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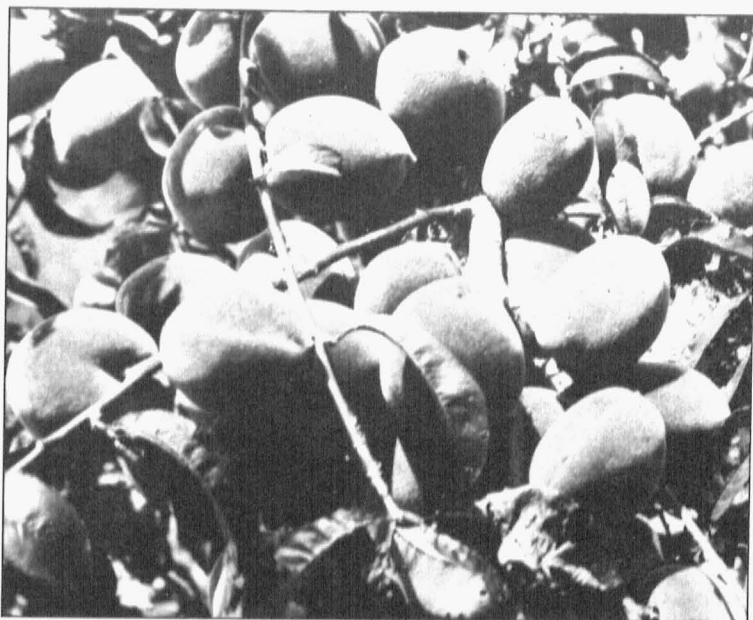
COLLEGE OF AGRICULTURE

AGRICULTURAL EXPERIMENT STATION

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Selecting Fruit Varieties

T. J. TALBERT AND A. D. HIBBARD



COLUMBIA, MISSOURI

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Selecting Fruit Varieties

T. J. TALBERT AND A. D. HIBBARD

In the selection of the best varieties, the Missouri Agricultural Experiment Station is endeavoring to assist fruit growers. Numerous hardy fruits are grown on the Station grounds. Information as to the time of blooming, leafing, fruit ripening, period of coming into bearing, susceptibility to attacks of insects and diseases, hardiness to cold and drought conditions, longevity, range of adaptability to climate and soil, etc. is obtained for producers. Thousands of seedling fruits are also grown for testing in the work of breeding new varieties.

The varieties planted may "make" or "break" a grower. Furthermore, fertile soils and good culture will not make poor varieties profitable or low-yielding kinds fruitful. Often returns from one variety may barely cover production and harvesting costs, while those from another net substantial profits. Growers who plant varieties that are unsuitable or unprofitable are at once involved in troublesome readjustment problems. The mistake must be overcome by digging up or pulling out the undesirable sorts and replanting or top-grafting them and waiting a number of years for crops.

Varieties, however, cannot be valued entirely on the basis of yield. Relative susceptibility to insect and disease attack, earliness of bearing, regularity of cropping, length of life, percentage of fruit that grades out, market demand and price must all receive careful consideration. Hardiness in wood and bud to winter and spring cold and resistance to injury from the heat and dryness of summer are also of great importance.

There is no perfect variety of fruit. Practically all varieties which appear to meet our needs, when carefully examined and tested, will be found to possess many weaknesses or faults. Fruit growers generally believe that there is a real need for developing and introducing better sorts to meet certain climatic requirements and particular soil conditions. It is self-evident that a new variety must be of greater value to the average consumer and thus be able to hold its place on the general market in competition with those well established in the trade.

ORIGIN OF FRUIT VARIETIES

Fruit varieties and their improvement have come about through the choice of chance seedlings, the selection of mutations (bud sports) and the collection of hybrids through breeding or hybridization. The least desirable varieties are being replaced from time to time by more suitable kinds which are still further improved by continued careful selection and breeding.

Chance Seedlings.—Most of the dependable fruits have originated as chance seedlings. Seed of fruit plants dropped by chance in the fields, along the roadside and elsewhere have sprouted, developed and thus given rise to chance seedling fruits. If they happen to possess the qualities required in dependable and satisfactory fruits, they have often been recognized, propagated, and brought into cultivation. A large percentage of the worthy varieties of fruits of the past and present have originated in this way or as chance seedlings.

It is generally known that when the seeds of fruit crops are planted, the resulting plants are usually not true to type. That is, the plants grown from seed do not resemble the parent plant in most respects. When Jonathan apple seeds, for example, are planted, the trees which grow usually bear fruit very unlike the Jonathan variety. Hence the planting of fruit crop seeds usually gives rise to the development of new varieties. To perpetuate and multiply the worthy ones, therefore, it is necessary to resort to some form of vegetative propagation, such as budding or grafting.

Selection of Mutations (bud sports).—Many valuable strains and varieties, originating as striking variations or bud sports are now in commercial culture of both citrus and deciduous fruits. Bud sports may occur as limb, entire tree, and individual leaf or fruit variants. They may be found through the occurrence of permanent and abnormal fruits and foliage that have observable characteristics markedly different from those that are normal for the variety. It is generally considered that sports or mutations of this kind lead to the production of "strains" within the variety. If the difference is marked enough and if they "come true" when propagated, they are designated as new varieties.

Variations in color of fruits have been most frequently found because such changes are conspicuous and most easily observed. It is known, however, that other bud variations than those of color of fruits, such as shape, size and texture, also occur. The characters in addition to color are usually overlooked because they are relatively inconspicuous. Bud sports of fruit crops are perpetuated and extended by vegetative propagation through the use of budding and grafting methods.

Red sports have attracted most attention in the case of apples. A few of the most outstanding of such sports and the parent variety from which they originated are: Delicious, Starking and Richared; Rome, Red Rome; Duchess, Red Duchess; Jonathan, Blackjon and Jonared; Stayman, Blaxtayman and Stamared; and York, Yorking and Yorkared. Many other bud sports have been discovered but some of them are worthless. With this in mind it is highly important to the planter that he know definitely regarding the source of the strain he may be purchasing and the experience and horticultural knowledge of the persons who selected the sport for propagation.

Strains originating from bud sports are likely to differ from the parent forms in only one or at most but few characters. For this reason, the planting of sports does not involve nearly as great hazards as the planting of new varieties, because the adaptability of the parents to local environmental conditions and successful marketing is known. With color sports this has been particularly true. In these, early color and maturity are the chief characters sought. The quality and general appearance of the parent, however, has not been changed materially.

Production and Choosing of Hybrids.—Hybrids result from crossing two or more varieties. To be of value they must be suitable for propagation. If seeds are used, it is difficult to “fix” the type so that it will come true. By budding, grafting, cuttage, layerage and division, however, the character of the plant may be perpetuated with certainty. Nearly all hybrids, therefore, are propagated by asexual parts.

In fruit breeding or hybridization, the object is to combine the desirable qualities of different varieties so that a few may be intensified. For example, the purpose might be to improve the fruit of existing varieties as to flavor and quality, develop more resistance to diseases, produce later fruit blooming and grow plants or trees that are annual instead of biennial bearers.

Under the most ideal conditions fruit breeding may prove to be an expensive and slow procedure. Many years may be involved in the selection and testing of suitable or superior new types from the results of a cross. Moreover, the results are very uncertain. For every new variety that shows promise of being better in one or more characters than either parent, hundreds and even thousands of seedlings may be grown, examined for several years, and finally destroyed.

In spite of these drawbacks, most of the State Agricultural Experiment Stations are now carrying forward fruit hybridization projects and worthy new fruits are being introduced from time to time. Some of the noteworthy varieties of fruits developed by controlled crosses or by hybridization are the Cortland and Milton apples, the Gorham and Ovid pears, Sapa and Waneta plums, Eclipse and Golden Jubilee peaches, Fredonia and Seneca grapes, Latham and Chief raspberries, and Blakemore and Dorsett strawberries.

THE PLANT PATENT LAW

The discovery and development of new varieties of fruits has been given an added impetus by the passage of the Plant Patent Act by the Congress of the United States in the spring of 1930. This law affords the same protection to the patentee of a new plant variety as is given to one who has had a patent issued to him on a new mechanical invention. In fact, the plant patent

gives the owner the exclusive right to reproduce, use or sell his discovery throughout the United States and its territories for a period of seventeen years. License may be granted by the patentee to others to grow, use, or sell the new plant variety in certain territories for limited periods.

By an amendment the Plant Patent Law was confined to asexually reproduced plants, probably because of their stability as contrasted with the usual variability of plants propagated by seeds. Without this restriction endless confusion might exist and make the law inoperative.

During recent years, the development of new varieties has tended to pass largely into the hands of public institutions, such as the United States Department of Agriculture and the State Agricultural Experiment Stations. With no protection in the introduction of new varieties, there was not so much of an incentive for individual plant breeders to develop and introduce new varieties.

New varieties developed by the Experiment Stations and by the United States Department of Agriculture are, of course, becoming public property and are available to nurseries for propagation. Varieties developed by individuals generally pass into the hands of nurseries, as few plant breeders or producers care to market new varieties themselves. With the rapid advance being made in variety development and the stimulus which is occurring from the Plant Patent Act, new varieties are supplanting rapidly many old and unprofitable ones.

CHOOSING VARIETIES OF FRUITS

Some of the most sought qualities in choosing varieties of fruits to plant have been given. Other factors to observe and study consist of time of ripening, size, keeping period and handling qualities. The fruit should hang on the trees or vines long enough to allow full maturity and proper harvesting. The quality, finish and appearance must be right for sale and consumption. In the case of trees, strong branches and crotches that will carry heavy loads of fruit without breaking are desirable.

Since fruit growing began, variety lists have changed. A few kinds, however, have continued to be favorites for long periods. Some of these are the Concord grape, Elberta peach, Jonathan, Grimes and Winesap apples, the Garber and Kieffer pears, Montmorency cherry, Early Harvest blackberry, Cumberland raspberry and Aroma strawberry. The history of the great number of varieties named, introduced and offered for sale shows that practically all have disappeared rather shortly after their introduction.

New and Old Varieties.—Before producers plant new varieties extensively, they should ascertain whether the new sorts will be acceptable to the trade where they will be in competition

with other varieties. The mere fact that a new sort may be superior in certain respects to the old one does not necessarily assure the grower that an established and critical market will immediately accept it. It usually takes time to win the public to a new variety.

Fruit varieties are impressed upon consumers and dealers generally because of outstanding quality and appearance. Undesirable features have caused some fruits practically to disappear from the markets while other varieties have persisted in popularity for a century or more. Some comparatively recent sorts have gained enormous popularity due to desirable qualities not found in the old varieties. Consequently the selection and planting of the best and most suitable kinds may insure greater profits.

In general, new varieties cannot be expected to capture large sections of the commercial markets as rapidly and successfully as did the Delicious apple. There are often, however, profits in new varieties when handled from comparatively small acreages and especially for local and roadside markets. Furthermore, progressive fruit growers and farmers often find variety trial lists decidedly interesting and helpful.

Fewer Varieties Now.—There are fewer varieties now from which to choose, consequently, the problem of selection is not as difficult as it was thirty years ago when a vastly greater number of kinds was being grown and offered to growers for planting. The trend at present is toward the planting of fewer varieties as is shown by the listings of nursery catalogs and the greatly reduced numbers of varieties found on the leading markets.

The commercializing of the fruit industry has brought about a gradual but marked decrease in the number of varieties. With the standardization of grades and packs, came the standardization of varieties. This was inevitable and necessary for economical production and successful marketing.

The Best Varieties.—It is obvious that definite varieties cannot be recommended as "the best" under all circumstances. In each fruit-growing district there are generally four or five well known and established sorts which can be relied upon. The bulk of new plantings should be selected from this list. New varieties should be planted in limited numbers as several years' observation by investigators and experienced growers is needed before final judgment can be passed upon them. This makes the acceptance of newcomers slow.

Soil Requirements for Fruit Varieties.—Evidence tends to show that the present trend is toward placing less importance upon the soil requirements of different fruit varieties and more upon the moisture-holding capacity and depth of the soil, its

fertility and humus content, and proper drainage and aeration for root growth.

Such fruits as the pear, quince, plum, blackberry, and black raspberry seem to thrive on a soil containing considerable quantities of clay and therefore rated as a fairly heavy soil type. It is true, however, that a soil heavier than a clay loam is usually not desirable. The peach, cherry, red raspberry, and dewberry usually do best and produce highest yields when grown on sandy loams or light silt loams. The apple, American grape, and strawberry seem to prefer a heavier soil than fruits classed with the peach, and a somewhat lighter soil than those grouped with the pear.

Other fruits may have quite similar or different soil requirements. Most of the crops, however, may be included in these large groups which grow in fairly heavy clay soils, medium textured soils such as silt loam and loams, and medium light or sandy to gravelly soils. There is no hard and fast preference between these types; one gradually grades off into another and fruits of the lighter soil group may in some instances be grown profitably in rather heavy clays, while fruits more at home in the clay or heavy types may do very well in comparatively light sandy soils.

Final Decision.—Whether the grower shall plant one kind of fruit, like the apple, including in this crop one or more varieties, or a number of different kinds; like apples, pears, peaches, cherries, plums, grapes, strawberries, raspberries, blackberries, etc., including one or several varieties of each, will depend mainly upon a consideration of some or all of the following factors and perhaps others:

1. Home or commercial planting
2. Pollination requirements
3. Production for local, roadside, or distant markets
4. Resistance to diseases and insects
5. Character of climate and soil
6. Transportation—long or short hauls
7. Available labor supply.

HOME OR COMMERCIAL PLANTING

Whether the fruit crop planting is to be made for commercial purposes or for home use will make a great deal of difference as regards the varieties to use. This is true, because commercial plantings generally are made up of a comparatively few varieties which are well known on the market and which have a proven reputation as good sellers, good keepers, or are desirable for various other commercial uses. In the commercial planting,

growers generally find that it is better to have a considerable quantity of a few varieties rather than a comparatively small quantity of a large number of sorts. A few varieties in considerable quantities offered for sale may enable the buyer to pay prices which will be profitable to the producer. On the other hand, where there are many varieties, there may not be enough of any one sort to justify distant shipments. Moreover, the market may be unacquainted with certain varieties and the buyer is likely to be unable to dispose of such sorts profitably. Consequently, commercial growers who have large numbers of varieties may often be unable to sell them profitably.

In home fruit plantings and in growing fruits to sell through roadside and local markets, it may be desirable and profitable to plant as many varieties as can be used in the home or sold locally. A succession of fruits may be found profitable; that is, the home planting might well contain varieties which ripen early, in midseason, and late. Special varieties which are not perhaps well adapted to commercial uses may be found of particular value if included in the home planting, because it is not as much a matter of profit as it is a case of having the fruits desired at the different seasons of the year. In the home fruit planting, therefore, it is well for the producer to plant whatever varieties are desired and in quantities to meet his particular home needs.

POLLINATION REQUIREMENTS

One of the important factors in the successful management of orchards, vineyards and small fruit plantings is the proper pollination of the varieties grown. Cross-fertilization in some instances will not be needed. This will be especially true of some kinds of fruits. Under certain nutritional requirements and weather conditions, the set of fruit for a large majority of the different kinds may be greatly improved if provisions at planting time are made for cross-pollination.

For good pollination, the varieties should bloom at approximately the same period because varieties which do not blossom at the same time will not cross-fertilize each other. Varieties which generally produce an abundance of viable pollen are always preferable, and if they are also valuable commercial sorts, regular in bearing and ripen their fruits at desirable periods, they are to be sought all the more.

Apples.—The Missouri Station has found that such varieties as Delicious, Golden Delicious, Grimes, Jonathan, Rome, York, Huntsman, Gano, Duchess, Yellow Transparent, Wealthy, Ingram, and Ben Davis are self-fertile to only a limited extent. They will, therefore, in most years be benefited by cross-pollination. Two varieties planted together in strips of four rows each or three varieties planted alternately in strips of two rows

each would be much more likely to produce regular cropping. Three varieties consisting of two rows each will assure the greatest benefit from cross-fertilization. Moreover, all the varieties in this group are inter-fertile.

Varieties which are self-sterile (unable to set fruit and mature it with their own pollen), at least in most localities and in most years, are the Winesap group to which belong Winesap, Stayman, Arkansas (Black Twig), Kinnard and Arkansas Black. They are unfruitful when planted in solid blocks and when pollinated with their own pollen. Moreover, they will not pollinate each other effectively and are inter-sterile. If this group is interplanted as suggested with varieties from the first group, they should yield good crops.

The set of all varieties of apples, whether rated as self-sterile or self-fertile, is usually increased if facilities for adequate cross-fertilization are provided. This can usually be accomplished by planting from three to five different varieties in strips of two to four rows each, alternating the strips with each other across the orchard. For example, starting at the border of a planting with two rows of Winesap, there should follow a good pollenizer of this variety such as Jonathan including two rows; then a good pollenizer of Jonathan like Delicious should follow with two rows, etc., including other varieties if used until the planting is completed.

Pears.—While some varieties of pears are self-fertile, others partially so and still others self-sterile, like the apple, the set of all varieties of pears will usually be increased materially through proper cross-pollination. This may be provided for as in case of apples and practically any of the varieties grown successfully in the state will act as good pollenizers for each other. At least two varieties should be planted in every case and the trees located for best results in adjoining rows.

Peaches.—The peach, with the exception of a few varieties is self-fertile. Single varieties, therefore, may be planted in large blocks. All agree, however, that better sets of fruit may be obtained if several varieties are planted in strips of two to four rows each, alternating with each other across the orchard.

Cherries.—All the Commercial varieties of sour cherries are self-fertile in Missouri. In years when cold rainy weather prevails at blooming time, the set of sour varieties generally may be greatly benefited by cross-fertilization. As in the case of peaches, the proper arrangement of pollenizers may increase production especially in bad pollination years.

Most varieties of Duke cherries especially May Duke, Royal Duke and Late Duke, are self-sterile due to their hybrid nature. They should, therefore, be interplanted with the chief sour

varieties. These are Montmorency, Early Richmond and English Morrello.

The popular varieties of sweet cherries are self-sterile. For example, such varieties as Bing, Lambert, and Napoleon with each other are self-sterile. Strains of Black Tartarian and Black Republican generally yield satisfactory results as pollenizers for the different sweet cherry varieties.

Plums and Prunes.—Nearly all the varieties of Japanese plums and many of the European plums are self-sterile. For this reason, they present serious pollination problems when considerable acreages are planted. The varieties of prunes range from self-fertile to self-sterile and generally require, for good fruit setting, cross-fertilization.

Practically all varieties of American species of plums are self-sterile. Plums and prunes, therefore, should not be planted in solid blocks. Proper interplanting using two or more varieties is likely to prove helpful in securing good sets of fruit.

Grapes.—The standard varieties of grapes grown in Missouri are generally self-fertile. Evidence of this is shown in the heavy fruiting of large blocks of a single variety such as Concord, Niagara, Moore's Early, etc. Special varieties such as Brighton are rarely planted because they are self-sterile if isolated. Consequently, varieties of this character should be planted side by side with well known fertile sorts.

Cane Fruits.—Nearly all of the black and red raspberries grown in the state are self-fertile. This enables the grower to plant them in any arrangement desired. The purple cane raspberries often appear to be self-sterile. The same is also generally true for other hybrid sorts. For these, of course, interplanting with fertile varieties is suggested.

Strawberries.—The leading commercial varieties of strawberries such as Aroma, Dunlap, Gandy, Klondike, Premier, Progressive, Mastodon and others are self-fertile. Moreover, practically all of the varieties now listed by nurserymen, including the leading new sorts, are self-fertile and one variety may be planted in a large or small block as desired.

PRODUCTION FOR LOCAL, ROADSIDE AND DISTANT MARKETS

For local markets and roadside establishments, many more varieties may usually be grown and disposed of profitably than if the production is for distant markets where carlot shipments are contemplated. For example, where the fruit is raised for the roadside market, varieties of several different kinds of fruit may usually be disposed of without difficulty. On the other hand, if producers depend upon the markets of Chicago, Milwaukee, and

New York for the sale of their crops, usually a smaller number of varieties must be grown and particular attention be given to those sorts which produce the most regular and abundant crops for the section concerned and which, at the same time, can be sold profitably upon the distant market. It may also be profitable to grow standard sorts and specialize upon those that are most profitable for carlot and truck shipments. Through such plantings, the grower may have the advantage of being able to sell on the general markets, when his local markets are oversupplied.

VARIETAL RESISTANCE TO DISEASES AND INSECTS

Some varieties of almost every kind of fruit are much more resistant than others to attacks of certain diseases and insects. The producer, therefore, may profit by selecting those sorts which are most resistant to the insects and diseases common to the particular section or district under consideration.

TRANSPORTATION—LONG OR SHORT HAULS

Transportation may be an important problem as regards varieties produced. For long hauls to distant markets, varieties which show the least injury from handling, carriage and delay in consumption should usually be selected. For short hauls over good roads, more tender and delicate varieties may be produced. Improved highways, refrigeration, and the use of modern trucks have made it possible to transport fruit successfully to more distant markets.

AVAILABLE LABOR SUPPLY

In the culture and harvesting of fruit crops, it is important that sufficient labor be available for use when needed. For example, in the harvesting of cherries, grapes, strawberries, and other more or less perishable fruits, extra labor will be needed at certain periods and if it cannot be obtained when required, great losses may be incurred. Moreover, it is generally known that more labor is required for the growing and harvesting of fruit crops than for grain crops.

The selection, therefore, of varieties which not only meet the needs of the markets, but which fit into the general scheme of farm management as regards securing an adequate labor supply may prove profitable. If for instance, the grower has too many Jonathan apples as compared to other varieties that ripen later in the season, he may find that with the available labor supply he cannot efficiently handle the Jonathan crop, which may require rapid picking to prevent dropping. By planting fewer Jonathan and more of one or two other varieties which may be harvested two or three weeks later, the labor

supply may be distributed and handled more economically. At the same time there may be less waste and confusion and more returns at the close of the season.

APPLE, PEAR AND QUINCE HARVEST

Varieties of apples are often classified into groups based upon their harvesting dates, keeping qualities, and consumption periods. Three divisions or groups are most common and they are designated as summer, fall, and winter varieties. There is, however, no fine or very definite line of distinction between them. Summer apples generally include those sorts normally consumed before September 15; fall varieties, those usually consumed by November 15; and winter varieties, those consumed after November 15. A still further division of the groups of varieties seems necessary in order to adequately list them. For apples, therefore, summer, late summer and early fall, late fall and early winter, and winter varieties are grouped.

SUMMER APPLES

In the growing of summer varieties, the proximity to markets is an important factor. It is also true that the great perishability of early apples limits their production largely to districts that have access to ready local or not very distant markets. A number of varieties ripening at different times may prove profitable in good markets close to large cities or local highway distributing centers. Advantages also accrue from having the apples reach the markets in advance of the supplies from other states and regions. Moreover, it is important that the quantity produced be about equal to the demand because it is much easier to oversupply the markets and reduce prices with summer apples than with the later fall and winter varieties.

Yellow Transparent.—The Yellow Transparent is the earliest of the commonly grown varieties to mature its fruit for home and market uses, but its season is short. The trees bear at an early age. It is adapted to a wide range of conditions and may be grown successfully in all parts of the state. It is of particular value for the home orchard and is grown on a commercial scale for local markets. It ranks high among early summer varieties.

The tree is generally fairly hardy in all parts of Missouri, but is very susceptible to fire blight. The fruit is resistant to other common diseases and to most attacks of insects, because it is earlier. The habit of growth is upright. The tree comes into bearing young, is moderately productive, often a biennial bearer, and frequently overproductive unless the fruit is thinned. The fruit grades out fairly well but shows handling bruises and is inclined to run small without proper fertilization, pruning, and thinning.

The color of the fruit is pale greenish yellow, becoming nearly white when mature. The fruit averages medium to small on slow-growing mature trees, especially in heavy crop years. It is of good quality and ripens unevenly from early July until early August. The flesh is white, fine-grained, tender and becomes mealy when overripe. The flavor is sprightly sub-acid. Green fruits often begin to be marketed in late June.

Duchess.—This is a Russian variety and is considered one of the hardiest sorts. It is a good apple to follow Yellow Transparent and may be grown successfully in all parts of the state.

The tree is vigorous when young and comes into bearing early. It tends to bear heavy biennial crops and is a moderate grower in maturity. The fruit ripens unevenly, requiring several pickings. It has made money for producers.

As a commercial and home orchard sort, it is outstanding. Since the Duchess has been planted heavily in other states, growers should, however, consider carefully future market conditions before increasing plantings for distant markets. It is very susceptible to fire blight and apple blotch. Thinning should usually be practiced for size and color.

The fruit ripens quickly, drops badly, goes down rapidly after picking and is generally difficult to handle commercially. The color is greenish yellow, attractively splashed and striped with red. The flesh is crisp, fine, juicy, and sprightly sub-acid in flavor. The fruit grades out well and is excellent for culinary purposes. It is ready for market from late July to about the middle of August. The red sports are most desirable for planting on account of better color.

Other Summer Varieties.—Some of the other summer varieties of apples that may be found of value, especially for the home and local markets are Early Red Bird, Early Harvest, Williams (Williams Early Red), Wilson Red June, Summer Champion, Benoni, Chenango, and Liveland Raspberry. In home orchards it is important that the grower plant the varieties desired in quantities sufficient to meet the needs of the family. Profitable cropping for home uses is not emphasized as much as it is when the production is for local and distant markets.

LATE SUMMER AND EARLY FALL APPLES

Summer Champion.—The tree is hardy, a good grower, heavy and regular bearer, and quite resistant to heat and drought. The fruit has an attractive red color, and is uniform in size. It may be found especially valuable for home consumption and local market uses.

Maiden Blush.—A well known late summer and early fall apple. Trees are fairly hardy and vigorous. It generally bears

annually. Fruit is pale lemon-yellow in color usually blushed on cheek with crimson, fair in quality, but ranks high for drying and culinary purposes. It is of greatest value for home and local market uses.

Wealthy.—A good apple in its season for both home and commercial plantings. As with other summer varieties, however, growers before making extensive plantings of Wealthy for distant markets, should consider carefully the demands and commercial production of other sections. For both home and local uses, it is one of the best of its season. The fruit ripens from early August until September. Like other summer varieties, green apples may be harvested earlier, depending upon the demand, and they are usually more profitable when grown for comparatively near-by markets than for long distance shipments.

Wealthy comes into bearing early and is a good cropper. It often overbears, producing undersized poorly colored fruit. This can be corrected through better fertilization, thinning and proper pruning. It grows rather slowly after reaching bearing age and is considered average in hardiness and it does well over a wide range of soils and climatic conditions. It is very susceptible to fire blight and cedar rust, but it has been a profitable variety.

The fruit is medium to large when properly grown, but may run small on old unproductive trees. The color is a beautiful red, blushed and marked with narrow stripes and splashes. The flesh is white, crisp, and juicy with an agreeable sprightly sub-acid flavor. It is rated as good to very good in quality. With careful harvesting and good storage, the variety may be kept until December.

Jeffries.—The fruit is tender, consequently, it is best adapted to local marketing. Since the season is short, the crop is moved as rapidly as possible. It is an excellent dessert apple and is in season during the latter part of August and early September. The trees are moderate growers and have a tendency to bear alternate heavy and light crops.

Other Late Summer and Early Fall Varieties.—Producers will find in many instances that such sorts as follow, and perhaps others, may be of value: Benoni, Chenango, Mother and McIntosh.

LATE FALL AND EARLY WINTER APPLES

Grimes.—Grimes is a popular yellow apple in Missouri. Moreover, it is a well known variety of high quality for both dessert and culinary purposes. The tree is a fairly vigorous grower, comes into bearing early, is hardy in bud and branches but notoriously susceptible to collar rot after bearing age is reached. For this reason it is generally desirable either to pur-

chase double-worked trees or set sorts that are known to be hardy at the crown and then top-work a year or two later. The tree is regularly productive in all parts of the state. It is a little less hardy than Jonathan, is short-lived and tends to bear alternate heavy and medium crops. To avoid crown rot difficulties, it is important that double worked trees be planted.

The fruit runs medium to a little small in size, especially on old trees; grades out well and generally sells for relatively high prices. It is very subject to storage scald and internal breakdown; comparatively resistant to fungous diseases and insect attack, but susceptible to spray russetting. The color is greenish yellow, usually becoming a deep yellow at maturity. The flesh is firm, fine-grained, juicy, and mildly rich sub-acid in flavor. In quality it ranks from very good to best. The season is fall and early winter. It has been a profitable variety.

King David.—The tree is hardy, comes into bearing early and few if any varieties bear as regularly or as abundantly. In fact, young trees particularly may out-yield Jonathan trees of the same age. On account of early, regular, and abundant cropping, it is often used as a filler. Fruit is about the size of those of Jonathan but are better colored, being a solid deep red. The size is uniform and the apples hang on the trees until harvested. The flesh is firm, fine, tender, spicy, and juicy. Chief faults are susceptibility of the fruit to the malady known as Phoma Spot and also a tendency for the fruit to decay at the core, especially when overripe.

Jonathan.—This is one of the most popular and most important varieties for home and commercial plantings in Missouri. The tree is moderately vigorous, long-lived, fairly hardy, very susceptible to fire blight and cedar rust, comes into bearing young, and ranks average to good in productivity. The variety has a wide adaptation and is grown successfully in all producing districts of the state. Perhaps it reaches its highest development in central and northern Missouri when grown in the loess soils along the Missouri and Mississippi Rivers. In the young orchards of the state Jonathan has been planted most extensively and the Red Jonathan color sports like Blackjon, Jonared, etc. are preferred by some growers.

The fruit grades out very much better than the average and sells for relatively high prices. It runs from medium to small in size, but it is smooth and symmetrical and bright red in color. The fruit is resistant to attacks of scab and apple blotch, but in storage is subject to "Jonathan Spot" internal breakdown, and soft scald. It also tends to drop badly at harvest time unless picked properly. These troubles can be largely overcome by picking when ripe and storing without delay at a temperature of 35°F. The season is fall and early winter. All factors considered,

it has been one of the most profitable varieties in Missouri for both home and commercial plantings.

Golden Delicious.—This is an excellent yellow apple. The good size, attractive golden yellow color, fine flavor and high quality of the fruit of this variety is tending to eliminate the market discrimination against yellow sorts. Moreover, its wide adaptations without the serious defects of Grimes has enabled it to rapidly supplant this variety as the leading yellow apple.

The tree is healthy and vigorous, comes into bearing unusually early and young trees rank high as annual bearers. It has been widely planted during the past fifteen years, and most growers believe it to be an apple of much promise. It has also been found to be generally hardy and relatively productive.

The fruit is medium to large, especially on young trees, a clear-skinned yellow color, firm, crisp, juicy, mild sub-acid flavor, aromatic, and very good quality. It is an excellent variety for both dessert and culinary uses. The fruit should be allowed to remain on the trees as long as possible for full maturity and to prevent shriveling in storage.

The prominent fruit russet dots sometimes mar the finish and the skin is also susceptible to spray injury or russeting. As with Grimes, Jonathan, and other varieties, to prevent spray injury it is necessary to use judgment and discretion in the application of caustic sprays. The fruit is resistant to scab, apple blotch, cedar rust, and fire blight. It is a good keeper in cold storage, but in cellar storage may shrivel badly. Golden Delicious has a late season, holds its juice well and may be considered a winter apple. Although a new variety, it is well worthy of careful consideration for planting in home and commercial orchards for both local markets and distant shipments.

Delicious.—Delicious, on account of its characteristic shape, large size, bright red-striped color, aromatic richness of flavor and effective publicity, is without question better known on the markets of the country than any other. The tree is hardy, vigorous, and ranks about average in production. In comparison with Golden Delicious, Jonathan, and Grimes, it comes into bearing somewhat later, is not as good a cropper, and is generally better suited to central and north Missouri conditions than to southern sections.

Delicious is a popular variety, and when good fruit is grown, may aid the sale of other varieties at harvest time in the orchard, at roadside market stands, and on the distant markets. To produce high quality marketable fruit, the variety is most exacting in pruning, fertilizing, spraying, harvesting and handling practices.

The fruit is susceptible to scab, and the tree to blister canker, but it is resistant to fire blight, cedar rust, and apple blotch. Fruit

of the Delicious keeps well in both cellar and cold storage. It is attractive, very tender flesh, mild rich sub-acid, quality very good to best for dessert. A grower would hardly think of planting a home orchard without Delicious, or preferably one of the good bud sports. Commercial producers, for local and distant markets, can also well afford to give Delicious or its red color sports careful consideration.

New Delicious Red Color Sports.—The two sports of Delicious best known on the markets are Richared and Starking. Richared appears to be identical with Delicious in tree characters and in size, form, and quality of fruit. It differs, however, in that full red color develops two to three weeks earlier than it does on Delicious. This is a distinct advantage in that it permits picking when maximum color is attained and before softening occurs thus extending the storage period.

Starking develops full red color in late August and early September and can be picked early enough to prevent over-maturity. While it has been generally believed that it differs from Delicious only in color, yet the Iowa Station* reports that Starking trees six to eight years of age are somewhat different in growth habits. The branches form wider angles, are more strongly attached and less subject to sharp, weak crotches than is the Delicious tree. Orchardists have also observed that Starking bears two to three years earlier than Delicious. Definite information has not yet been obtained regarding hardiness of these sports, but if they continue to be as promising as they now appear, much may be gained by planting them instead of the parent variety.

Other Late Fall and Early Winter Varieties.—Some varieties that rank high with producers for special purposes, trial and local markets are Ada Red, Northwestern Greening, and Arkansas (Mammoth Black Twig) or Paragon. Still other varieties not mentioned may be found of value, but as yet have not established themselves upon the markets.

WINTER APPLES

York (York Imperial).—The tree is vigorous, of bushy growth, large, comes into bearing moderately early, and yields biennial crops. Fruit thinning is generally required and careful and regular pruning is needed to secure size and color. It is susceptible to attacks of fire blight and cedar rust. By judicious pruning and fertilization, annual bearing may be induced. The tree is long-lived and blooms late, causing it to be comparatively free from frost injury.

The fruit will stand rough handling, is medium in quality, susceptible to scald in cold storage, but if handled properly, sells

*Iowa Agr. Exp. Sta. Bul. 341, December, 1935.

well and is a favorite for canning and baking. Relatively, it is considered one of the best varieties for depleted soils and is unquestionably one of the most valuable commercial sorts. The season of York in cellar storage extends to December and in cold storage, to February. It is fairly uniform in shape and size, although characteristically lopsided, and averages medium to large. The skin is tough, green or yellow blushed with light red stripes and the sprightly sub-acid flavor ranks good. The better color of the red sports of York such as Yorkared makes them preferable for planting.

Rome (Rome Beauty).—The tree is vigorous, productive, hardy, comes into bearing moderately early, is a late blooming variety and requires a fairly long growing season. Relatively, it is one of the most regular annual croppers, due to its habit of bearing on terminals as well as spurs. It is very susceptible to cedar rust and fire blight. The tree is apt to overbear and when old there is often a tendency for it to produce undersized and poorly colored fruit. The Red Rome or color sport is generally preferred for planting.

The fruit when well grown is of good size, uniform, smooth, and attractively mottled with bright red. The prevailing color effect is red or red mingled with yellow. It is thick-skinned, stands handling well and is a good keeper. With good maturity and proper coloring, it is not susceptible to storage scald. The flavor is mild sub-acid, generally good—not high in quality. Rome is in season from October until April.

Turley.—As a comparatively new seedling of Winesap, Turley has attracted favorable attention in the Middlewest especially as a variety of the Stayman type. It is free of the most serious faults of the Stayman, such as lack of color and stem end cracking. The tree comes into bearing fairly early, is vigorous and productive, and develops an open type of head with good foliage. In hardiness it is believed that the tree is equal to or superior to the Stayman.

The fruit resembles Stayman in shape, form, and flesh characters. It ranks large in size. A solid red color or nearly so generally prevails. The flesh is firm, crisp, tender, juicy, mild sub-acid, yellow, and ranks very good in quality. The season is winter.

Winesap.—The tree is smaller and not as vigorous in growth as Stayman. It is resistant to attacks of fire blight, cedar rust, and apple blotch but both fruit and foliage like all the Winesap Group are susceptible to scab. Under Missouri conditions it is generally hardy, and relatively it is a fairly regular cropper. It comes into bearing a year or so later than Jonathan and Grimes.

On old trees the fruit should be thinned, and unless careful attention is given to pruning and fertilizer treatments to keep up vigor, it will run small. With average trees, the fruit is medium to small, rarely large. The skin is tough and is an attractive deep red. The flesh is firm, juicy, sprightly sub-acid, and good to very good. Its season extends to February in ordinary storage and to March or April in cold storage. Winesap stands handling well, is a good shipper, and is a favorite for both home and commercial plantings, although the yields are comparatively low on account of small trees and fruit.

This variety and its near relatives should however, be planted near good pollen producers like Jonathan and Delicious because the Winesap group produces pollen of poor viability.

LESS PROMINENT WINTER VARIETIES

There are other winter sorts which are well known to home and commercial orchardists and widely listed by nurserymen, but which are not now so generally planted. A few of these will be described briefly as to good and bad characters.

Stayman (Stayman Winesap).—The tree is subject to winter injury at the crown and in the crotches of the large lower branches, comes into bearing moderately early and produces fairly regular crops. It is resistant to fire blight, cedar rust and apple blotch, but both fruit and foliage are susceptible to scab. Its worst fault is the splitting and cracking of the fruit following rains in early September. Fruit injury of this character is particularly likely if dry periods precede rain at or about harvest time. The injury may be extensive enough to crack and ruin practically every apple. The fruit is medium to large; attractive, dull red, with indistinct stripes of carmine. The general color effect is a light red. Staymared is a great improvement in color and is preferred in plantings. The flesh is moderately fine-grained, tender, crisp, juicy, sprightly sub-acid, and good to very good. This apple sells well on the markets and is generally in demand. Where it can be grown without severe fruit cracking and winter injury of the trees, it should prove profitable.

Ben Davis, Gano, and Black Ben Davis.—These varieties are very similar in tree and fruit characters and climatic adaptations and are, therefore, discussed together. At one time the Ben Davis was the most important commercial apple. It is not now, however, being planted extensively. Since Gano and Black Ben Davis are similar, but of better color, they are usually planted instead of Ben Davis where a variety of the character of this group is desired.

The tree is strong and vigorous with upright form, comes into bearing fairly early and yields large annual crops under good culture. Unquestionably this has been a profitable variety

but it is now on the decline because other sorts are replacing it, as they have better quality, are equal in productivity and bring better returns upon the markets. It is susceptible to blister canker, fairly susceptible to scab, but generally resistant to fire blight, apple blotch, and cedar rust.

The fruit ranks low in dessert quality, yet for cooking, handling, shipping, and keeping qualities it is one among the best. Many producers still maintain that over long periods this variety is one of the best paying sorts. Fruit of Ben Davis is above medium size, attractively colored, with stripes and splashings of brilliant carmine over greenish yellow while Gano and Black Ben Davis are almost solidly covered with deep red. Gano has a brighter color than Black Ben Davis. The flesh is white, tipped with yellow, coarse-grained, tender, lacks juice, mild sub-acid, fair quality, and the season is December to May.

Collins (Champion).—The variety is not grown extensively except in Arkansas and south Missouri. The tree is vigorous, hardy, and productive. It is resistant to fire blight, scab, apple blotch, cedar rust, and blister canker. On account of its vigor, productiveness, regular bearing, and freedom from blister canker, it is preferred by many growers as a variety to replace Ben Davis and others of this class since it is of about the same quality.

The fruit is fairly large, of excellent keeping quality, bright dark red, indistinctly striped with purplish carmine and occasionally showing contrasting clear yellow ground color. The flesh is nearly white, very firm, coarse, crisp, moderately tender, sprightly sub-acid, and fairly good. The season is January to June.

Willow Twig is a southern variety. The chief extensive plantings are found in Illinois and Missouri. The tree is a strong grower, bears fairly early and regularly, is very susceptible to fire blight and apple blotch, but resistant to scab and cedar rust.

The fruit is perhaps less attractive than Ben Davis both in size and color but does not become mealy and deteriorate in quality as soon in storage. It is one of the best late keepers and the season is from January to May. The prevailing color is red with contrasting green showing through the stripes. Limited plantings have proved profitable mainly on account of the late keeping quality.

Ingram is a moderately vigorous variety, but it is likely to bear small fruit unless the trees are properly pruned, fertilized, and the fruit thinned. This will be particularly true as the trees grow old. The fruit is of medium quality and fairly resistant to disease and insect attack. Ingram is grown chiefly because of the good keeping quality of the fruit and the regular and abundant cropping habits of the variety.

VARIETIES OF CRAB APPLES

Florence.—Trees bear very early and are unusually hardy and vigorous. It is a regular and abundant cropper. The fruit is good size and attractive brilliant pinkish-red in color. It is valuable for sauce, jelly, jam, preserves, etc., and is considered one of the best crab apples for home and market uses. The season of ripening is August.

Transcendent.—The tree is vigorous, large, comes into bearing early and is productive. It is susceptible to fire blight and cedar rust, blooms early and blossoms are often injured by frost. Fruit of this variety is medium to large, skin clear bright yellow, blushed and splashed with red. It ripens in late August and early September.

Hyslop.—The tree is vigorous, hardy, upright growing, comes into bearing early, and is generally considered a regular cropper. It blooms later than Transcendent and is fairly resistant to fire blight and cedar rust. The fruit is above medium to large, skin pale yellow overspread with dark red blush and thick bloom. Specimens well exposed to sunlight and fully mature are colored dark red. Flesh of the Hyslop is firm, fine-grained and juicy, but deteriorates in storage. It is desirable for home and market uses. The season is September.

Dolgo.—This is an attractive crab apple imported from Russia in 1897. The fruit is juicy, jellies rapidly, excellent in flavor and splendid for cider. The tree is hardy, vigorous, and productive. Season is early September.

VARIETIES OF PEARS

Tyson.—The tree is hardy, vigorous, fruitful, nearly perfect in shape or form and quite resistant to fire blight. It is comparatively slow coming into bearing but is a regular cropper. The fruit matures in August, is medium to small in size, often poorly colored, develops softness rapidly and must be consumed or marketed promptly. It is one of the best early sugar pears for the home, and for the local and roadside markets.

Seckel.—The tree is vigorous, productive and resistant to fire blight. The wood is short-jointed, stout, olive-colored, and clusters of fruit are borne on the ends of the branches.

Fruit of this variety is small, uniform in size and shape, skin smooth, dull yellowish brown lightly marked with pale russet and sometimes with a lively russet red. The flesh is juicy, delicately flavored and excellent for culinary purposes. It is good for the home orchard and limited commercial plantings for local markets. Its season is late August and early September.

Vermont Beauty.—Trees of this variety are rapid growers of large size and very productive. The crop ripens a little later and keeps longer than Seckel. The fruit resembles that of the Seckel in shape, but is larger and handsomer. The tree is hardy, upright-spreading, has a stocky trunk and the branches are very thick and long. The fruit ripens in early September, is medium in size, bright-cheeked, attractive red, and is considered one of the best pears of its season. It deserves a place in home orchards and in commercial plantings sufficient to meet market requirements.

Garber.—Garber and Kieffer are much alike and the fruits of both are generally considered poor in quality. Garber ripens a week or two earlier than Kieffer, the fruits are rounder and flatter at the ends and the quality is somewhat better. The tree is hardy to cold and heat. It is vigorous and comes into bearing fairly early and is a regular cropper. The fruit ripens about August 12 and is harvested in late September or early October. It should be planted with Kieffer for good pollination and fruit setting. This variety is a seedling of the Chinese sand pear. It is not good to eat out of the hand, yet it is ranked high for culinary purposes.

Kieffer.—The Kieffer is believed to be grown more commonly than any other pear in North America. The fruit is not good to eat in the raw state, but is well suited for culinary preparations. The trees are long of life, vigorous, resistant to blight and San Jose scale, come into bearing fairly early, and are regular croppers. The fruit when canned retains its flavor well and also its attractive color and shape. For this reason it is preferred by commercial canners. Its season is September to October.

Winter Nelis.—The tree is small, ill-shaped, and a poor grower. It is hardy and later toward maturity becomes moderately vigorous. It comes into bearing young, is very productive, resistant to fire blight, and is almost an annual bearer. The fruit is small and usually poorly colored and unattractive. It is valued for dessert purposes and keeps, ships and sells without difficulty on local and distant markets. It is esteemed for the flesh and flavor of the fruits. The season is from December to March. It is rated as the best winter pear for both local and commercial markets.

Other Pears.—Other pears which are sometimes grown in Missouri with more or less success are Bartlett, Duchess (Angoulene), Le Conte, Gorham, Lincoln, Douglas, Anjou, Phelps, Sheldon.

QUINCE VARIETIES

In general, commercial plantings are small, ranging from a few trees to a few acres. The quince is not well known on the markets and the demand is not great. The fruit is used mainly for preserves and jelly making. Flowers are produced on spring shoot growth, consequently, the fruit bloom and young fruit is seldom injured by late spring freezes and frosts.

The quince is nearly as susceptible to fire blight in humid warm localities as the Bartlett pear and it is but little, if any, more resistant to winter cold than the peach. The production of the fruit, therefore, is confined to the regions of mild winters and cool, moist summers. There are comparatively few varieties and the difference between them is not great. Some of the leading ones are Orange, Van Deman, Pineapple, Champion, Smyrna, Borgeat, Beethe's and Rea's Mammoth.

THE PEACH

Perhaps no other fruit industry is so largely built upon one variety as the peach. Many varieties meet important needs, but the Elberta peach dominates the industry. For home and nearby markets, a succession of varieties is usually desirable in order that the season of use may be extended over a long period. The list which follows is made up of some of the best varieties for home and commercial requirements. There may be, however, other sorts that for certain districts and special needs are better suited for planting than those listed. The list does, however, include some of the best varieties for general culture throughout the state and particularly in the southern districts of south central and southeast Missouri where peach growing is most profitable. Dates of fruit ripening or harvesting are based chiefly on the varieties as they are grown in the southern one-third of the state. Varieties here generally ripen from a few days to a week or ten days earlier than the same kinds when grown in central and north Missouri.

Mikado.—This is a very attractive peach, earliest good yellow, with a bright blush, round, medium sized, good quality, semi-cling, season southeast Missouri about July first. The buds are very hardy. The fruit is of particular value for local markets and should be handled carefully as it softens rapidly and bruises easily. The trees are vigorous and productive and may require cross-pollination. They also tend to over-bear and require thinning.

Golden Jubilee.—The fruit is attractive, yellow, with a slight blush, oval, free-stone, large, good quality, bruises easily, but is generally valuable for local markets. The fruit may lack color if trees are over-vegetative. The tree is vigorous, buds

hardy, productive, and the harvest season is a few days after Mikado—July 4 to 10.

Halehaven.—The fruit is large, very attractive, yellow, more red color than Elberta, excellent quality, freestone, tough skinned, short pubescence, colors early, softens slowly and handles well. The tree is vigorous, productive and hardy. It usually sets fruit so heavily, fruit thinning is needed. At this time it is one of the most promising new varieties for Missouri peach growing districts. It ripens one week before Champion, about the last week in July for southeast Missouri.

Red Bird (Red Bird Cling).—The tree is hardy, bears early and abundantly, is a regular cropper and the fruit buds are resistant to cold. Since the fruit is harvested early, the trees withstand drought conditions in late summer and fall much better usually than commercial varieties that ripen their fruit later. The fruit is large, bright glowing red, clingstone, and ripens in southern Missouri about July 25. Growers commend it as an abundant and regular cropper, good for handling, adapted to truck trade and a profitable variety.

Cumberland.—The first good early white freestone. The fruit is good size, carries a heavy blush and very good. The tree is vigorous and productive. The fruit ripens with Golden Jubilee or about one month before Elberta.

Rochester.—The tree is large, vigorous, hardy and productive. Although yellow peach varieties are considered less hardy in the bud than white ones, yet Rochester ranks as one of the most resistant to cold of the yellow sorts. The fruit is medium to large size, lemon yellow changing to orange yellow blushed and mottled with dark red which may prove unattractive. The flesh is yellow stained with red near the pit, highly flavored, very good in quality, and the stone is free. Fruit is harvested in middle July. It is worthy of limited planting.

Champion.—The tree is excellent in form and shape, vigorous, hardy, productive, distinguished by luxuriant green foliage, bears early, and is suited to fertile soils. The fruit matures in early midseason or about last week in July. It is attractive, excellent quality, and medium in size. The flesh is tender, white, juicy, and has a pleasant flavor. Its color is pale green to creamy white with splashes of carmine mingled with a blush of dark red and the stone is free. Because of high quality of fruit, good growth, tree vigor, hardiness, and regular abundant production, Champion is usually considered one of the best early to midseason sorts for home uses and local markets.

Belle (Belle of Georgia).—The trees are large, spreading, vigorous, hardy and very productive. It is a southern variety and reaches its best development toward the South. Of all the commercial varieties, this is one of the hardiest in the fruit bud.

Consequently, it is one of the surest croppers. The fruit is medium size, matures about one week before Elberta, and is roundish oval in shape. The skin is thin, tender, greenish white to creamy white blushed and mottled with light and dark red. The flesh is white tinged with red at the pit, juicy, tender, sweet and mild. It has a semi-free to free stone. The quality is good and the variety ranks high for home uses and the local markets.

Elberta.—Elberta is still the most popular peach on the markets. Its wide and favorable reputation on local and distant markets gives it a distinct and marked sales advantage. Elberta is also outstanding on account of its handling and shipping qualities. These advantages, coupled with the tendency of the trees to bear regular and abundant crops, make the Elberta a leading commercial variety. The trees are not as hardy in bud or wood as some other less desirable sorts, and the fruit cannot be rated high in quality.

The fruit is medium to large size and roundish oblong in shape. The skin is thick, tough, deep yellow partly overspread with red and mottling. The flesh is yellow, juicy, stringy, firm, tender and good. The stone is large and usually entirely free from the flesh. It ripens about August 10. With no other variety to replace it for shipping quality or as favorably known on the distant commercial markets, Elberta may continue to be a favorite for a long time, particularly for distant shipments.

J. H. Hale.—The tree is moderately vigorous, but not quite as large as Elberta. In most sections it is considered self-sterile. The fruit buds are not very resistant to low temperatures, being even more tender than Elberta. It ripens about August 10 with Elberta, and therefore, competes with this variety. The fruit runs larger in size than Elberta and is generally considered more attractive. It is better in quality and may sell for somewhat higher prices on markets where it is known. Fruit growers may consider this variety in plantings for home and market uses.

Late Varieties.—Varieties such as Salwey, Heath Cling, Krummel and others may be found of value for late season use. These late sorts are not now rated as high as formerly because they are very susceptible on account of their late ripening period to attacks of the Oriental Fruit Moth. Consequently, as methods for the control of this pest are not very satisfactory, growers are turning to the early and mid-season varieties as they generally show much less injury from the moth than the late kinds.

Heath Cling.—Heath Cling was probably grown in the colonies before revolutionary days. It is also the oldest named American peach now in cultivation. Few varieties produce hardier, healthier trees. The fruit keeps longest, often being in good condition from October to December. It is sweet and rich

in flavor. The flesh adheres tightly to the stone, but it ranks excellent for cooking, preserving, and pickling. Heath Cling is not as productive as some other varieties, but it has other qualities which recommend it strongly for planting in the home orchard and to a limited extent at least for local markets. Fruit ripens in late September.

Krummel.—The tree is large, hardy, vigorous, and fairly productive. It is usually considered as hardy in fruit bud as Salwey. Krummel is a valuable sort where a late peach is desired. The fruit is large, globose, one-sided, light lemon yellow blushed with carmine. The flesh is yellow, free from stone, red at the pit, very fine in texture, juicy, and the quality is good though a little acid. Krummel is usually considered a profitable variety for the home orchard and for local markets where a late variety is desired. Fruit ripens in late September or early October.

**VARIETIES OF PEACHES IN ORDER OF RIPENING
RECOMMENDED FOR HOME OR MARKET PRODUCTION**

Variety	Flesh Color	Adhesion of pit	Days ripe before Elberta
Red Bird	white	cling	44
Mikado	yellow	semi-cling	37
Early Rose	white	cling	35
Golden Jubilee	yellow	free	30
Alton	white	semi-cling	30
Cumberland	white	free	30
Fair Beauty	yellow	semi-free	23
Rochester	yellow	free	21
July Elberta	yellow	free	19
Vedette	yellow	free	18
Halehaven	yellow	free	17
Valiant	yellow	free	14
Hiley	white	free	12
Eclipse	yellow	free	12
Champion	white	free	10
Polly	white	free	10
Sungold	yellow	free	7
Belle	white	free	3
Early Elberta	yellow	free	3
Elberta	yellow	free	0
J. H. Hale	yellow	free	-3
Shipper's Late Red	yellow	free	-7
Wilma	yellow	free	-10
Salberta	yellow	free	-14
Frank	yellow	cling	-20
Heath	white	cling	-25
Krummel	yellow	free	-35

THE NECTARINE

The nectarine is a smooth-skinned peach. It is often characterized as a fuzzless peach. Most botanists classify it as a sport of the peach. Nectarines often come from peach seed and peaches may arise from the seed of nectarines. Also, nectarine trees often bear peaches and peach trees bear nectarines. It is, therefore, possible for either to be originated from the other by means of bud variations or bud sports. Nor do the trees differ materially; in fact, the chief distinction is that of the smooth skin of the nectarine fruit. The latter is also usually of smaller size, firmer flesh, and has a richer flavor. It is believed by some that the dryness of the flesh, and its aroma and flavor seem to be in some way correlated with its smooth skin.

As in the case of the peach, there are freestone and clingstone varieties. Both fruits also have varieties with red, yellow, and white flesh. Both are adapted to the same soil and climatic conditions and wherever one may be grown successfully, the other may be also. A chief disadvantage in the culture of the nectarine is that its smooth skin makes it susceptible to fungous diseases and particularly to the attack of the curculio.

The time of blooming corresponds to that of the peach and the ripening season for the various varieties occurs with that of the peach. The fruit does not rank as high as the peach upon the markets of the country, however, and for this reason it is usually discriminated against. The chief supply comes from California. In fact, few, if any, other sections produce large commercial quantities although it is highly prized and much sought by those who know and appreciate it.

Lord Napier.—This is perhaps the earliest variety of nectarine. In California the tree is a very heavy and regular bearer and fruit is of high quality. It is also grown extensively in the East for forcing purposes in greenhouses and also in gardens. The tree is fairly large, vigorous and hardy. The fruit ripens early, is large, regular, cream mottled and streaked with blood red. On the side next to the sun a dark crimson cheek often develops. The flesh is white, tender, juicy, good quality, and the stone is free.

Downton.—The tree is medium in size, upright spreading, hardy, and very productive. Fruit ripens in mid-season, color is greenish white with a lively red cheek next to the sun. The flesh is pale green, red at stone, juicy, tender, fine-grained and of good quality. The stone is free.

Sure Crop.—An attractive, firm, freestone, white flesh, large, oval, and nearly overlaid with bright red. The tree is vigorous, productive and believed to be superior to old standard sorts.

Newton.—Newton is considered to be one of the very best nectarines by the New York Agricultural Experiment Station

at Geneva. The tree is large, vigorous, upright, spreading, hardy and productive. Fruit is large, handsome, and highly flavored. It ripens late. The flesh is pale green with faint red radiating from the stone and the quality is very good. The stone is free.

Other leading varieties of nectarines that are planted in both the East and the West are Borden, Cardinal, Advance, Gower, Elruge, Hardwicke, Stanwick, Humboldt, Pineapple, Pitmaston, Orange, New White, and Victoria.

THE APRICOT

The apricot, like the peach, is largely grown in the warmer sections of North America. Except in California, the plantings are not very extensive. This is because the trees bloom very early and late spring freezes and frosts are likely to destroy the fruit buds and flowers. Commercial production is confined almost entirely to the Pacific Coast section, more than 90 per cent of the commercial crop being produced in California. Apricots are grown to a limited extent also in Oregon, Washington, Idaho, Utah, Colorado, Arizona, New Mexico, and New York. Still other states grow it in a small way, but largely for home consumption.

The wood and fruit buds of some varieties of the apricot are more resistant to low temperatures than those of the peach. The profitable culture of this fruit, however, is confined to the milder climates of the country. In most sections it blooms about a week earlier than the peach. Consequently its fruit blossoms are more often killed by late spring cold than those of the peach. In Missouri the apricot is likely to fruit about as often as the sweet cherry. In the southern and southeastern districts, therefore, it may prove worth while for home and local market uses.

Some of the principal varieties of the apricot are Tilton, Moorpark, Belnheim, Newcastle, Alexander, Peach, Hemshirke, Budd, Wilson Delicious, Stella and Superb.

THE SOUR CHERRY

The sour cherry may be grown successfully in every county in Missouri. It will thrive in many different soil types and is able to withstand heat, cold, and extreme dryness to a great degree. The trees are generally more resistant to the attacks of insects and fungi than other stone fruits. It is as regular in cropping as the apple. The sour cherry is particularly immune to San Jose scale and usually requires only two to four spray applications during the spring and early summer for the protection of fruit and foliage.

The trees respond to good culture as other kinds of fruits do. It would be folly as a rule to plant trees without preparing to practice proper cultivation, fertilization, pruning and spraying. With good care, trees should be expected to fruit regularly and profitably after about five years. There is usually a strong local demand for cherries. If this can be met effectively, with adequate labor for harvesting and handling, there are many opportunities for limited plantings in the different districts of the state.

Dyehouse.—The chief advantage of the Dyehouse is its earliness. It ripens its crop about a week earlier than the Early Richmond, which it strongly resembles. The fruit is somewhat smaller than that of the Early Richmond and the trees are not quite as productive. This variety, however, is worthy of a place in the home orchard where an earlier variety than Richmond is desired.

Richmond (Early Richmond).—The Early Richmond is considered the leading sour cherry of its season. The fruit is medium in size, mediocre in quality and ranks fair to good in attractiveness. The fruit is not in as great demand for canning and pie making as Montmorency. Trees of this variety thrive in a great variety of soils. They are vigorous, healthy, and fruitful. The fruit ripens with early sweet cherries and is light red in color. Next to the Montmorency, Richmond is the most popular sour cherry.

Montmorency.—This variety takes first rank as the leading sour cherry grown in the United States. Its fruit is in demand on the chief markets of the country for both canning and home uses. Like the Richmond, it is well adapted to a great diversity of soil types which makes the variety suitable for wide planting. The fruit stands handling well in harvesting, shipping and on the markets. The canned product is attractive. The many good qualities of this variety recommend it as the best in its season.

English Morello.—This is the standard late cherry. The fruit is attractive in appearance, stands harvesting and shipping well, is resistant to brown rot and hangs on the trees after ripening. It is distinctly a canning, preserving, and cooking fruit. As it is so astringent, it is not suitable for eating out of the hand. The trees are hardy but are not as hardy as Montmorency and Richmond. Neither are they adapted to as great a diversity of soils. For a late variety, however, it ranks well and deserves a place in plantings for home and limited market uses.

THE DUKE CHERRY

Duke cherries are hybrids or crosses between the sweet and sour cherries. Consequently, Duke cherries have some of the characteristics of both the sweet and sour varieties. They are generally as hardy as the peach and crop as often. Since they occupy an intermediate place between sweet and sour sorts, they are worth while for both home and commercial plantings.

May Duke.—May Duke ranks high among the early cherries of its class. It is well known and widely distributed. It fills a special place in the cherry orchard as a fruit for the local market and the home.

Royal Duke.—In season of ripening it follows May Duke and is perhaps the standard late variety. It is much like the other hybrids except in time of ripening or in season. It is lighter in color than May Duke and a little later in season. The cherries are also larger and do not hang as thickly, but are scattered along the branches and often found singly. The trees are markedly upright and the foliage is dense. Like the other Dukes, it has a place in the home orchard and is a good variety for the local markets.

Late Duke.—The fruit is not quite as sweet as that of May Duke and it ripens from two weeks to a month later. The trees are more open and spreading than the other Dukes. They are hardy and the blossoming time is late, making the variety adapted to northern conditions. This is a valuable variety for the home orchard and for local sales.

THE SWEET CHERRY

The sweet cherry is very exacting in soil requirements, lacks hardiness to both heat and cold and is susceptible to the attacks of insects and fungi. The trees bloom early and the developing fruit buds are subjected to injury by late spring freezes and frosts. In spite of these drawbacks, sweet cherries are grown for home and local market uses and may be expected to fruit about as often as peaches. Sweet cherries are worthy of trials especially in the southern and southeastern districts.

Gold.—This is an early summer, hardy, delicious sweet cherry. Fruit is large in size and of golden yellow color. The special merits of Gold are its hardiness, productiveness and early bearing habits. It, therefore, commends itself to home and commercial orchardists.

Wood (Governor Wood).—The fruit of this variety ripens early, some time during the first half of June. Fruit is of good size and excellent quality. The color is yellowish white tinged with crimson and the flesh is soft and will not stand shipping. For the home orchard and limited uses, it is considered a good variety.

Tartarian (Black Tartarian).—This has been considered a favorite sweet cherry for home uses and roadside markets. It is too soft for handling and shipping, but it is valued highly in the home and for local uses. The fruit is small but well and favorably known upon the markets. The tree is fruitful and hardy. The fruit is glossy black in color with handsome purplish red flesh of a sweet rich flavor. For the canning trade, the small size is a drawback.

Napoleon (Royal Ann).—As a firm fleshed sweet cherry, Napoleon is the leader. It is also highly praised for the large size, handsome appearance, and high quality of the fruit. The trees are very productive, large, vigorous, upright and spreading in growth. The fruit matures in mid-season. The color is bright red over a yellowish background, distinctly mottled. Harvest occurs about the middle of June. The fruit is well adapted to dessert purposes as well as canning. It stands handling and shipping and has become a favorite with the fruit trade.

Bing.—Fruit is dark red in color, good size, very attractive and high in quality. Trees succeed in Missouri as well or better than most other varieties. It is generally hardy, vigorous and productive.

Windsor.—The flesh of Windsor is firm and holds up well in harvesting and shipping. The quality rates from good to very good. The trees are among the hardiest and thrive in a wide range of soil types. They are also healthy and fruitful. This is a much sought and widely grown late variety.

Seneca.—Black Tartarian type, medium size, purple black, round-cordate, flesh soft, juicy and richly flavored. It is rated as the best of the early sweet cherries.

THE PLUM

More than two thousand different varieties of plums have been described and named from fifteen different species. All of these sorts have been under cultivation at different times. The plum varieties have a great range of flavors, aromas, and colors, as well as forms and sizes. Named and cultivated varieties are widely distributed throughout North America wherever fruits are grown.

It is very essential that a properly planned and thoroughly executed spraying program be followed in the culture of plums. The chief insect enemy of the fruit is the curculio, and the most destructive diseases are *Bacterium pruni* and brown rot. Thorough and timely spraying, however, supplemented by good culture, will usually control these pests.

In general, the markets demand large fruited varieties that stand harvesting and handling well, but in home orchards a wide selection of varieties may be made. Since plum varieties may prove highly self-sterile they may not produce fruit when planted alone. It should also be remembered that the earliest bloomers are the Japanese sorts which are followed by the American varieties and these by the European kinds. The blooming time of the Japanese-American hybrids falls between the blooming periods of the parents with considerable overlapping. It is obvious, therefore, that varieties of each group should be planted in adjoining spaces if possible.

While it is true some varieties of plums and prunes are generally self-fertile and may be planted alone in large blocks where they bear heavily yet it is generally safer to plant a number of different varieties together to provide for cross-pollination at blooming time. Perhaps no less than three to four varieties should be planted together. In fairly large orchards the varieties may be planted in strips consisting of two rows of each variety. In smaller plantings, adjoining trees may be of different sorts.

Hybrid and Native Plums

Most of the native plums are inferior to the domestica, damson, and Japanese varieties. In fact they may be considered of commercial importance in localities where only native plums are hardy and suitable for culture. Hardiness to cold and resistance to heat and freedom from diseases and insects are the chief advantages of many varieties of our native plums.

The Japanese Hybrid Plums constitute a large group of varieties which generally bloom before most of the European sorts. Consequently, these are usually made more susceptible to frost injury than the better European varieties. In flesh texture and quality the Japanese Hybrid plums are much like the American plums. They are not rated highly for either dessert or culinary purposes particularly when compared with the superior European varieties. A few of the leading varieties are Underwood, LaCrescent, Fiebing and Monitor.

Omaha.—This American Japanese hybrid plum is hardy, productive, large in size and of good quality. The fruit is light red in color but a little darker than Wild Goose. The flesh is moderately firm, yellow and juicy. It ripens in early July and is followed by Wild Goose. It ranks well for home and local uses.

Wild Goose.—The Wild Goose plum is an old, well known, hardy, productive variety and the only native American plum planted extensively. It ripens in late July. The fruit is medium size, clear red color, fair to medium in quality and ships and keeps well. It is used for jelly making and may be eaten fresh when thoroughly ripe. This variety has long been a standard in the home and on local markets. The trees are large, hardy, healthy, and when cross-pollinated, are very productive.

Munson.—This is a hardy, early productive plum. The fruit is bright red, skin thin, flesh yellow, soft, quality fair and very early. This is a Munson hybrid.

Waneta.—This is one of the Hansen Hybrids. It is unusually hardy, resistant to injury by heat and drought, bears early and regularly. The fruit is large with purplish-red colored flesh.

Red Wing.—This American-Japanese hybrid plum is medium in size, oblong, dull red, freestone, and good in quality. The

tree is productive and hardy, a Minnesota hybrid, suggested for planting where European plums fail on account of cold.

Superior.—The tree is a heavy bearer, good pollenizer for other varieties and rated as one of the best Minnesota hybrids. The fruit is very large, red with heavy bloom, freestone and good quality.

Hanska.—This is an American-Chinese hybrid. The fruit is red covered with blue bloom, medium size and yellow flesh. It ranks high for dessert as its flavor and aroma are very marked. The tree is hardy, an upright grower and ripens its fruit about August 5 to 10.

Gold.—This is a mid-season variety. It was originated by Burbank. The fruit is very large, clear, semi-transparent golden yellow, and at harvest, overspread with bright carmine blush. The tree is healthy, hardy, long lived, and a good cropper where the fruit buds are not injured by spring frosts and freezes. Gold is a "Japanese Hybrid."

The Japanese Plum

In range of adaptability to soil and climatic conditions, the Japanese plums rank high. This is true because the trees are practically free from black knot, leaf blight, and the attacks of curculio on the fruit. The chief kinds, however, are clingstones, soft-fleshed, early blooming, sensitive to cold, poor in quality and susceptible to brown rot.

Abundance.—Abundance is usually believed to be one of the best plums of the Japanese group. The variety is adapted to a great variety of soils and is generally considered a heavy and annual bearer. One of its chief faults is that it drops too freely as ripening occurs. The tree is vigorous, open-topped, hardy and productive. Blooming season is early, and like other Japanese sorts, it is subjected to injury by late spring freezes and frosts. The fruit is early, pinkish red color, changing to dark red, with thin bloom.

Red June.—Red June is much like Abundance, but it blooms later and the fruits are fairly resistant to the attacks of curculio and brown rot. The trees are large, vigorous, hardy, productive and healthy. The fruit is early, red, bloom thin, tender, and slightly astringent. The flesh is light yellow, sweet and good, and stone clinging. Fruit matures in mid-season.

Burbank.—This is the leading Japanese plum in the eastern states. The fruit is red in color, large in size, sweet and fairly good in quality. It blooms very early, however, and late spring freezes make its planting of questionable value where late frosts are a common problem. Burbank fruits ripen early.

The European, or Domestica Plum

The European plums are the oldest and best known. They also have the widest range in flavor, size, color and aroma. Moreover, their adaptation including hardiness and period of blooming make the groups the most sought in areas where they can be grown successfully. At least, a few varieties seem promising for planting in central and southern Missouri.

Stanley.—One of the most promising new varieties. It is noted for its resistance to spring frosts, early bearing, and heavy production. The fruit is medium to large in size, flesh greenish yellow, good quality, blue, freestone, prune type, and ripens during first half of September. It is suggested for both home and commercial plantings.

Grand Duke.—The fruit is large, purple, blue bloom, yellow fleshed, cling, trees bear early, heavy producer, trees may lack vigor, and usually requires good spraying for brown rot control. Variety should prove satisfactory for both home and commercial plantings.

Gueii.—The fruit is one of best shippers, cling to free, poor in quality, mid-season, fine looking, subject to brown rot, and has made producers money. Tree large, vigorous, hardy, and very productive.

Italian Prune.—The fruit is sprightly flavored, good for dessert, wine color, attractive, freestone, and good keeper. Trees are large, hardy and productive.

German Prune.—Fruit medium size, dark purple, firm, sweet, a favorite for canning. Good keeper, excellent shipper and ripens in midseason. In general, it may give as good results for both home and commercial uses as the Italian Prune. Tree good grower, free from diseases and early, heavy producer.

Shropshire Damson.—The fruit is of medium size, good for culinary purposes and improves in quality when fully ripe. It is one of the best Damsons and is planted extensively for both home and commercial purposes. The tree is rated among the best for size, vigor, hardiness, health, productivity and reliability in bearing.

Other Varieties.—Still other sorts that might be used for home requirements and in trial plantings are President, Yellow Egg, Moore's Arctic, Arch Duke, Pacific, Bradshaw, French, Damson, Silver Prune, and Green Gage.

Cherry Plums.—A class of hardy, disease-resistant, plum-like fruits produced on dwarf trees which can be trained to a bush. The fruit resembles a cherry in size and color but the flesh is similar to that of the plums. The trees tend to bear at an early age, are prolific and hold their fruit firmly. They ripen their fruit early in the season, are drought resistant and suffer very

little from the attacks of insects. These hybrids are superior to wild plums for preserving, as they have a more tender skin, smaller pit and considerable less of the objectionable sourness. The fruit is small and not suited for dessert purposes. Varieties which are generally available are: Opata, Sapa, Compass, Oka and Etopa.

THE GRAPE

The grape is well adapted to a wide range of soil and growing conditions. Perhaps no other fruit will thrive as well or give as good returns for home uses with so little care and attention. But it responds wonderfully to good culture, giving increased yields of higher quality fruit. The vines lend themselves readily to training on a fence, trellis, or building and with proper pruning may be grown successfully on plots or spaces unsuited to other fruits.

As a fruit crop, grapes have many more advantages than are usually accorded them. In their growing regions, they are generally hardy, easily grown, and productive. They may be propagated without difficulty and the plants are relatively inexpensive to buy. The vine is famous because of early bearing, long life under proper culture, and abundant harvests. A crop, moreover, is practically always assured because of late blooming and consequent freedom from frost injury. The fruit is usually popular and in demand at fair to good prices. Also, exceptionally large numbers of by-products are possible, among them being unfermented grape juice, flavoring syrups, jams, jellies, wines, etc. These factors, of course, promise continued interest and improvement in grape culture.

Interest in grape growing continues not only for the home garden, but for various commercial purposes. There is a considerable demand from truck trade, roadside and local markets. Distant shipments are also made to meet the needs and demands of city markets.

Local Market and Home Use Types

There is not a wide range of choice in the selection of commercial varieties of American grapes. It is important, however, that those with established performance records for a designated region be used. Some of the most desirable requirements are hardiness, good quality, attractiveness, wide soil adaptability, evenness of ripening, resistance to serious diseases and injurious insect attack, and freedom from shelling and berry cracking. On the larger markets the black or purple grapes are usually preferred; some of the high quality red grapes, however, command good prices. The white and green varieties do not move as readily or at as high prices as the dark varieties except in small

quantities. A long list of varieties is well suited to the home garden, local markets, and at least a limited special roadside market and truck trade demand. Also in some regions one or more of these may become profitable commercially.

Sometimes it is desirable that vineyards supply grapes from early in the season until late autumn. The following list of varieties has been arranged in their approximate order of ripening. When properly grown, they furnish a succession of ripe, wholesome, and appetizing fruit for a period of about ten weeks.

Variety	Color	Remarks
Fredonia.....	Black.....	Good quality, vigorous and productive. Very compact cylindrical clusters. Excellent shipper. Ripens three weeks before Concord.
Ontario.....	White.....	Produces large, open clusters of medium size berries. Flavor excellent. A strong grower and hardy. Very early.
Moore Early.....	Black.....	Good quality. Fruit similar to Concord but not as good flavor. Requires fertile soil. Ripens 7-10 days earlier than Concord.
Delaware.....	Red.....	Best in quality, very sweet. Clusters and berries small, but bunches compact and attractive. Vine small and slow-growing. An excellent table grape. Harvest follows Moore Early.
Brocton.....	White.....	Similar to Diamond which it replaces. Flesh sweet, melting, and richly flavored. Bunch large and very compact, berries medium to large. Requires special care since the vines tend to over bear. Ripens after Delaware.
Worden.....	Black.....	Good to very good in quality. Fruit very similar to Concord, but clusters and berries larger. Ripens a few days earlier than Concord.
Brighton.....	Red.....	Excellent quality. Quickly deteriorates in quality after maturity. Self-sterile. Ripens about with Worden.
Niagara.....	White.....	Good quality. Very productive. Large, handsome clusters. The standard commercial green variety. Ripens about with Concord.
Lindley.....	Red.....	Considered the best of the red grapes. Ripens about with Concord. Bunches medium in size, loose but well formed, uniform size and attractive. Defects are self-sterility, irregular bearing, and lack of adaptation to soils. A favorite for the home garden.
Concord.....	Black.....	Good quality, very productive. Good for table fruit, grape juice, jelly, etc. Ripens mid-season. Well known and widely grown. Succeeds under the greatest variety of soils and growing conditions. Has been termed "The grape for the millions."
Herbert.....	Black.....	A fine table grape, fruits near perfection. Vigorous, hardy and fruitful. Ripens with Concord but keeps much later and packs and ships better. Self-sterile and must be set near other varieties.
Goethe.....	Red.....	Excellent in quality, vigorous and productive. An excellent table grape. Keeps well into the winter. Good for wine but usually considered too difficult to grow for this purpose.

Catawba.....	Red.....	Excellent in quality, productive and keeps best of all. An excellent late variety. It is adaptable to a great range of soils and climatic conditions. Its great value lies in its high quality and attractive appearance. A standard red grape on Eastern markets.
Sheridan.....	Black.....	The best late black grape. Ripens about three weeks after Concord which it excels in flavor and quality. Bunch and berry are large. The clusters well filled and compact. Has excellent keeping qualities.

Other Grape Varieties

A few other varieties that may be found of value for trial, home and local market uses are:

Early.—Erie (black), Daisy (red), Fredonia (black), Portland (green), Bachman (black), Ontario (green), and Seneca (green).

Mid-season.—Brilliant (red), Hernito (black), Golden Muscat (green), Extra (black), Bailey (black), Caco (red), and Agawam (red).

Late.—Sheridan (black), Urbana (red), Minnie (green), Keuka (red), and Wine King (black).

European Varieties.—These consist of the varieties grown in California and the Old World. They possess high quality and great production capacity but are not generally adapted to growing conditions that prevail in Missouri. The vines are particularly susceptible to injury by winter temperatures and are subject to serious attacks of diseases. Most attempts in growing European grapes, therefore, have failed although producers may occasionally, through careful winter protection and good culture, be able to grow the vines fairly well. The best results have come from vines grown in the extreme south central and southeast parts of the state.

Varieties worthy of trial plantings are Actoni, Bakator, Black Malvoise, Chasselas Golden, Feher Szagos, Lignan Blanc, Muscat Hamburg, and Sultanina.

THE STRAWBERRY

Many strawberry varieties are cosmopolitan and grow successfully over a wide area. Others are restricted to certain sections or localities. Of the 1800 or more named varieties, relatively few are adapted to any one combination of soil, climate, method of growing, or marketing condition. Some are called pistillate or imperfect because of their failure to produce pollen at blooming time for fertilization and fruit setting when planted alone. This difficulty may be overcome by planting every third or fourth row to a perfect variety such as Dunlap. In most cases

only perfect varieties, however, should be planted. With these the grower eliminates a risk and may count on just as large yields. Pistillate or imperfect sorts are not listed, therefore, or described. It is also well to plant varieties which have proved successful in the particular locality concerned. New types, no matter how well advertised, should be tested for several years by growers and the Agricultural Experiment Station to determine whether they are better than standard sorts before making large plantings.

While the strawberry will grow and produce profitably nearly everywhere, there is a marked difference in its growth and production in different sections. Perhaps no other fruit crop is influenced so greatly by soil and climatic conditions. A distance of 50 to 100 miles may be very influential. It is important that varieties of firm flesh and good handling quality be selected for shipment. Frequently only one variety is grown in a district for commercial purposes as other sorts rank low in production, are poor in quality, and do not grow well.

Time of ripening varies greatly. For some localities late varieties are most profitable because the harvest comes when there are fewer berries on the markets. For others, early kinds may be selected as the crop meets less competition. It may pay to plant early, mid-season, and late varieties in order to prolong the harvest, sales and shipments. If this is done, a careful study of the available list should be made in order to choose kinds best adapted to the particular section and market demands.

Varieties of Recognized Value

The list of varieties which follows includes some of commercial importance in different parts of the United States and Canada. It is not complete, and there are probably other varieties as good or better than some named, especially for certain Missouri localities. Unless otherwise stated, all included have perfect flowers. It is important to select for culture those that conform to the requirements of the producer's home uses or prospective markets.

Premier (Howard-17).—Premier is one of the most widely planted early strawberries. It is a sure cropper. The fruit is medium red, of good flavor, very attractive, large, very uniform, firm, and fairly satisfactory for distant shipments by truck. The plants are vigorous and healthy and grow well on most soils. It is a good plant maker, may be placed on the markets about ten days ahead of mid-season varieties and when compared with other sorts it ranks as superior in size and productiveness. It is the best early variety for Missouri.

Dunlap.—This is one of the leading varieties for the central states. For home uses and local markets it is particularly well adapted to central and north Missouri. It is a good plant producer,

the fruit is high in quality and very attractive. Dunlap is one of the best pollenizers for pistillate sorts, as it blooms heavily from early until late with its greatest production occurring in mid-season. It thrives better under neglect than most other varieties. The fruit is not firm enough for distant shipments but it is highly prized for canning and local markets. It succeeds well in all parts of the state.

Aroma.—This variety is a vigorous grower and ranks medium to good as a plant maker. The berries are large, medium in quality, uniform, light red in color with a bright green calyx and are very attractive in packages. Aroma ships well and with proper handling may be placed on distant markets in perfect condition. It is grown extensively for distant markets in southwest Missouri, northwestern Arkansas, Kentucky and Tennessee. The fruit ripens from mid-season to late. This is the best commercial variety for distant shipments.

Blakemore.—The plants make a vigorous healthy growth and produce a large number of new plants. This variety ranks high in production. The berries are firm, follow Premier in season, medium in size, and will stand shipping long distances. Toward the end of the season in dry years, the berries may run small. On good soil it makes too many plants and requires thinning. It sells well and is good for canning. Strains free from the yellows disease should be planted.

Varieties for Trial

Culver.—Trials in Southwestern Missouri have shown this variety to be very drought resistant and highly productive. The plants grow vigorously, form new plants abundantly and the foliage appears to be quite resistant to leaf diseases. The berries are of good size and color but bruise slightly. The flavor is sprightly and the quality very good. This is the most promising berry tested under Missouri conditions since the introduction of Blakemore. Ripens just before Aroma.

Fairmore.—Apparently adapted to southern conditions. Plant is vigorous and healthy. It makes a good row under extremes of hot dry weather. The firm flesh and tough skin should make it a good shipping berry. Worthy of trial.

Aberdeen.—This variety is adapted to heavy fertile soils. It is resistant to the diseases which attack strawberries on wet locations. The berry is large, light colored and very attractive but too soft for shipping. Should be tried where other varieties fail.

Southland.—It seems to be of greatest value in the southern states. It does not appear to be firm enough for the general markets. It grows freely, ripens in mid-season, the fruit is

attractive and high in quality, and the plants are productive. As a home garden variety, it may be worthy of a trial.

McClintock.—This variety produces large attractive fruit which handles well. The yield in Tennessee has been equal to or better than other varieties commonly grown. It maintains good size throughout the season. Growth starts early and plants have been vigorous on both poor and fertile soils. The fruit ripens in mid-season, stands handling and shipping as well as Klondike and grades out larger.

Bellmar.—Plants of this variety are somewhat more vigorous than Premier. It is productive, the berries are long and conical bright red and very attractive with large green calyx. In comparison with Premier, the fruit is firmer, of better quality and holds its size about as well. It is a worthwhile mid-season new variety.

Catskill.—Catskill is productive, has hardiness of bloom, good quality of fruit and average size. It ripens in mid-season and is generally considered worthy of trial.

Everbearing Varieties

The so-called everbearing varieties produce fruit at the usual time and again in late August, also during the fall months if the growing conditions are good. Many of those not designated as everbearing may fruit equally late in the season if given as intense culture as the everbearing varieties.

Of the "everbearing" types, the most popular are Progressive, Mastodon, Lucky Strike, Champion, and Gem. These are more widely grown than any others of their class. Investigations made both under irrigation conditions and where there is a normal rainfall have shown that the everbearers are not as profitable as the spring bearers. But the former may be successfully grown in the garden for home use and they may also be grown for local markets where rainfall, irrigation and demand are particularly favorable.

THE CANE AND BUSH FRUITS

Cane and bush fruits include those fruits borne on canes and bushes or small woody plants which do not have a central stem or axis. The brambles have biennial tops and are classified as cane fruits while the bush fruits have perennial tops. The cane fruits or brambles consist of the black, red, and purple raspberry, the blackberry, dewberry, and related forms and hybrids. Under bush fruits are grouped the gooseberry and currant which are common in Missouri fruit plantings. Both groups, and especially the brambles, are grown in nearly all parts of the United States and Canada.

The plantings range from a few brambles and bushes cultivated for home use to plantations in which considerable acreages are involved. For the most part, these fruits are of native rather than foreign origin. Few other fruits as widely cultivated bear this distinction.

As compared with tree fruits, the turnover of cane and bush fruits is much more rapid. This enables the producer to obtain quicker returns. These fruits may be profitable to the producer before tree fruits come into bearing and may be maintained permanently as a diversified system of fruit crop production.

THE BRAMBLES

The berries of the bramble fruits are soft and highly perishable. The fruit must, therefore, be handled carefully and quickly. Also since the fruit ripens very rapidly and over a comparatively short period, it necessitates the employment of large picking crews. This being true, immediate consumption, processing or placing in cold storage, is required to prevent spoilage.

The probable length of life of the bramble plantation is rather short, ranging from four to five years or seven to nine years, depending much upon the particular section where the fruits are grown and the care given the planting. The bramble fruits may, however, bring very profitable returns within two or three years. The income when compared with that received from truck and grain crops, is very satisfactory. The crop may be grown on high-priced land, provided the location is where a quick and early disposition of the fruit may be made. The labor required in production is comparatively small and one man is able to handle a considerable acreage except at harvest time.

There is a large number of varieties for each of the brambles. But most of these are not of great commercial importance, and are restricted to certain localities or districts. New varieties are constantly being introduced, and in many cases are received with enthusiastic approval. Some of these are indeed promising and worth while, but they should all be tested and compared with standard types over a period of years to definitely determine their commercial value. In the selection of varieties for any particular section, the local state experiment station and successful growers in the region should be consulted. There is an opportunity for improving the sorts now being grown. Those mentioned in connection with each bramble are worthy of consideration if adapted to the district concerned.

Blackberries

The blackberry, when compared with other fruit crops, is of recent development although it was given some attention as early as 1840. It is one of the most recent of the native fruits of North America to be improved and brought into general cultivation. Wild plants are still abundant in waste lands of most parts of the state and the chief production of many districts is still from the uncultivated wild types. Blackberries are grown fairly extensively for home use. The states leading in production are Missouri, New Jersey, Illinois, and California; and there are nineteen states in which the fruit is of commercial importance. Considering the fact that the major development of the crop has taken place since the period of the Civil War, this is a splendid record for the blackberry.

Blackberries may be divided into two groups: Early and late maturing sorts. Early varieties are usually preferred because they ripen before the wild plants and thus avoid competition with them. Also, the early varieties may escape, to some extent, the hot dry weather which often prevails in some districts during the ripening season of late varieties.

Early Harvest.—Tests conducted by the Missouri Agricultural Experiment Station have shown that Early Harvest out-yielded all other early varieties. The berries are medium in size, juicy, sweet, firm, and ship well. The plants are erect, stocky, vigorous, fairly hardy and very productive.

Eldorado.—This variety follows Early Harvest in ripening. The fruit is medium to large, sweet, and the quality is good. The plants are erect, vigorous, very hardy, productive, and resistant to orange rust. It is a standard variety and is planted generally in Missouri.

Brainerd.—The plants are extremely vigorous and productive. The canes are so large and heavy that they require support. The berries are large and excellent for culinary uses, but are not satisfactory for dessert unless allowed to become fully ripe. The fruit resembles that of the Eldorado in shape and flavor. The season is very late with most of the fruit maturing in August. It is apparently not hardy north of the Missouri river.

Alfred.—This is a promising new variety. The fruit is large, firm, sweet, of good quality, ripens about a week earlier than Eldorado, and continues through a long period. The plants are erect, vigorous, hardy, and productive. It is worthy of trial plantings.

Ward.—Over a five year period the Missouri Agricultural Experiment Station has found the Ward to be the highest yielding late variety. The plants are upright, vigorous, usually hardy, productive, and resistant to orange rust. The fruit is similar to that of Snyder in size and quality.

Other varieties for consideration and planting are Lagrange, Blowers, Ambrosia, Ancient Briton and Mersereau.

Dewberries

This fruit is often called a trailing blackberry; in fact, it is distinguished from the blackberry by its trailing form of growth and the early ripening of the fruit. Other differences are its deeper rooting habit, the comparatively few flowers in the cluster, and its habit of rooting from the tips of the canes. It is productive and may be grown profitably over a wide range of soil types, varying from poor to good. The properly ripened fruits rank high for size, flavor and quality: The berries are delicious and refreshing.

Lucretia.—This is the best known variety and it is planted generally throughout the state. The plants are trailing and need support. They are vigorous, hardy, and productive. The fruit ripens early, is large, firm, good quality, and jet black in color.

McDonald.—McDonald is a blackberry-dewberry hybrid. The plants are vigorous, productive and drought-resistant, semi-trailing, and may need support. It is subject to injury in severe winters and is self-sterile. Every fourth row should be planted to a pollinizer, consisting of Lucretia dewberry or Early Harvest blackberry. The fruit of the McDonald is large, oblong, and of good quality.

Other Varieties.—The Bartel has been hardy and profitable in the North. A variety of the southern type is Manatee, while Skagit Chief with others, represents the western dewberry. The chief varieties of commerce, however, are Lucretia and Bartel. Both Maise and McDonald are grown extensively in the western states and the McDonald is profitable in the East.

Youngberry

The youngberry is believed to be a cross between the loganberry and the dewberry. The berries are very large, dark purplish red in color and excellent in flavor, soft, tender and very difficult to handle without doing injury to them. The canes are vigorous, productive, trailing and need support. The plant is not entirely hardy under Missouri winter conditions, and where temperatures fall much below zero, severe winter killing of fruiting canes may result. Even in the southern third of the state, late fall and early winter mulching is suggested, laying the canes on the ground and covering them to a depth of two or three inches. Moreover, the canes, for good production, should be lifted in the spring and trained on a support similar to the grape trellis.

Boysenberry

The boysenberry is much like the youngberry, but somewhat hardier it is believed. In most sections even of southern Missouri, except the extreme southeastern section of the state, mulching as in the case of youngberries is suggested to prevent winter cold injury to the canes. It produces rapid growth and bears heavy crops of large berries. The fruit ripens with the youngberry and dewberries. In fact the fruit is so much like that of the youngberry it is difficult to determine the difference.

Raspberries

The raspberry varieties may be divided into three classes: Black raspberry, purple raspberry (hybrid of red and black raspberry), and red raspberry. A number of different species are in cultivation in restricted or extensive areas. The fruit is grown for home and local market uses in all the counties of the state.

RED VARIETIES

Latham.—This is one of the newest of the red varieties. It is hardy, very productive, and is increasing in popularity as it is planted widely over the state. The fruit ripens in mid-season and may be picked over a period of about three weeks. The berries are light red in color, large, and fair in quality. It is a worthy variety.

Chief.—This variety is much like the Latham in several important characters, but it is not as productive and the fruit is smaller and of better quality. It ripens about a week earlier than Latham and for this reason is valued for the early markets. The plants are productive, unusually vigorous, and sucker freely.

Newburgh.—The Newburgh was introduced in 1929. It ripens with Chief. The plants are vigorous, drooping, may require support, and are very productive. The berries are dark red, large, firm, less crumbly than Latham, and good quality.

Indian Summer.—The most promising of the fall bearing types. The plants make a good growth and form a fair number of suckers. It is hardy and a heavier producer than Ranere. Berries are large, dark red, somewhat irregular, rather soft and crumbly. The quality is good.

Other varieties that may be tried and found valuable are Cuthbert, June, and Viking.

BLACK VARIETIES

Cumberland.—It is a leading standard mid-season variety and is planted generally in all parts of the State. The fruit is of fair size, firm, good quality and attractive. Plants are vigorous, hardy, productive, but only fairly resistant to anthracnose and virus diseases.

Bristol.—The best black raspberry for Missouri. The bushes are hardy, vigorous and bear heavy crops. The season is early so that most of the fruit matures before dry weather. The berries are large, firm, fairly glossy, attractive and of excellent quality.

Naples.—A good late black raspberry for market. The berries are large, glossy, attractive and of good quality. It is about one week later than Bristol. The plants are vigorous, productive, hardy and resistant to anthracnose.

Gregg.—Of Gregg, it is said that the defects are in the plants and the good qualities in the fruit. The plants are susceptible to virus diseases and anthracnose, may winter kill to some extent, and are adapted to few soil types. The fruit is late, medium to large, handsome, excellent quality, and rated as best of all black raspberries. In spite of its faults, Gregg is a variety worthy of planting in Missouri.

Logan.—A promising early hardy variety. It is said to be comparatively resistant to virus diseases and not subject to injury by drought. The berries are large, firm, and very good and they ripen before Cumberland.

PURPLE VARIETIES

The purple raspberries are hybrids between the red and black raspberries. On the markets the fruit has not met with as much favor as it merits. This has been due to the dull unattractive purple color of the berries. Purple raspberries are valuable, however, for table use and are unexcelled for canning and culinary purposes.

Cardinal.—Under Missouri conditions, Cardinal has proved to be one of the best of the purple raspberries. The fruit is medium in size, firm, and of good quality. The plants are vigorous, spreading, productive, hardy, upright, and resistant to diseases. The season is late. It is better adapted to southern conditions than most sorts.

Sodus.—This is the most productive purple raspberry ever grown at the Missouri Station. The plants are hardy and stand dry weather well. The berries are very large, firm, medium purple, subacid and good in quality.

Potomac.—Potomac may be worthy of planting because of its resistance to anthracnose and leaf spot. The fruit is large, firm and good quality. The plants are upright, productive, hardy, vigorous, and the season of ripening is late.

THE BUSH FRUITS

Gooseberries and Currants

Gooseberries and currants may bear crops in three years after planting but the maximum production is not reached until the bushes are six years of age. An average of three or four tons per acre is considered a good yield. The bushes have perennial tops and roots. The individual branches bear for a number of years. Since the branches soon pass the age of maximum production, it is necessary to remove them when this state is reached in order that younger and heavier yielding wood may take their place.

These fruits are valued highly for making jellies, jams, preserves, tarts, etc. Being very rich in pectin, they are particularly important when blended with other fruits or when used alone.

Gooseberry Varieties.—Since American varieties of the gooseberry are generally more productive and higher in quality, they are usually planted throughout the United States and Canada instead of the larger and showier European sorts.

The Downing, which is considered to be a hybrid with European species, is grown more extensively than any other variety. It is the standard for home and market uses. The plants are medium to large, vigorous, upright, hardy, spreading, very productive and healthy. The fruit ripens in mid-season, is medium in size, juicy, tender, aromatic and quality is very good.

The Houghton ranks next to Downing in importance. The plants are large, vigorous, upright and spreading, dense, productive, healthy and hardy, but susceptible to mildew and aphid attack. The fruit is small, unattractive, medium firm, juicy, tender and very good quality. It ripens in mid-season.

Glendale.—The plants are resistant to high temperatures and disease, vigorous and good producers of high quality fruit. This is one of the few varieties that will grow in southern Missouri.

Pixwell.—A very hardy and vigorous grower also resistant to drought and disease. The berries are large oval and an attractive green color. It is easy to pick since it has only a few soft thorns.

A new variety known as Poorman has larger berries and fewer thorns. It is possible that it may replace some of the older types. Valuable European varieties are Industry, Chautauqua, Crown Bob, and May Duke.

Currant Varieties.—Satisfactory varieties of currants are Wilder, Fay, Red Cross, and Perfection. All of these ripen their fruit in mid-season and produce large red berries in rather large and compact clusters. The plants are vigorous and comparatively

free from insects and diseases and are generally satisfactory in all other characters.

One of the best white currants is the White Dutch, and it is possible that this sort is worthy of further trials and plantings. Of the black currants, the Naples is one of the best known. The Crandall is also a black currant of some prominence since it is able to endure hot, dry summers and with good care will bear profitable crops. Other standard black types are Prince of Wales and Champion.

SUMMARY OF FRUIT VARIETIES FOR MISSOURI

The varieties which follow are suggested for distant shipments, including large car lot movements and for roadside market sales. They may, however, be equally well suited for home culture. Still other varieties for certain conditions and particular districts may be as good or better than the sorts that have been listed. Additional numbers of varieties may also be required for special needs. Furthermore, varieties of fruits little used for commercial purposes have been omitted from the Summary, but they are discussed under appropriate headings and may be referred to easily by consulting the Table of Contents.

APPLES

Commercial Varieties

Summer.—Yellow Transparent and Red Duchess.

Late Summer and Early Fall.—Maiden Blush and Wealthy.

Late Fall and Early Winter.—Double worked Grimes, King David, Jonathan or red sports, Golden Delicious and Delicious or red sports.

Winter.—York Imperial or red sports, and Red Winesap. Also varieties proved to be profitable but not high in quality are Red Rome, Gano or Black Ben Davis and Collins (Champion).

For Roadside Market

Summer.—Early Harvest, Yellow Transparent, Red Duchess and Chenango.

Late Summer and Early Fall.—Summer Champion, Maiden Blush and Wealthy.

Late Fall and Early Winter.—Double worked Grimes, King David, Jonathan or red sports, Golden Delicious, Delicious or red sports.

Winter.—Stayman or Staymared, Red Winesap, Turley, Arkansas, York Imperial or red sports, Red Rome, Gano or Black Ben Davis, Collins (Champion), Willow Twig and Ingram.

PEARS**Commercial Varieties**

Fall.—Vermont Beauty, Garber, Kieffer.

For Roadside Market

Summer.—Tyson, Seckel.

Fall.—Vermont Beauty, Garber, Kieffer, Lincoln, Sheldon and Phelps.

PEACHES**Commercial Varieties**

Early.—Red Bird and Halehaven.

Mid-season.—Belle and Elberta.

Late.—Salberta, Frank (Clingstone) and Krummel.

For Roadside Market

Early.—Red Bird, Mikado, Cumberland, Golden Jubilee, Rochester, Fair Beauty, Vedette, and Halehaven.

Mid-season.—Hiley, Belle, Champion, Eclipse, Sungold, Elberta, and J. H. Hale.

Late.—Shippers Late Red, Wilma, Salberta, Frank, Heath and Krummel.

SOUR CHERRIES**Commercial Varieties**

Early.—Richmond (Early Richmond).

Mid-season.—Montmorency.

For Roadside Market

Early.—Dyehouse and Richmond (Early Richmond).

Mid-season.—Montmorency and English Morello.

DUKE CHERRIES**Commercial Varieties**

Mid-season.—Royal Duke.

For Roadside Market

Early.—May Duke.

Mid-season.—Royal Duke.

Late.—Late Duke.

SWEET CHERRIES**Commercial Varieties**

Early.—Gold and Seneca.

Mid-season.—Napoleon (Royal Ann).

For Roadside Market

Early.—Gold, Wood (Governor Wood), and Seneca.

Mid-season.—Napoleon (Royal Ann), Tartarian (Black Tartarian), Bing, Windsor, and Seneca.

PLUMS**Commercial Varieties**

Early.—Munson, Red June, Gold, Wild Goose.

Mid-season.—Green Gage, Shropshire Damson, Lombard and Omaha.

Late.—French Damson, President, German Prune, and Italian Prune.

For Roadside Market

Early.—Munson, Red June, Early Gold, Wild Goose, Underwood and Red Wing.

Mid-season.—Gueii, Superior, Green Gage, Yellow Egg, Lombard, Omaha, Shropshire Damson, Bavay and Waneta.

Late.—German Prune, Italian Prune, President, Stanley, French Damson and October.

GRAPES**Commercial Varieties**

Early.—Fredonia and Ontario.

Mid-season.—Concord and Niagara.

Late.—Catawba and Sheridan.

For Roadside Market

Early.—Seneca, Fredonia, Ontario, Moore Early, Portland, Delaware, Merrimac.

Mid-season.—Worden, Brocton, Niagara, Concord, Herbert and Brighton.

Late.—Catawba and Sheridan.

For Wine Making

Norton, Missouri, Reisling, Muench, Wine King and Catawba.

STRAWBERRIES**Commercial Varieties**

Early.—Premier and Blakemore.

Late.—Aroma.

For Roadside Market

Early.—Premier and Blakemore.

Mid-season.—Dunlap, Dorsett, Catskill. Fairmore, Culver, Aberdeen and Cato.

Late.—Chesapeake, Aroma and Gandy.

Everbearing.—Mastodon and Gem.

BLACKBERRIES**Commercial Varieties**

Early.—Early Harvest.

Mid-season.—Alfred and Eldorado.

Late.—Ward.

For Roadside Market

Early.—Early Harvest, Lucretia and Boysenberry.

Mid-season.—Alfred, Eldorado, Snyder and Blowers.

Late.—Mersereau, Ward and Brainerd.

RASPBERRIES**Commercial Varieties**

Early.—Bristol and Sodus.

Mid-season.—Latham and Cumberland.

Late.—Gregg and Cardinal.

For Roadside Market

Early.—Bristol, Chief, Indian Summer and Sodus.

Mid-season.—Latham, Newburg, Naples and Cumberland.

Late.—Gregg, Cardinal and Potomac.

GOOSEBERRIES**Commercial Varieties**

Mid-season.—Downing and Glendale.

For Roadside Market

Mid-season.—Downing, Glendale, Houghton, Pixwell, and Josselyn.

CURRANTS**Commercial Varieties**

Mid-season.—Wilder, Perfection and Fay.

For Roadside Market

Mid-season.—Wilder, Perfection, Red Cross, Red Lake, White Dutch, Naples, Crandall and Champion.