fruitful varities, selfing sets considerable fruit during seasons of good insect activity. With the evidence at hand, it therefore is hazardous to place much reliance on insects for distributing pollen that has been applied artificially.

It would seem then that you should pollinate as many blossoms as you want fruits on the tree, unless you rely on insects for bringing in other pollen or distributing the tree's own pollen for what it is

worth. Pollinizing one blossom in every fifth cluster on a tree in good bloom is good practice.

In New Hampshire, experimental evidence shows that heavy rains immediately after hand pollination of McIntosh apples did not wash enough pollen from the stigmas to interfere with a satisfactory set of fruit.[3] At least one experienced commercial hand pollinator seems to have observed different results with Delicious apples in the state of Washington, however. He reports having observed no benefit from hand pollination that was followed immediately by rain.

BOUQUETING

When pollination by natural means is poor, we can aid natural carriers of pollen by placing bouquets in the orchard. Obviously, they are effective only when the weather permits insect activity. Generally, there is at least a short period of such weather during each blossom period.

Place the bouquets where insects like to work. The warmer and sunnier the place, the better, so long as it is protected from the wind. A small bouquet for each tree, placed rather high on the south side, is usually adequate. The most common method of bouqueting, however, is to place large branches in barrels of water on the ground.

The ideal stage for cutting the bouquets is when the most advanced blossoms are open. The sooner they are in water after they are cut, the better. When it is convenient, place them in water immediately after cutting, especially if they must be hauled some distance. Once the branches are removed from the tree, cutting them off under water as they are placed in the container helps to keep them fresh. This can be done quite easily if the barrels distributed in the orchard are nearly full of water when the branches are placed in them. As one man places them in the water, another can cut off the ends of the branches.

The blossoms must be kept fresh. Wilted blossoms are valueless. Visit the bouquets daily to make sure that the barrels are full of water. The branches use a surprising amount of water, particularly during warm days.

APPLES

In general, a variety that is a good pollinizer for one variety may be considered good for another. It goes without saying, of

[3] R. L. Boyd and L. P. Latimer, *Relation of Weather to Pollination of McIntosh Apples.* Proc. Amer. Soc. Hort. Sci., 30:12-16, 1933.

course, that the two must be in bloom at the same time. As may be expected, some varieties are better producers of pollen than others. Of the high producers, Yellow Transparent, Winter Banana, Duchess, and McIntosh are considered early. Delicious, Jonathan, Golden Delicious, and Wealthy, on the other hand, are midseason; and Rome Beauty is the outstanding late variety, as shown in Table 1.

Table 1. Some Varieties of Apples and Pears in Washington, Showing Their Ability to Produce Fruit from Their Own Pollen and the Approximate Time of Bloom

APPLES	
Generally Partially Self-fruitful	Generally Self-unfruitful
Early	**Early**
Yellow Transparent	McIntosh
Winter Banana	Early McIntosh
Early Harvest	Cortland
Duchess	Milton
Midseason	**Midseason**
Jonathan	Delicious
Wealthy	Starking
Golden Delicious	Richared
King	Arkansas Black
Grimes Golden	Gravenstein
	Red Gravenstein
	Stayman Winesap
	Wagener
Late	**Late**
Rome Beauty	Northern Spy
PEARS	
Midseason	
Anjou	
Bosc	
Bartlett	
Seckel	
Comice	
Flemish Beauty	
Late	
Winter Nelis	

Some varieties are known to be very poor producers of pollen. Chief among these are Winesap, Stayman Winesap, and Arkansas Black.

Intersterility in apples is rare. As stated previously, a good pollinizer for one variety is generally good for another. However, there

is an exception to this general rule in the case of Grimes Golden and Arkansas Black. Grimes Golden, which is usually regarded as a good pollinizer, will not fertilize Arkansas Black, nor will Arkansas Black fertilize Grimes Golden.

PEARS

Varieties of pears grown in Washington are, for the most part, good pollen producers. In general, they may be used to pollinate each other quite satisfactorily, assuming, of course, that they are in bloom at the same time. Seckel is considered an exception to this general rule inasmuch as it is not a suitable pollinizer for Bartlett. Of special interest in this connection also is the fact that Winter Nelis is a late bloomer and in some sections Bosc is too late for Anjou.

PEACHES

Most varieties of peaches are self-fruitful, as shown in Table 2. With these, cross-pollination is considered unnecessary; sometimes, however, solid blocks of some of these varieties may fail to set satisfactory crops. In such cases, it is advisable to include pollinizers. Any of the self-fruitful varieties are suitable pollinizers for the self-unfruitful varieties.

APRICOTS

The standard varieties of apricots are considered self-fruitful (Table 2).

CHERRIES

Sour cherry varieties in general are self-fruitful, as shown in Table 2. The three leading varieties of sweet cherries, however—Bing, Lambert, and Royal Ann—are self-unfruitful and intersterile. *They will not fertilize each other.* There are many suitable pollinizers, among them some seedlings. Special care should be exercised in selecting clean stock as pollinizers; at the present time, using marketable varieties offers some real advantage in controlling the cherry fruit fly.

Table 2. Peach, Apricot, Plum, and Cherry Varieties with Pollinizers for Those Requiring Cross-Pollination

Self-fruitful	Generally Partially Self-fruitful		Generally Self-unfruitful	
	Variety	Pollinizers	Variety	Pollinizers
PEACHES				
Carman			Candoka	Nearly any of standard self-fruitful varieties
Crawford			Halberta	〃 〃
Early Elberta			J. H. Hale	〃 〃
Elberta			June Elberta	〃 〃
Gold Medal			Chinese Cling	
Golden Jubilee				
Lemon Cling				
Muir				
Orange Cling				
Rochester				
Salway				
Slappey				
Southhaven				
Halehaven				
Valiant				
Vedette				
Veteran				
APRICOTS				
Blenheim				
Moorpark				
Tilton				

Table 2 (Continued)

Self-fruitful	Generally Partially Self-fruitful		Generally Self-unfruitful	
	Variety	Pollinizers	Variety	Pollinizers
CHERRIES				
Early Richmond English Morello Montmorency	Black Tartarian	Black Republican, English Morello	Bing	Centennial, Black Tartarian, Black Republican, Deacon, Lyons, Windsor, Schmidt
			Lambert	Windsor, Schmidt, Black Tartarian, Deacon, Lyons
			Royal Ann	Schmidt, Black Tartarian, Lyons, Black Republican, Deacon
			Windsor	Schmidt, Black Tartarian, Lambert
			Mayduke	Black Tartarian, Hedelfingen, English Morello, Early Richmond, Montmorency
PLUMS				
Damson	Beauty	Burbank, Formosa, Wickson	Abundance	Climax, Wickson, Burbank
French Prune (Agen)	Climax	Burbank, Abundance, Wickson	Burbank	Wickson, Climax, Abundance, Beauty, Formosa, Tragedy
German Prune	Elephant Heart	Delicious, Santa Rosa	Formosa	Gaviota, Wickson, Burbank, Beauty, Santa Rosa
Italian Prune	Santa Rosa	Beauty, Wickson, Apex, Climax	Gaviota	Formosa
Sugar	Wickson	Formosa	Imperial	French Prune, Sugar
Yellow Egg			Pond	Imperial, Yellow Egg
Stanley	Green Gage	Formosa	Tragedy	Clyman, Yellow Egg
			Duarte	Gaviota, Santa Rosa, Beauty, Burbank
			President	Vacaville Blue, Sugar, Italian Prune, Weatherspoon Prune, Tragedy, French Petite
			Apex	Santa Rosa
			Satsuma	Santa Rosa, Wickson, Burbank, Climax

Table 3. Filbert and Walnut Varieties with Pollinizers for Those Requiring Cross-Pollination

Self-fruitful	Generally Partially Self-fruitful		Generally Self-unfruitful	
	Variety	Pollinizers	Variety	Pollinizers
		FILBERTS		
	Barcelona	White Aveline, Du Chilly, Daviana, Bolwyller, Du Provence		
	Brixnut	Bolwyller		
	Du Chilly	Daviana, Alpha, Gasaway, Clackamas, Nooksack		
		WALNUTS		
Mayette Meylan Parisienne Wiltz	Franquette	Meylan (late blooming strain), King, almost any seedling		

FILBERTS

Most varieties of filberts are considered self-unfruitful, as shown in Table 3. The chief difficulty in pollinating filberts lies in the fact that on most varieties the pistillate blossoms and the pollen-bearing catkins do not bloom at the same time. To ensure adequate pollination, it is necessary, therefore, to include several pollinizers that shed pollen at different times.

WALNUTS

Franquette, our most popular variety of the Persian (English) walnut, is generally considered self-fruitful. Its ability to set satisfactory crops from its own pollen is questioned, however, because the pistillate blossoms sometimes come out before the pollen is shed. This condition is especially noticeable with young trees; but ordinarily in mature orchards there are enough late catkins to make cross-pollination unnecessary. Because of the pollination problem with young trees, we have listed Franquette as a partially self-unfruitful variety, as shown in Table 3.

Visit your county Extension office, located in your county seat, for further information or for other publications on farm and home problems.

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