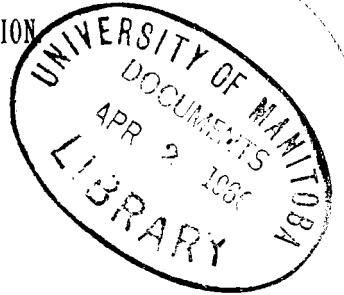


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THE STATE AGRICULTURAL COLLEGE.

2) THE AGRICULTURAL EXPERIMENT STATION

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Notes on Plum Culture.

Approved by the Station Council,
ALSTON ELLIS, President.

FORT COLLINS, COLORADO.

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NOTES ON PLUM CULTURE.

BY CHARLES S. CRANDALL.

Prefatory note on the application of horticultural rules.

There are certain general rules in the practice of horticulture that are capable of wide application. If we say that cherry trees should never be planted on wet or mucky soil, we state a general rule, equally applicable to any section of the country.

There are certain other rules, such as those governing the choice of varieties, selection of stocks, season for and manner of budding or grafting, time of planting and frequency of irrigation, that may be called specific rules. These are of necessity local in character and may be quite restricted in application.

Possibly no state presents greater diversity in local conditions that govern horticultural practice than does Colorado. Not only do wide differences exist between eastern and western sides of the Continental Divide, but either slope may be divided into sections that would warrant considerable differences in practice on many points, and then, each section may have peculiarities that would subdivide it. Even the differences between the two banks of a stream, or the varying soil conditions of two adjoining farms, may present factors that modify successful practice.

If a man moves from one section to another he will naturally attempt to grow the varieties and follow the methods with which he is familiar. He meets failure in many particulars and after a time learns by experience that his new surroundings call for different methods and likely different varieties. It has always been the experience in new countries that the pioneers in horticultural work made mistakes which they found expensive and discouraging, but by persistence they learned to avoid the early errors and finally

achieved success. Later comers can, and should, profit by the experience of these pioneers. The methods they have found successful can be safely followed, no matter how they differ from those successfully practiced elsewhere.

The specific rules to which I here refer are often discussed in public, and frequently the views expressed are very diverse. Two men may discuss a particular practice, each persistent in holding his honestly expressed conviction, derived from personal experience, to be the only correct one. Each knows he is right and no amount of discussion will bring them to the same view. The newcomer seeking information is confused by the opposite views so strenuously contended for. Transactions of societies and the horticultural press bear evidence that such discussions are not infrequent. The writer is of the opinion that in many cases these discussions do more harm than good, or are at least profitless, because they are dropped with the differences unexplained. Inquiry will often bring out differences in the local conditions under which the experiences have been acquired that will fully account for the diverse views expressed.

The idea that I would emphasize and urge upon those who contemplate entering upon horticulture as a business is, that a careful study should be made of all the conditions surrounding the particular place chosen. Sum up the experience of the pioneers, consider the liability to late spring frosts, and early fall frosts, to storms and winds. Examine into the water supply, soil, subsoil, slope, exposure, direction of prevailing winds, and every other feature that may have bearing upon future success. Attention to these factors will enable intelligent action, saving expense and avoiding disappointment.

I am lead to dwell in some detail upon this matter of the application of specific rules because so many requests for advice on the points enumerated are constantly being received. Usually inquiries are unaccompanied by any statement of local conditions or aims in view, and it is difficult, often impossible, to give the desired information except in the most general terms, and this is unsatisfactory both to the writer and to the seeker after information.

DERIVATION AND DISTRIBUTION OF OUR PLUMS.

The genus *Prunus* as now constituted embraces those species from which have been developed all our stone fruits, Almonds, Peaches, Nectarines, Apricots, Plums and Cher-

ries. Its representatives are widely distributed over the earth and the number of species as given by different authors varies greatly. Bentham and Hooker in their *Genera Plantarum* place the number at about eighty. A later work, the *Index Kewensis*, recognizes 121 species, and records 290 names as synonyms. The 121 species here considered valid are distributed as follows:

Eastern hemisphere 87 species, 15 of which are credited to Japan and 12 to China. Western hemisphere 32 species, 21 of which belong to the United States and the region north. Seven are credited to Mexico and four to South America and the West Indies. Two species are recorded as of unknown origin.

Our American manuals record species of the genus as follows:

Botany of California (1876), 6 species.

Chapman's *Flora of the Southern States* (1883), 7 species.

Coulter's *Manual of the Rocky Mountain Region* (1885), 5 species, 1 variety.

Gray's *Manual*, 6th Ed. (1890), 10 species, 1 introduced variety.

Coulter's *Flora of Texas* (1891), 8 species.

The Britton and Brown *Flora* (1897), 16 native, 4 introduced species, 2 native and 1 introduced varieties.

Taken together these floras recognize 27 native and 4 introduced species, and 3 native and one introduced varieties.

Of the native representatives of the genus, 16 species and 1 variety are true plums, or of such close affinity as to readily class with them, while 11 species and two varieties are cherries or belong with the cherry group. Nearly all the species enumerated in the manuals are, or have been at some time, introduced into gardens and cultivated, either for their fruits or as ornamentals, but the varieties now catalogued by nurserymen and grown in orchard, represent but few species. Of the native cherries only the shrubby sandcherries (*Prunus pumila*, *P. Besseyi*, and *P. cuneata*) are grown for fruit. The Wild Red Cherry (*P. Pennsylvanica*) is occasionally used as a stock upon which the common sour cherries, of European origin, are grafted; it has also been used to a limited extent as a stock for some of the plums.

Of the native plum group, three species (*P. Americana*, *P. hortulana* with its variety *Mineri*, and *P. angustifolia*) have furnished nearly all of the cultivated varieties. The Beach plum (*P. maritima*) is the parent of but one variety of

doubtful value. The Mariana so largely used for stocks, and the De Caradeuc are closely related, but of uncertain origin. A few varieties are probably hybrids, although the manner in which most of them originated is more a matter of speculation than of definite knowledge. There are still other varieties that cannot even be classed as hybrids and whose ancestry is likely to remain undetermined. Professor Bailey of Cornell, who has given the whole plum group careful study, arranges the native varieties into groups as follows:*

The American Group—*Prunus Americana*.

The Wild Goose Group—*Prunus hortulana*.

The Miner Group—*Prunus hortulana* var. *Mineri*.

The Chicasaw Group—*Prunus angustifolia*.

The Mariana Group—Of uncertain origin. De Caradeuc assigned to *Prunus cerasifera*, and Mariana thought to be a hybrid.

The Beach Plum—*Prunus maritima*.

The Wild Plum of the Pacific Coast—*Prunus subcordata*.

Hybrids, unclassified varieties—Of uncertain origin.

Our foreign introductions belong to two groups:

The European Plums, such as Lombard, Green Gage, and the numerous prunes—*Prunus domestica*.

The Japanese Plums—*Prunus triflora*.

While the European plums can be grown in some sections, the tender nature of the fruit buds makes them uncertain on the eastern slope, except in favored localities, and dependence must be placed mainly upon the Americana varieties. In the fruit districts of the western slope the Wild Goose is eminently successful and stands at the head of the list of profitable varieties, but it is probably too tender for the eastern slope, certainly for the northern and central districts.

In general throughout the West the native plums are proving profitable. Even in districts where the domestica varieties are successfully grown, the native red plums sell in competition with them, and at remunerative prices. While it may be admitted that most native varieties are inferior in size and flavor to those of the domestica class it should be remembered that the extended introduction of the natives is comparatively recent, that the improvement in them has been rapid, and that they offer wonderful possibilities in the direction of future development. All the

* See bulletin No. 38, Cornell Experiment Station.

better varieties are very productive. Some show a strong tendency to excessive production, a habit which if allowed to go unchecked, not only gives inferior fruit, but tends to shorten the life of the tree. With such varieties systematic thinning must be practiced in order to insure regular crops, and fruit of the largest size and best flavor. Then, having produced good fruit, if the grower will exercise the same care in handling that is given other fruits, and will place them on the market in the same attractive packages, the demand which already exists will be greatly stimulated.

PROPAGATION OF THE PLUM.

Most varieties of plums have come to us as seedlings selected and retained because of their good qualities; they show development or variation from wild types in varying degree, but with all, the departure is such that we can not reproduce them through the seed, and in order to maintain them we are forced to adopt other means.

All varieties are perpetuated by either budding or grafting, usually on plum stocks. The kinds available as stocks are various and exhibit as great differences as appear between the varieties to be propagated. No one stock can be regarded as perfectly satisfactory for general use with all varieties, and it follows that care and thought must be exercised in making choice of what shall be used.

The character of the soil, whether light or sandy, or verging on the other extreme of heavy clay, and the general features of the climate will largely govern this choice, but consideration must also be given to the characteristics of the varieties to be propagated.

The desirable varieties have parentage in widely different species, each of which has characteristics peculiarly its own. The derivative varieties follow more or less closely after the parent species, inheriting habits, likes and dislikes, which must be regarded if we achieve success in their management. Even among derivatives of the same species we may find varieties sufficiently different to call for the use of different stocks and different methods of treatment. This would be looked for among the varieties that have been under cultivation for the longest periods, and is due to the fact that the variation and development from the original type has not been along parallel lines. Differences in climate, in food supply, and in general environment have led to diver-

gence resulting in races which possess distinctive and well-marked characters.

Some knowledge, therefore, of the history and derivation of varieties is essential to the propagator in order that he may make intelligent selection of the stocks upon which to work his profitable varieties. Successful propagators, well versed in the history of varieties, and in the principles of culture will, however, often differ in their estimate of available stocks, just as they will differ on methods of practice. Strong growing varieties are not suited to very slow growing stocks because they over-top them and the trees are short lived. On the other hand success does not follow the attempt to force a slow-growing variety by working it upon a rank-growing stock. The nearer the variety to be grafted corresponds with the stock to be used in general habit and vigor of growth, the better will be the prospects for health and longevity in the tree.

Figures 1 and 2, Plate I, illustrate an overgrowing of the stock that is not uncommon. Figure 1 is a Yellow Sweet, (*Prunus Americana*,) planted in 1894. The enlargement just above the union is marked, and it is increasing each year. Figure 2 is a Wolf (*Prunus Americana*) tree of uncertain age, probably 14 or 15 years old, in which the enlargement is still more marked. We have no information as to the stocks used in either of these cases, but the fact that there is not perfect affinity between the varieties and their stocks is apparent.

For the European plums such as Lombard, Green Gage, and Bradshaw probably no stock is better than seedlings of some variety of the species from which these varieties came—*Prunus domestica*. These have been in common use for many years, but in recent years have been in some degree superseded by Myrobalan stocks (seedlings of *Prunus cerasifera*, a species of European origin). Myrobalan stocks are in common use in European countries and have rapidly grown in favor with our nurserymen, not because better trees can be grown upon them, but because it is easier to secure good Myrobalan than good domestica stocks. Seeds of domestica varieties that will produce an even stand of stocks is difficult to obtain, and the Myrobalan, which is easier to grow and less liable to injury from parasitic fungi, offers an acceptable substitute. Some nurserymen import the seeds and grow their own stocks, others find it more profitable to import the seedlings. They are usually received during the winter, planted in nursery rows in spring, and budded in July and August. In the south the stocks in

common use are the Marianna plum and the peach, and very diverse opinions as to their relative merits have been expressed. Probably the differences arise from varying local conditions, for the testimony at hand indicates that on the light and dry soils the peach stock does best, while the Myrobalan is better suited to the heavier and more moist soils. Even at the north the peach meets with some favor as a stock for plums on light soils, but it is too tender for districts where severe winters are common. For the native varieties, Wolf, Weaver, De Soto and other derivatives of *Prunus Americana*, the natural inference that Americana stocks would be best seems to be borne out by experience, but the degree of success may depend in a measure upon the seed used. The species is extremely variable in general habit and rapidity of growth as well as in the fruit produced. Seeds from which to grow stocks should be chosen from vigorous free-growing trees only. The progeny of such trees will most nearly accord with the varieties to be propagated and better insure the future of the tree. Seeds are obtained in the fall, separated from the pulp, mixed with sand and kept in a cool, moist place, during the winter. If they can be frozen and thawed several times, so much the better, for they will then more readily crack under the pressure of the swelling embryo.

In spring they are sown in seed beds of deeply stirred rich soil. In the fall the seedlings are lifted, sorted and packed away in sand in a cool pit or cellar. The following spring they may be planted in nursery rows to be budded in July and August. The commencement of the budding season is determined by the maturity of the scion buds to be used; they are buds of the current year's production and must be well matured. Budding may be continued as long as the bark will "slip," and this as well as the maturation of the scion buds will be largely influenced by weather conditions. The length of the budding season may, therefore, vary greatly in different years. Usually the season with plums is shorter than with peaches or apples. About ten days after insertion the buds should be examined and the bands loosened if necessary. Where buds have failed to unite, the stocks may be rebudded and this may be repeated as often as the length of the season will allow. Late in the fall stocks on which buds have failed should be taken up and stored for grafting in late winter or early spring. When growth starts in the spring the budded stocks must receive prompt attention. The stock must be "headed down," that is, cut off above the bud, and here practice varies somewhat.

Some growers prefer to cut from four to six inches above the bud, while others would at once cut as close to the bud as it is safe. The idea in cutting high is to leave a stub which may serve as a support to which the shoot from the bud may be tied, the stub being removed at the close of the first season's growth. All shoots below as well as above the scion bud must be removed, otherwise they will starve the bud by diverting the sap to their own development. Further production of these shoots from the stock will occur, and they must be frequently checked in order to secure the best growth of the scion.

By far the greater number of plum trees grown commercially are produced by this process of budding. It is the easiest and best way when trees are grown in quantity, but as good trees can be produced by grafting, and often it is more convenient to graft than to bud. Here at the station we have used both methods and have found grafting rather more uniformly successful than budding. During the budding season the weather is hot and dry, and frequently no water is available for irrigating; many buds dry out and fail to take, so that under conditions similar to ours the writer believes the method of propagating by grafting will give the best satisfaction, and particularly to the fruit grower who propagates in a small way for his own use. I am aware that the idea is current that stone fruits, and particularly plums, are difficult to graft. It is true that certain precautions must be observed that need receive little attention when grafting the apple, but these simple precautions taken, the work is no more difficult and success is as certain as with the apple. Of course the mechanical work of putting scion and stock together must be well done, but outside of this there are three points upon which success mainly depends:

1st—The perfectly dormant condition of both stock and scion at the time the operation is performed.

2nd—The protection of the union by coating with wax.

3rd—Proper care of the plants between grafting and setting in nursery.

The work is usually performed during March or April, and may be continued so long as the dormant condition can be maintained. Plums, however, start growth under slight stimulus, and a few warm days will end the work, even when all ordinary precautions have been taken. We have frequently filled the passage-way in our outside storage-pit with snow and ice as a means of keeping the temperature down, and have thus gained a few days. It is best to com-

mence early enough so that the finish need not be hurried by the weather conditions.

Scions must not only be dormant, but must be otherwise in good condition, neither wilted from drying, nor water soaked from being kept too wet. Sometimes it is convenient to take them from the trees as wanted; more frequently they will be cut late in the fall, or come from a distance, and the question of how to keep them will present itself.

They may be kept in an outside cellar or pit, packed in dry leaves, or in moss that is but slightly damp. The aim should be simply to provide conditions that will prevent the loss of moisture, without affording opportunity for the absorption of an excess.

The particular method of grafting to be used is much a matter of taste. Several are available, among which the four following are named in the order of the writers preference: Veneer, Side, Whip and Cleft.

The side graft is probably in more general use than any of the others, but after several years experience with all of them we are inclined to favor the veneer method as giving the most perfect union.

It is not our purpose to here discuss the principles of grafting, but may remark that in all grafting no union takes place between cut surfaces of the wood. It is only through the adjustment of the cambium of the scion to that of the stock that union is secured, and here, it is not a union between cells existing at the time the grafting is done, but through new cells formed in extension of the cambium, which is the only channel of communication between leaves and roots. This being true it seems reasonable that the less the area of cut wood surfaces the better. The minimum of cut wood is secured by the veneer graft, which only exposes the wood in the oblique transverse cuts at the apex of the stock and the base of the scion. The one valid objection that may be urged against the veneer graft is that the scion is easily displaced. It is easily displaced if carelessly tied, but with reasonable care no trouble need be feared.

Whatever the method used the union should be thoroughly covered with some protective wax. A liquid wax to be applied with a brush is most convenient, and of several preparations one known as "Alcoholic Plastic" answers the purpose admirably. It is made as follows: One pound of Resin, and one ounce of tallow melted together; remove from the fire, and after cooling slightly, but while still liquid, add eight fluid ounces of alcohol and stir thoroughly. This

preparation must be kept in a corked bottle or other closed vessel to prevent the evaporation of the alcohol.

After waxing, the grafted stocks should be returned to the cellar and kept at as low a temperature as possible without freezing until the time arrives for setting in nursery. The roots may be placed in damp sand, but the scions should be subjected to such a degree of moisture only, as will prevent drying out. The practice as here outlined is successfully followed in our station work. In all grafting of plums the scion should be set low on the crown so that when planted in the nursery the union may be placed well below the surface.

The plum is seldom worked above the ground, and there seems to be nothing in the practice to commend it for practical purposes. If it is attempted it should only be with varieties of close affinity, and trees of equal vigor. Scions from a slow-growing tree can not keep pace with the branches of a strong-grower, and if the strong scion is worked on the slower stock it soon out-grows it and the wind breaks it off. A scion of Indiana Red worked on a wild Americana stock three feet above the ground produced a straight whip five feet and four inches long; three feet above the union the new growth had the same diameter as the stock at the ground. It yielded to a moderate wind.

Sometimes when new varieties are procured for trial, a few scions are worked on old trees of some Americana variety with a view to obtaining fruit quickly. Thus trees of Ogon planted in 1894, have not yet fruited because the tops have killed back every year, but scions from the same trees, taken at the time of planting and worked on *Prunus Americana* have given us fruit for four seasons. Several other varieties treated in the same manner at the same time, have fruited, but all, or nearly all are now dead.

PRUNING.

Plums are pruned for the purpose of forming and maintaining a symmetrical, well-balanced top. Five or six branches, equally distributed about the stem, and having some vertical separation are selected to serve as a framework of the top. All others are removed and the leader is shortened. The branches retained should be cut back to some extent, but this, as well as the shortening of the leader must be determined for each tree, being dependent upon the root system and the apparent vigor. In shortening the branches

and leader, the cuts should be made with reference to selected buds so placed that the future extension may be in the right direction. During the summer, rub off shoots that start where they are not wanted, and pinch the tips of rampant branches. The second spring, before growth starts, the shoots produced the previous year should be shortened to encourage the production of secondary, interior branches, and the third year this is repeated. From now on no pruning is needed except to remove branches starting from wrong places, and to control the too vigorous branches. This is best done by summer pinching, and in general it may be said that the less the knife is used on plum trees, the better it is for the trees. Most varieties require very little pruning after the head is once formed.

SOILS.

Plums will adapt themselves to almost any soil that would be chosen for apples or pears. Domestica varieties are perhaps best on heavy clay, and choice may be more restricted with them than with most other sorts. The native varieties are suited to a wide range of soils, but no tree will do well on wet mucky soils, and as the plum is a rank feeder and a heavy bearer, the soil must be of good fertility.

Colorado soils are in general well adapted for the plum, but even on the best, good cultivation and the systematic application of fertilizers is to be recommended.

IRRIGATION,

Frequency in the application of water is so entirely dependent upon the character of the soil that no rule can be made to govern it. How best to irrigate must be learned by experience for each orchard. In a general way it may be said that young trees require more water the first season than is necessary in succeeding years. Trees that are bearing, however, should receive almost, if not quite as much, as young trees; it is necessary for the best development of the fruit,

The soil of our station orchard is quite compact; water does not spread quickly, and each irrigation is prolonged for a greater time than would be necessary on more porous soils. When water is available we aim to apply it once in

ten days for young trees; somewhat less frequently for those older.

The effects of drouth during July and August are frequently seen in small inferior fruit. Reasonable care in the application of water during this period will well repay the trouble in the increased quantity and better quality of fruit. It is, however, possible to apply an excess that may work as great injury as the most severe drouth. It is only by studying the appearance of the trees, and the condition of the soil that we can arrive at a correct adjustment of the quantity to be applied, and the time to apply it.

It is our practice here to withhold water after the first of September in order to check growth and allow the wood to ripen. If growing conditions are maintained through the fall the young and succulent wood, of even the hardiest varieties, is in danger of being killed by low winter temperatures, but if well ripened it survives the extremes without injury. Twice within the last six years we have had open winters that proved more productive of injury to trees than those of continuous cold. There were long periods of warm weather, with no frost in the ground, and no precipitation to supply the continuous evaporation. The soil became very dry and the trees suffered in consequence. To guard as much as possible against such injury it is the practice to give a late irrigation, usually in November. If the ground can be well saturated at this time it is of advantage to the orchard whether the months following be cold or warm; if warm, the soil will not so soon become dry, and danger from this source is lessened; if cold and the soil be continuously frozen, the moisture is retained and the conditions for spring growth improved.

The system practiced is to furrow for each irrigation, using a one-horse plow and turning from the trees on both sides of the row. Water is run in the furrows for from 12 to 36 hours according to the supply available and the condition of the soil. As soon as practicable after irrigating, a harrow is used to close the furrow and smooth the surface. The aim is to keep a constant mulch of loose soil on the surface so as to check evaporation as far as possible. The method of applying water is illustrated by plate 2.

PLANTING DISTANCE.

Practice and opinion on the matter of distance between trees in orchard planting is very diverse. The general

tendency is toward too close planting and sometimes this is carried to extremes. I have seen several plum orchards planted 10x10 feet that even now when only five years old have much the appearance of thickets. Cultivation is impossible, the fruit is small and difficult to get at, insects find a safe harbor, and the whole arrangement is unsatisfactory and unprofitable. The condition grows worse with each year. In most cases the suggested remedy, removing alternate trees will not be followed until too late, if at all, and within a very few years the whole must of necessity be destroyed and the labor of planting lost.

The most common practice is to plant 15x15 feet, but this is too close for fully developed trees of spreading habit. A better plan is to plant 15x20 feet, or to adopt the accepted California practice and allow 20x20 feet. There seems to be a decided preference for low-headed trees on the ground that they are less liable to injury from winds, and that less trunk is exposed to the action of the sun. With low-headed trees the disadvantages of close planting are more quickly apparent. The best formed trees in the station orchard are those headed at from 30 to 36 inches from the ground, and this is the distance we prefer.

Young trees are frequently injured by what are known as "frost cracks," a longitudinal splitting of bark and wood on the south side of the trunk, occurring in late winter or early spring and attributable to the extreme daily range of temperature which often occurs at this season. To guard against this injury the trunks should be protected in some way. Various devices have been used, but we have found wrapping with burlap the most effective and least expensive. Burlap that had been used for baling was purchased at dry goods stores for two cents per pound and cut into four inch strips, three and four feet long; one pound giving as an average 9 strips. These are wound spirally on the trunks, being held at the top by a lap, and by tying with cord at the bottom. One man can cover from 50 to 60 trees per hour with the material prepared and ready at hand. The covering is applied in November and removed in April or May. The same bands will serve for two or three seasons. The whole cost is less than one cent per tree and well repays the trouble.

ARRANGEMENT OF VARIETIES.

The Wild Goose plum has long been regarded as infertile when isolated and the same complaint has occasionally

been made regarding other varieties, but the experiments carried on by Professor Waugh of Vermont, in 1896 and 1897, indicate that the actual extent of self-sterility among varieties of plums, has by no means been appreciated or even suspected. His tabulation shows that of 6,428 blossoms covered, on 56 varieties, representing all classes of plums, only five produced fruits, and from the experiments he draws the conclusion that "For all practical purposes, all classes and varieties of native plums may be regarded as absolutely self-sterile." It is possible that these results might vary with different seasons and in different localities, but making due allowance for possible variations, the results are startling enough to warrant the attention of plum growers everywhere. The cause of this sterility appears to lie largely in the inefficiency of the pollen of the flowers of a plant upon the stigmas of the flowers of the same plant. It lies in a condition known to exist among many wild as well as cultivated plants. One of nature's provisions for securing cross-fertilization, and the plants come under the recognized Knight's Law that "Nature intended that a sexual intercourse should take place between neighboring plants of the same species."

Self-sterility may also be due in some degree to imperfect pistils, the cause for which must be sought in some physiological weakness of the tree, such as might be brought about by the work of insects or disease, or from a feeble condition following the production of a phenomenally heavy crop of fruit. Or it may be due to unfavorable weather conditions prevailing at blooming time.

Recognizing, then, the existence of self-sterility among plums, the aim should be to so associate the varieties that one may supply pollen for the other. No data is at hand to warrant any definite statement as to what varieties are especially adapted to the fertilization of certain other varieties, but it is perfectly plain that to be of use to each other the varieties must bloom at the same time.

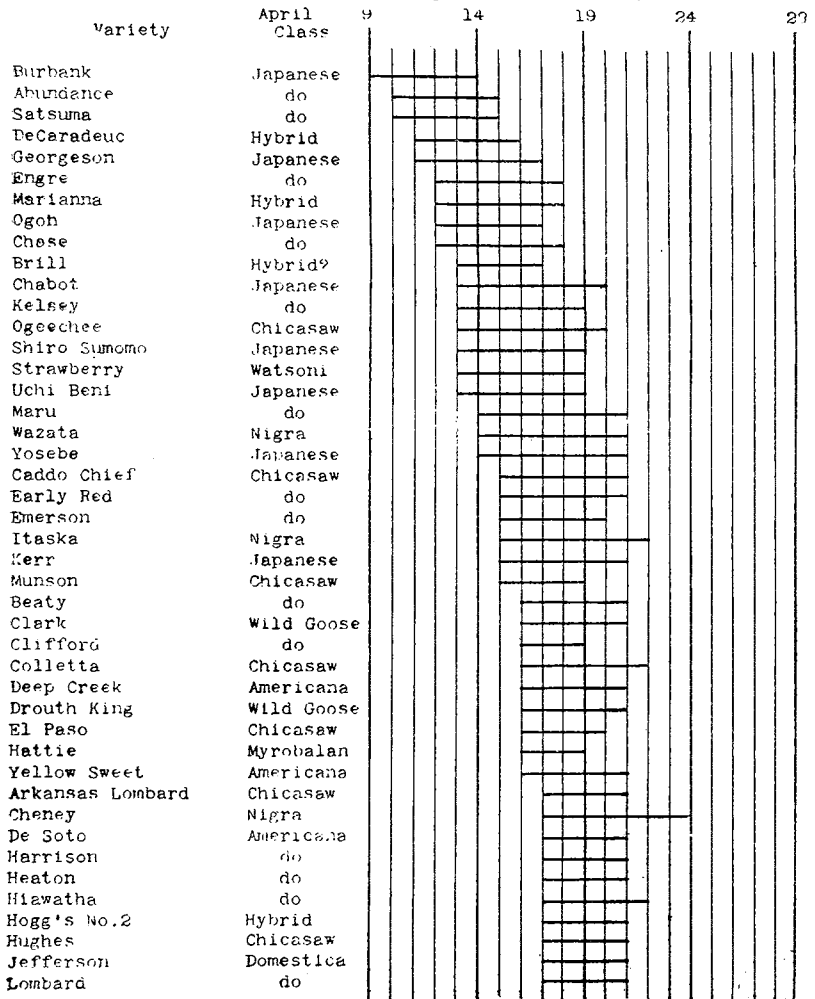
The varieties now available from which to choose show a rather wide range in blooming period; some bloom together, some finish before others begin and some overlap. All are much influenced by the weather at the time, and this may vary greatly in different years, not only in the appearance of the first flowers, but in the length of the blooming period. While irregularities may occur from one season to another, it is probable that the relative periods of the different varieties will remain much the same. For the convenience of those who may be interested, and also as a stim-

ulus to further observations, we here reproduce a graphic tabulation of blossoming periods as given by Mr. J. W. Kerr of Denton, Maryland, in his trade catalogue. The same table is also given by Professor Waugh in the tenth report of the Vermont station. The latitude of Denton is very nearly that of Colorado Springs, but differences in altitude and climate make a considerable difference in the season of growth. The varieties are arranged in the table in the order of blossoming and it serves to show those blooming together as well as the earliest and latest bloomers. It will be observed that the classes to which the varieties are referred embrace three not given in our list; Nigra, Wayland, and Watsoni. The first is separated from *Prunus Americana* and recognizes in the northeastern plums the variety nigra of that species. The Wayland group is separated from the Miner group, with which it has close affinities. The Watsoni group are varieties of *Prunus Watsoni*, a sand plum ranging from Nebraska to Arkansas, and in the cultivated forms closely resembling the Chicasaw varieties with which they are usually classed.

PLUM BLOSSOM CHART.

Showing average plum blossoming seasons in the latitude of Denton, Md.

From J.W.Kerr's catalogue. Fall of 1897.



Plum Blossom Chart. continued.

Variety	Class	April 9	14	19	24	29
Milton	Wild Goose					
Newman	Chicasaw					
Ocheeda	Americana					
Richland	Domestica					
Rollingstone	Americana					
Spaulding	Domestica					
Wilder	Miner					
Wild Goose	Wild Goose					
Willard	Japanese					
Yellow Panhandle	Watsoni					
African	Chicasaw					
Cherokee	Americana					
Freeman's Favorite	Wild Goose					
Gaylord	Americana					
Hilltop	do					
Louisa	do					
Miner	Miner					
Minnetonka	Americana					
Ohio Prolific	Wild Goose					
Osage	do					
Smiley	do					
Speer	Americana					
Texas Belle	Wild Goose					
Van Buren	Americana					
Whitaker	Wild Goose					
Yellow Transparent	Chicasaw					
Comfort	Americana					
Cottrell	do					
Cumberland	Wayland					
Kickapoo	Americana					
Lone Star	Chicasaw					
Lord's Seedling	Americana					
Rockford	do					
Roulette	Wild Goose					
Schley	do					
Champion	Americana					
Chas. Downing	Wild Goose					
Clara	Americana?					
Cluck	Chicasaw					
Crescent City	Miner					
Columbia	Wayland					
Dr. Tyler's Sugar Drop	Domestica					
Gordon	Americana					
Hammer	do					
Hawkeye	do					
Idall	Miner					
Indian Chief	Wild Goose					

Plum blossom chart. continued.

Variety	Class	April				
		9	14	19	24	29
Indiana Red	Miner					
Jewell	Wild Goose					
Kampeska	Americana					
Kopp	do					
LeDuc	do					
Maquoketa	Miner					
Muncy	Americana					
Nelly	do					
North Carolina	do					
No.0.(Kerr)	do					
No.6.(Kerr)	do					
No.20.(Kerr)	do					
Old Gold	do					
Parsons	Miner					
Pottawattomie	Chicasaw					
Prairie Flower	Miner					
Purple Yosemite	Americana					
Sophie	Wild Goose					
Sucker State	Wayland					
Weaver	Americana					
Wooten	Wild Goose					
California	Americana					
Coe's Golden Drop	Domestica					
Colorado Queen	Americana					
Dakota	do					
Forest Rose	Miner					
German Prune	Domestica					
Hanson	Americana					
Honey	do					
Iris	Miner					
Jones'Late	Americana					
Knudson's Peach	do					
Macedonia	Wild Goose					
Mankato	Americana					
Maryland	Hybrid					
Missouri Apricot	Wayland					
Moore's Arctic	Domestica					
Moreman	Wayland					
Noyes	Miner					
Pirah	Chicasaw					
Poole's Pride	Wild Goose					
Reine Claude	Domestica					
Gen.Hand	do					
Shropshire Damson	do					
Stoddard	Americana					
Surprise	Wild Goose					
Williams	Nigra					

Variety	Class	Plum blossom chart. continued.				
		April 9	14	19	24	29
Williams' No. 17	Americana					
Wolf	do					
Forest Garden	do					
Red Panhandle	Watsoni					
Smith	Americana					
Utah Hybrid	Hybrid					
Wayland	Wayland					
World-beater	do					
Wyant	Americana					
American Eagle	do					
Garfield	Wayland					
Illinois Ironclad	Americana					
Irene	do					
Kanawha	Wayland					
Leptone	do					
Marion	Americana					
Blackhawk	do					
Rachel	Miner					
Reed	Wayland					
Choptank	Wild Goose					
Esther	Miner					
Galena	Americana					
Golden Beauty	Wayland					
Heideman's 33	Americana					
Heideman's Black	Besseyi					
Heideman's Red	do					
Heideman's Yell	do					
Newton Egg	Americana					
Pendent	Wild Goose					
Reche	Americana					
William's No. 0	do					
Winnebago	do					
Wood	do					
Prunus Maritime	Maritima					
Holt	Americana					
Joe Hooker	do					
Peffer's Premium	do					
Smith's Red	do					

The following table arranged on the same plan as the preceeding shows the blossoming period of 56 varieties as compiled from observations in the station orchard last spring. Five of the varieties are represented by old trees of uncertain age, and of whose early history we have no record. They are probably from 12 to 15 years old.

The representatives of five others are young trees planted in 1897 and blooming for the first time. The remainder were planted in 1894. The flowering period of Joe Hooker was probably delayed, and later prolonged by the trees having been killed back somewhat during the preceeding winter. The flowering period is here computed from the time the first flowers opened until the petals had in great part fallen.

The two striking differences between the Maryland and Colorado tables are in the commencement of blooming, and in the length of the periods. Variations in climate would lead us to expect differences in the commencement of blooming. This difference here appears as 17 days, and it is probable that variations in seasons might either increase or diminish this. The variation in length of period is extreme. The shortest period recorded in the Maryland table is two days. Our shortest is 12 days. While the longest periods are 7 days in Maryland, and 31 days in Colorado. The great length of the periods observed here may in part be accounted for by the weather conditions prevailing at the time. It will be observed that 11 varieties began blooming on April 30, and that 9 varieties began on May 7, none opening in the interval. This is directly attributable to a storm which prevailed between these dates.

Rain began falling on April 30. On the night of May 2 wet snow accumulated to the depth of 3 inches. This covered the trees and clung to the branches for several days. It was continuously cloudy to the evening of May 5, and while it did not freeze during this period the temperature was sufficiently low to effectually check all vegetation. On examination after the storm it was found that considerable injury had been done. The *Americana* varieties that began opening the flowers before the storm, had most of the pistils in the open, and nearly open flowers killed. Kampeska showed less injury than any other variety of the class. On Minnetonka, Speer, Ocheeda and some others, it was difficult to find an uninjured pistil in open flowers or much advanced buds; most of them were black and shriveled. Coe's Golden Drop among *domestica* varieties had the pistils killed in all open flowers, and also in all advanced buds. Russian No. 2, although having no open flowers, had started the buds to some extent and nearly all were killed. Varieties that were at the time quite dormant suffered no apparent injury.

The storm had the direct effect of delaying the appearance of bloom on most varieties for at least seven days. Whether it effected the blooming period or not is matter of conjecture, but it seems probable that the long period of low temperature may have influenced the vitality of the buds in such way as to prolong the blooming season. The tables are suggestive, and the questions which arise from studying them can only be answered from the data of a number of seasons. Similar tables representing the different districts of the state, and covering other orchard fruits would be

helpful to the planter, and would become more valuable as the number of years over which observations extend, increased.

TO WHAT DEGREE ARE PLUMS SELF-FERTILE.

The following tests to determine self-fertility were undertaken last spring, the work being in charge of my assistant, Mr. J. H. Cowan, who was assisted by one of our students. The preliminary work of covering the flowers was performed on April 30th, with the exception that the flower clusters on one variety, Missouri Apricot, were covered May 7. Grocer's paper bags were used and securely tied. Such flowers as were open, or partially open, were removed before covering, and are not counted. Approximately one half of the clusters were hand-pollinated, the other half being left to themselves. The hand-pollinated set embraced 43 clusters, containing 629 flowers and represented 40 varieties. The stigmas of all flowers were dusted with pollen, either from the same flower, or from other flowers of the same cluster. This work was performed on the dates as tabulated, May 14-18 inclusive. The pistils were at this time in good condition, the stigmas appreciably viscid. The pollen was also in good condition, and the stigmas were copiously covered.

The examination June 6 showed 113 apparently well formed fruits, and 105 imperfect fruits, those that showed some development of the ovary, but did not appear to be well fertilized. In other words it appeared on June 6 that 17.94 per cent. of the flowers had produced good fruits, and 16.69 per cent. had set imperfect fruits. At the final examination June 23 there remained 6 fruits representing a fraction less than 1 per cent. of the flowers pollinated.

In the following tabulation the number of flowers treated is given for each variety, together with the number of fruits formed, and also the estimated stand of fruit on the trees.

SELF-POLLINATION OF PLUMS. SPRING OF 1898.

Tabulation of Hand-pollinated Set.

	When pollinated.	No. of flowers.	Fruits Good.	Jun. 6 Imp.	Fruits June 23.	Stand of fruit estimated.
American Eag'le	May 14	16	2	2	1	light
Apricot	" 17	7	0	1	0	medium
Cheney	" 14	8	0	5	0	very light
Colorado Queen	" 14	13	5	2	1	medium
Comfort	" 14	4	0	0	0	very light
Coutrell	" 18	18	10	2	0	medium
Deep Creek	" 14	23	0	1	0	medium
Deep Creek	" 17	19	0	0	0	medium
Forest Rose	" 14	17	0	3	0	medium
Hammer	" 18	8	4	0	0	none
Harrison	" 14	9	0	6	0	heavy
Hawkeye	" 14	13	4	1	0	medium
Hilltop	" 14	17	0	2	0	very light
Ida	" 14	14	4	3	0	very light
Idall	" 14	12	0	8	0	very light
Illinois Ironclad	" 17	23	0	0	0	light
Joe Hooker	" 14	10	0	1	0	very light
Kampeska	" 14	15	0	4	0	medium
Kickapoo	" 17	8	5	0	0	medium
Kopp	" 14	19	0	8	0	medium
Le Duc	" 17	14	5	4	0	very light
Leonard	" 18	22	8	0	0	very light
Little Blue Damson	" 17	13	2	1	0	medium
Maryland	" 14	19	0	0	0	very light
Miner	" 18	22	8	0	0	very light
Minnetonka	" 18	13	1	2	1	very light
Missouri Apricot	" 14	10	2	3	1	light
Moon	" 17	27	9	7	0	light
Ocheeda	" 17	15	4	6	0	medium
Peffer's Premium	" 17	12	2	6	0	medium
Prairie Flower	" 18	13	8	0	0	very light
Purple Yosemite	" 14	10	6	1	0	heavy
Quaker	" 18	20	1	2	0	none
Rockford	" 17	4	0	0	0	very light
Speer	" 17	15	4	5	0	very light
Van Buren	" 17	34	7	9	2	medium
Weaver	" 14	7	0	0	0	very light
Weaver	" 14	6	2	1	0	very light
Winnebago	" 14	26	2	3	0	heavy
Wolf (young tree)	" 14	20	0	4	0	heavy
Wyant	" 14	26	8	2	0	very light
Yellow Sweet	" 14	8	0	0	0	very light
		629	113	105	6	

The self-pollinated set embraced 48 clusters containing 699 flowers and represented 41 varieties. At the time the pollen was applied to the flowers of the other set, these clusters were examined and such flowers as then had dead pistils were removed, otherwise they were not disturbed until the count of June 6 was made.

SELF POLLINATION OF PLUMS. SPRING OF 1898.

Tabulation of Set Not Hand-pollinated.

	Number of flowers.	Fruits June 6		Fruits	Stand of fruit estimated.
		Good.	Imperfect.	June 23.	
American Eagle.....	10	2	2	0	light
Apricot.....	16	0	0	0	medium
Cheney.....	8	0	0	0	very light
Colorado Queen.....	19	3	8	0	medium
Comfort.....	2	0	2	0	light
Cottrell.....	19	4	4	0	medium
Deep Creek.....	11	0	2	0	medium
Deep Creek.....	12	0	0	0	medium
Forest Rose.....	14	0	2	0	medium
Hammer.....	8	2	1	0	none
Harrison.....	11	0	0	0	heavy
Hawkeye.....	11	4	1	0	medium
Hilltop.....	11	0	0	0	very light
Ira.....	14	1	4	0	very light
Idall.....	15	4	4	0	very light
Illinois Ironclad.....	22	0	0	0	light
Joe Hooker.....	15	5	1	0	very light
Kampeska.....	14	0	2	0	medium
Kickapoo.....	10	6	2	0	medium
Kopp.....	25	0	8	0	medium
Le Duc.....	9	3	5	0	very light
Leonard.....	16	0	5	0	medium
Little Blue Damson....	15	7	0	4	medium
Maryland.....	20	0	0	0	very light
Miner.....	21	8	0	0	very light
Minnetonka.....	10	0	2	0	very light
Missouri Apricot.....	14	0	9	0	light
Moon.....	28	11	8	0	light
Ochæda.....	18	6	2	0	medium
Peffer's Premium.....	17	4	10	0	medium
Pennock's Hybrid.....	37	0	3	0	light
Prairie Flower.....	13	8	0	0	very light
Purple Yosemite.....	15	9	6	1	heavy
Quaker.....	18	1	1	0	none
Rockford.....	2	1	0	1	very light
Speer.....	10	3	4	0	very light
Van Buren.....	90	15	18	0	medium
Weaver.....	9	1	0	0	very light
Weaver.....	7	0	0	0	very light
Winnebago.....	20	0	4	0	heavy
Wolf (young tree)....	24	6	6	1	heavy
Wyant.....	15	9	3	0	very light
Yellow Sweet.....	4	0	0	0	very light
	699	123	129	7	

It appears from the table that on June 6 there were 123 well formed fruits and 129 imperfect fruits. Or of 699 flowers covered, 14.73 per cent. set good fruits and 15.59 per cent. set imperfect fruits. On June 23 the number of fruits remaining was 7 which represents practically 1 per cent. of the flowers covered.

The number of fruits produced by the hand-pollinated flowers was 6.

In final results, then, there is a remarkably close agree-

ment between the two sets. The natural conclusion is that the infertility did not lie in the failure of the stigmas to receive pollen, but must be looked for either in an inherent antipathy which the plant has for its own pollen or in some outside influences. One factor comes in here which makes the test unsatisfactory, and prevents drawing definite conclusions as to the cause of the infertility, and that is the extent of the "June drop" from all parts of the trees. This was so great that even the trees that set full, matured but a light crop. The same influences acting upon the covered flowers would account, in part at least, for the results recorded. Further discussion of the cause is reserved until additional observations suggested by the work this year can be made.

INSECTS AND DISEASES.

INSECTS.

The insects commonly injurious to the plum, such as the Plum Gouger, Curculio and Plum Aphis are treated in bulletin No. 47 by Prof. Gillette, and for information concerning them the reader is referred to that bulletin.

FUNGUS DISEASES.

There are several parasitic fungi reported from different parts of the country as injurious to the plum. At least four of these are present in Colorado, although only two have thus far worked to an injurious extent upon the cultivated plums. The fungus at present doing greatest injury, and having widest distribution, is the Leaf-spot or Shot-hole fungus (*Cylindrosporium Padi Karst*). It has been present in the station orchard for four seasons, but has been controlled by spraying so that no serious injury has resulted from it.

The disease makes its appearance early in the summer or about the time the leaves reach full size. Small circular spots of a red or purplish color are first seen; these enlarge somewhat, becoming an eighth of an inch in diameter. As

the fungus matures the spots become dark brown, shading to light brown at the center. The effected tissue shrivels, and finally drops out, leaving circular holes. Frequently several spots may run together so that the holes left in the leaf are irregular in form. Under conditions favorable to the fungus the spots become so numerous as to destroy the leaves attacked, and thus check the growth of the tree, and prevent the development of fruit. If stocks in nursery are attacked the bark tightens and the stocks cannot be budded. The injury to orchard trees by this disease is in direct proportion to the percentage of leaves destroyed, but no matter how slight the attack it should receive attention. The tree is entirely dependent upon the leaves for the elaboration of its food, and any injury to them that interferes with the fulfillment of this important office, checks growth and injures vitality.

Various remedies have been tried and of these the Bordeaux mixture gives the most general satisfaction. In our practice with this remedy we have made two applications; the first as soon as the leaves are developed, and a second about three weeks later. In some seasons a third and possibly a fourth application may be necessary, as the development and spread of the fungus is in a measure dependent upon weather conditions. The appearance of leaves attacked by this fungus is shown in Plate III.

POWDERY MILDEW OF THE PLUM AND CHERRY.

(*Podosphaera oxycanthae* (DC.) DBy.)

This disease has not appeared in the station orchard, but has been reported to us from two counties of the state as injurious to both plum and cherry trees. The fungus works entirely on the surface of the leaves, drawing its nourishment from the cells by means of minute suckers called haustoria. Badly effected leaves appear as if dusted with a white powder and this suggested the common name. Being on the surface the fungus is easily reached by any of the fungicides in common use. Finely powdered sulphur, which has been successfully used in combatting the closely related Powdery Mildew of the Grape, would probably be equally effective in destroying this parasite. The fungus does not usually appear until late in summer; our specimens were received the last week in August.

BLACK KNOT. (*Plowrightia morbosa.* (Schw.) Sacc.)

The fungus causing Black Knot has proved destructive to plums and cherries in many of the eastern states. It has not, so far as my information goes, attacked cultivated plums in Colorado, but from its presence as a common disease of the wild plums of the foothills, it seems likely that it may at any time appear in orchards.

Black Knot has been known as a disease of plums for a long time, but the cause was for many years a mystery. The larvæ of insects being commonly found in old knots, led many to believe that the trouble was due to them, but entomologists proved that the larvæ found were only using the abnormally developed tissue as food and had nothing to do with its production. The fungus was named as early as 1821, but discussion regarding the true cause continued until Dr. Farlow,* of Cambridge, worked out the life-history of the fungus and established beyond controversy that it was the cause of the trouble.

The presence of the disease is first seen in swellings on twigs; these are due to an abnormal growth induced by some irritative action of the fungus threads. As development proceeds the bark is ruptured, the exposed inner surface becomes covered with spore bearing threads, and assumes a greenish-brown color. These spores are carried by winds and insects and serve to infect other branches or trees. The knot continues to enlarge, becomes hard and changes to a brown and finally black color. Later in the fall cavities form in the tissue of the knot and in these are produced a second form of spores which may escape in spring to further disseminate the fungus. Two other spore forms have been found in connection with the fungus, but further mention of them is not necessary here. The threads of the fungus are perennial within the tissues of the plant, and when once started, growth will continue until the tree dies. While spraying at the proper time may be of use in preventing spreading to other trees, the only effective remedy for trees attacked, is to cut and burn the knots as soon as discovered. One of the characteristic knots is shown in Fig. 1, Plate 4.

* Bulletin Bussey Institution Part V pp. 440-453 (1876).

PLUM POCKETS. (*Exoascus Pruni Fekl.*)

This disease is quite common on the wild *Prunus Americana* of the foothills, but no case of attack upon cultivated varieties has come to my notice. The effects produced by the growth of this fungus are perfectly characteristic. Not long after the fall of the blossoms the young plums begin to enlarge rapidly; they become spongy or bladdery, and may vary in size from one-half inch to an inch and a half in diameter. In color they are pale green or yellowish. By the middle of June they shrivel somewhat, becoming wrinkled, and finally drop. Sometimes only a portion of the fruits on a tree are effected and again no normal fruits can be found. The fungus sometimes attacks the leaves and young twigs, but more commonly the fruit only is effected. From observations on wild plums it appears that trees once infected continue to produce pockets each year, and it is doubtful if these trees can be cured; but spreading to other trees can be prevented by gathering and destroying the pockets before the spores are discharged. Where the disease attacks cultivated plums it seems to be quite local and does not spread rapidly. It is never epidemic and there seems to be little danger of serious injury from it. Plum pockets as they occur on the wild plum are illustrated in Fig. 2, Plate 4, which was photographed from a dry specimen.

A BLIGHT DISEASE.

Late in the summer of 1897 twelve trees in the orchard were attacked by a blight, the nature of which is obscure. The leaves began turning brown at the edges; this spread, involving the whole leaf surface and the trees died. Examination failed to reveal the presence of fungi, and it seems most probable, from the appearance and development of the disease, that its cause must be sought in some bacterium. The disease, while possessing the same general nature as pear blight, is certainly distinct from it. The trees attacked were all old and in bearing. No young trees suffered, and there was no reappearance of the disease this season.

VARIETIES.

The following notes on varieties are based almost wholly upon observations made in the station orchard.

This orchard, as originally set, contained the following varieties:

Coe's Golden Drop.	Prairie Flower.
Wolf.	Marion.
Russian No. 2.	Forest Garden.
Miner.	Little Blue Damson.

We have no record of the planting, and do not know the year, or the original number of trees, or the source from which they were obtained. The original planting is now represented by 1, Coe's Golden Drop; 29, Wolf; 1, Russian No. 2; 10, Miner, and 9, Prairie Flower.

The following additions have been made: In 1894, 57 varieties; in 1895, 10 varieties; in 1896, 1 variety; in 1897, 62 varieties; in 1898, 31 varieties. The total number of varieties planted for trial is 169. Seventeen varieties have been lost through winter-killing, so that there are now living representatives of 152 varieties. Some of these give no promise of value and will be discarded. The number that have proved suited to our conditions is not large, and nearly all of them are of the American group. Detailed descriptions are given only of those varieties that are fruited. A few others are briefly mentioned.

AMERICAN EAGLE. (*Prunus Americana.*)

Represented by nine trees planted in the spring of 1894. Trees well formed, spreading in habit, of moderate vigor. Leaves large; young stems and petioles densely puberulent. Bore heavily in 1897, followed by a light crop in 1898. Fruit large, round-oblong, dark red or mottled with small yellow spots; stem of medium length; skin thick; flesh firm, reddish yellow, of excellent quality. Stone rather small for the size of the fruit, cling, rounded at apex, prolonged into a sharp point at stem end, strongly convex on the sides, margin sharp, but not otherwise prominent. Ripe September 20.

APRICOT. (*Prunus Americana.*)

Planted in 1894. Of bushy habit, forming a close, compact head. Leaves large, broad, sharply serrate, stalks pale red, pubescent. Fruit medium in size, round-oblong, color red, where shaded mottled red on yellow ground, bloom slight; suture inconspicuous, skin thick; flesh reddish-yellow, quite firm, juicy, sweet and of good flavor when fully ripe. Stone cling, rather large, flat, moderately pointed at both ends, no prominent margin, roughish. Ripe September 4.

BOTAN. JAPANESE GROUP. (*Prunus triflora.*)

Our trees were planted in 1897 and have not yet had sufficient test as to hardiness. They have made a vigorous growth and are now well set with fruit buds. Leaves of medium size, glossy, light green, sharp-pointed at both ends; stalks short and stout.

BURBANK. JAPANESE GROUP. (*Prunus triflora.*)

Trees planted in 1897 bore a few fruits this season. Habit of growth upright, very vigorous. Leaves of medium size, broadly lanceolate, short acuminate, stalk short and stout. Fruit large, peach-like in shape; color deep red, on yellow ground, which appears in small spots; flesh firm, deep yellow; suture evident; stone small, semi-cling. Ripe September 12.

CHAMPION. (*Prunus Americana.*)

Trees planted in 1894 have made a vigorous spreading growth, smooth, less thorny than most members of the group. Leaves large, light glossy green, strongly recurved, stalks red, short, somewhat pubescent. Not yet fruited.

CHENEY. (*Prunus Americana.*)

Planted in 1894. Very vigorous in growth and upright in habit, producing no virgate drooping branches; quite thorny; leaves obovate, acuminate, three to five inches long, veins prominent, pubescent below, light green, leathery in texture, stalks stout, about an inch long; fruit large, somewhat oblique, pointed or rounded at apex; stem short, stout, set in a large cavity, suture evident; color dull red, mottled on a greenish-yellow ground; stone cling; skin thick, flesh firm, sweet, of good flavor. Ripe September 4. One of the most promising of the Americana varieties. Fruit fig. 1, plate V; tree, plate VIII.

CHOPTANK. WILD GOOSE GROUP. (*Prunus hortulana.*)

Trees planted in 1894 have made a vigorous growth each year, and have regularly killed back nearly to the ground each winter. Evidently too tender for this locality.

CLARK. WILD GOOSE GROUP. (*Prunus hortulana*)

Trees well formed and of moderately vigorous growth. Kills back at the tips each year. Leaves of medium size, rather broad for the species; fruit of medium size, nearly spherical, but somewhat irregular; color red in the sun, shading to light red on green ground in the shade; suture distinct; flesh firm, orange-red, very acid; stone cling. Ripe Aug. 30. The quality of the fruit does not commend the variety.

CLINTON. MINER GROUP. (*Prunus hortulana* var. *Mineri*.)

Trees planted in 1894. A vigorous grower, but has killed back repeatedly; worthless here.

COE'S GOLDEN DROP. (*Prunus domestica*.)

This well-known English variety is perfectly hardy in tree, but the fruit buds are yearly killed to such an extent that it is not at all productive. Trees are upright in habit and of slow growth. Leaves of medium size, dull dark green, obtusely crenate, stalks glandular, pubescent, as are also the lower surfaces of the leaves; young wood dark purplish-red, glabrous. Fruit large, roundish-oblong, projected into a slight neck, and indented at insertion of stem, suture deep, sides somewhat unequal; color pale yellow or greenish; flesh firm, of excellent quality; stone free, nearly straight on one edge, curved on the other, margin irregular, sharp, rough. Ripe September 20.

COLORADO QUEEN. (*Prunus Americana*.)

Trees planted in 1894 are well formed and of vigorous growth, much inclined to the production of long drooping or pendulous branches. Leaves of medium size, broad, sharply serrate, light green, stalks slender, young wood light colored, glabrous. Fruit below medium in size, spherical, slightly indented at lower end; color dark purplish-red over yellow ground which shows as small dots; suture hardly apparent; stem long, rather stout; skin thin, flesh juicy, sub-acid, of fair quality; stone circular, convex. Ripe September 4.

COMFORT. (*Prunus Americana.*)

Of slow growth and straggling habit, very thorny, producing many drooping branches; leaves of medium size, ovate-lanceolate, sharply and irregularly serrate, stipules large and rather broad, soon falling. Hardy. Although planted in 1894 the trees have not yet fruited.

COTTRELL. (*Prunus Americana.*)

Planted in 1894. Trees vigorous, but irregular in habit, hardy; young wood brownish-red, glabrous; leaves above average size, dull light green, broad, coarsely and irregularly serrate; stalks glandular, rather short and stout, red, pubescent. Fruit medium to large, round-oblong, color red, nearly uniform, on lemon-yellow ground, and covered with a thin rosy bloom; skin thin, flesh firm, of superior flavor; stone semi-cling, large, smooth, elliptical with a prominent rounded margin, convex portion relatively small; stalk long, slender. Ripe September 14. Quality and productiveness place this among the desirable varieties.

DEEP CREEK. (*Prunus Americana.*)

Our trees were planted in 1894 and 1895. They are inclined to be irregular in habit and are of slow growth as compared with Weaver or Cheney. They are very thorny and in general appearance resemble wild trees; young wood glabrous. Leaves large, oblong-lanceolate, coarsely and bluntly serrate, stalks red, slightly pubescent, rarely glandular. Fruit small to medium, roundish or slightly oblong; suture apparent, or in some fruits inconspicuous; color uniformly deep red when fully ripe, bloom abundant; stem of medium length, slender; skin thick; flesh firm, juicy, sweet when ripe; stone semi-cling, oblong, sides strongly convex, pointed, smooth. Ripe August 30. Fairly productive. Trees planted in 1894 bore a light crop in 1896, a heavy crop in 1897 and a light crop in 1898. Fruit fig. 2, plate V; tree, plate IX.

FOREST GARDEN. (*Prunus Americana.*)

Tree typical of the class; leaves of medium size, light green, sharply serrate, the teeth overlapping, stalks reddish, nearly glabrous, glandless. Fruit medium in size, round;

color dark purple-red; stem long, slender, skin thick; flesh moderately firm, of sub-acid flavor; stone semi-cling, rounded at lower end, sides convex, prolonged into a flattened point at upper end, roughish. Ripe September 16. Tree a heavy bearer.

FOREST ROSE. MINER GROUP. (*Prunus hortulana* var. *Mineri*.)

Represented by two station-grown trees. They were grafted in the spring of 1894, one on Myrobalan stock, the other on Americana stock; grown one year in nursery and set in orchard in 1895. Both fruited in 1897. The trees are alike except that the one on Myrobalan stock is slightly larger than the other. Both are of good form and vigorous growth. Leaves medium, rather broad, dull light green, sharply serrate; stalk slender, puberulent, glands commonly wanting. Fruit medium in size, round, or somewhat oblique, dark red on yellow ground which shows as minute dots; stem long, slender; skin thin, suture obsolete, flesh firm, sweet and of fine flavor; stone cling, circular, but drawn into a point at the upper end, somewhat rough. Season medium, ripe September 4. A good and productive variety. Fruit fig. 1, plate VI; tree, plate X.

GARFIELD. WILD GOOSE GROUP. (*Prunus hortulana*.)

Trees planted in 1894 have killed back so badly each winter that we may class this as too tender for this locality.

HAMMER. (*Prunus Americana*.)

Four trees planted in 1894 are of erect habit, but of slow growth, nearly free from thorns. Kills back at the tips to some extent and has not fruited. Leaves large, oval-oblong, doubly crenate, light green, flat, stalks glandular; young wood light-red, glabrous.

HARRISON. HARRISON'S PEACH. (*Prunus Americana*.)

Trees of moderate vigor, forming round symmetrical tops; hardy. Leaves large, broad, margins loosely crinkled, very irregularly and sharply serrate; stalks stout, glandular, densely puberulent. Fruit medium to large, round-

oblong; color light red on a translucent light yellow ground, covered with a thin rosy bloom; stem long, slender, skin thick; flesh rich, juicy; stone cling, rather long pointed, convex on the sides, smooth. Season medium; ripe September 11. A promising variety.

HAWKEYE. (*Prunus Americana.*)

Trees planted in 1894 are well formed and vigorous, but not quite as large as those of Wolf, Weaver or Cheney of the same age. Leaves large, obovate, glossy green, sharply and irregularly serrate. Fruit large to very large, round, slightly flattened; color dark red shading to light red on yellow ground, which shows as conspicuous dots; bloom thin, suture apparent; stem stout, of medium length; skin thick; flesh very firm; flavor excellent, sub-acid; stone cling, very large, round oval, very flat, rough. Ripe September 18. A desirable variety. Plate XI.

HILLTOP. (*Prunus Americana.*)

A vigorous variety of spreading habit. Leaves medium to large, obovate, acuminate, irregularly serrate, leathery in texture, pubescent below; stalks red, pubescent, usually glandless. Trees were planted in 1894, but have not yet fruited.

HOLT. (*Prunus Americana.*)

Planted at the same time as Hilltop and resembling that variety in vigor and habit. Trees killed back slightly during the winter of 1895-6. Leaves large, acuminate, sharply and irregularly serrate, upper surface crimped, stalks glandular. Not yet fruited.

IDA. (*Prunus Americana.*)

Trees planted in 1894. Very thorny, of slow irregular growth; young shoots somewhat pubescent; leaves large, broadly ovate-lanceolate, irregularly serrate, leathery in texture; stalks glandless or occasionally with a single small gland. Fruit of medium size, round oblong; suture evident; color mottled and shaded with red on yellow ground, stem of medium length, stout; skin thick, flesh pale yellow, in-

ferior in flavor; stone cling, roundish, rather flat, blunt at both ends, with no prominent margin. Season medium to late. Ripe September 18. Fairly productive.

IDALL. MINER GROUP. (*Prunus hortulana* var. *Mineri*.)

Trees planted in 1894 have passed through four winters without injury and are apparently perfectly hardy. They are vigorous and have formed symmetrical heads. Leaves large, obovate, doubly serrate, dull dark green, stalks glandular and pubescent. Not yet fruited.

ILLINOIS IRONCLAD. (*Prunus Americana*.)

Planted in 1894. Growth slow. Trees much smaller than those of Wolf and Weaver of the same age. Leaves large, dark green, sharply doubly serrate, the veins pubescent below; stalks red, pubescent, glandular. Fruit of medium size, oblong, truncate at base, cavity large and deep, suture inconspicuous; stem long, stout; color red on lemon-yellow ground; stone cling, oval, flat, no prominent margin or point; flesh firm, sub-acid, of good flavor. Season medium to early; ripe September 6.

INDIANA RED. MINER GROUP. (*Prunus hortulana* var. *Mineri*.)

Trees planted in 1894 have killed back every year and the variety is classed as too tender.

JOE HOOKER. (*Prunus Americana*.)

Trees of moderate vigor, forming well-shaped heads, but showing a tendency to the production of long drooping shoots. Leaves rather small, ovate-oblong, stalks slender. Fruit medium to small in size, roundish-oblong; color red on yellow ground. Ripe September 11.

KAMPESKA. (*Prunus Americana*.)

Trees planted in 1894. Growth stocky and slow, branches stiff. Leaves below average size, light green, obovate, sharply acuminate and very sharply serrate; stalks

pubescent, glandular. Fruit small, round, dark purplish-red, bloom rather thick, stem of medium length, stout; skin thick; flesh of fair quality; stone semi-cling, oval, strongly convex on the sides, sharp on the edge but not margined. Ripe September 11. Tree productive, but fruit too small to be ranked as valuable.

KICKAPOO. (*Prunus Americana.*)

Planted in 1894. Not yet fruited. Trees of slow growth and straggling habit. Leaves large, broadly lanceolate, sharply and irregularly serrate, stalks glandular.

KOPP. (*Prunus Americana.*)

Trees of good form and fair vigor, producing some drooping branches. Leaves large, dark green, sharply serrate; stalks red, pubescent, mostly glandless. Fruit medium to small, round, deep red, shading into the green ground, this mottled with white dots; skin thick; flesh firm, of good sub-acid flavor, sweet when fully ripe; stone nearly free, oblong, pointed, strongly convex, smooth. Ripe September 1. A productive variety.

LATE ROLLINGSTONE. (*Prunus Americana.*)

Trees of moderate vigor, forming round compact heads. Leaves of medium size, obovate-oblong, short acuminate, irregularly and unequally crenate; young shoots red, smooth, shining; stalks glandular, pubescent. Fruit medium in size, round, flattened at both ends, deep red, shading into light red; stem of medium length; skin thick; flesh firm, of excellent quality. Stone cling, broad-oval, sides moderately convex, smooth. Ripe September 11. Not to be distinguished from Rollingstone. Even in time of ripening there appears to be no difference here.

LE DUC. (*Prunus Americana.*)

The trees planted in 1894 are still rather small, but stocky and well-formed; they fruited heavily in 1897. This year they bloomed full, but matured a very light crop. Leaves large, light green, sharply serrate; stalks glandular,

pubescent on inner side; young wood glabrous. Fruit of medium size, round, waxy yellow shaded with red; skin thick; flesh juicy, sweet and rich; suture obsolete; stone roundish-oval with convex sides, semi-cling. Ripe August 25. Very productive. A good variety.

LEONARD. (*Prunus Americana.*)

Trees of same size and appearance as those of Le Duc. Leaves large, rather short and broad, doubly and sharply serrate, stalks glandular. Fruit medium in size, round, dark red and mottled red on green ground; flesh not firm, quality only fair, acid; stone cling, small, smooth, roundish-oblong, with a rather sharp margin. Ripe September 1.

LITTLE BLUE DAMSON. (*Prunus domestica.*)

Represented by three trees grown at the station, two of which are on Marianna stocks, one on *Prunus Americana*. They were set in 1895. There is no appreciable difference in size, but the one on *Prunus Americana* is overtopping the stock and will probably be short-lived. In habit the trees are upright and the growth is vigorous. Leaves of medium size, dark glossy green, only moderately crinkled, stalks usually without glands. Fruit small, oblong, cavity scarcely apparent, no suture; color very dark blue, almost black with heavy blue bloom; stem short and stout, flesh firm, decidedly acid; stone free, small, oblong, flat, rough. An abundant bearer, but fruit too small to be valuable.

MARION. (*Prunus Americana.*)

Trees forming round, symmetrical heads; leaves of medium size, oval, sharply serrate, the teeth overlapping; stalk slender, glandless, or occasionally with one or two small glands; young shoots slender, glabrous. Fruit medium to large, round, flattened at lower end; purplish-red on orange ground, bloom thin; stem long and slender; skin thick; flesh sweet, juicy, of good flavor; stone semi-cling, rounded at base and pointed at the stem end; sides convex; margin rounded. Ripe September 15. Productive.

MARYLAND. (Classed by J. W. Kerr with *Prunus Bessayi*.)

This variety originated with J. W. Kerr of Denton, Md., and is a seedling of Utah Hybrid. The latter is of doubtful origin. Professor Waugh thinks it a probable hybrid between *Prunus Watsoni* and *Prunus Bessayi*.* Our trees came from Mr. Kerr in 1894. They are the most straggling in habit of any in the orchard, producing many very long, slender, light red shoots, which are projected horizontally or downward. Apparently perfectly hardy here. Leaves of medium size, elliptical, acute or short acuminate, crenate; stalks glandular. Fruit small, spherical, color dark brownish-red, shading to light red on green ground; suture obsolete; flesh soft, watery, quite sweet and pleasant to the taste; stone cling, short, obliquely-oval, rounded at both ends, rough. Ripe August 20.

MINER. (*Prunus hortulana* var. *Mineri*.)

One of the varieties planted in the original orchard. There are now ten trees, all well formed and healthy. They have borne for several years and are productive, but occasionally the season is too short and the fruit does not mature. Leaves large, broad, often obovate, short acuminate, evenly crenate; stalks glandular. Fruit medium in size, nearly spherical or round-oblong; deep red over greenish-yellow ground; stem long, slender; flesh firm and of very good flavor; stone cling, broad, short pointed at both ends, slightly roughened. suture obsolete. Ripe September 29 in 1897; September 22 in 1898.

MINNETONKA. (*Prunus Americana*.)

Planted in 1894. Trees of slow growth, small, with bushy tops, quite free from thorns; young branches densely pubescent. Leaves large, broadly oval, dark green, coarsely serrate, stalks stout, usually glandless. Fruit small, oblong or oval, red on yellow ground; skin thick, flesh firm, rather acid, stone cling. Ripe September 11.

* Vermont Station, 10th Report (1896-7), p. 101.

MISSOURI APRICOT. WILD GOOSE GROUP. (*Prunus hortulana*)

Trees grown at the station and set in orchard in 1895; fruiting first in 1897. Of moderate vigor, inclined to be irregular in habit. Leaves of medium size, ovate, coarsely and sharply serrate, pubescent below; stalks glabrous, mostly glandless. Fruit medium to large, roundish, slightly narrowed at stem end, truncate at apex, sometimes indented, stem long; color waxy yellow with red cheek next the sun, mottled all over with small light-colored dots; flesh firm, sweet, rich; stone cling, short and broad, rounded at apex, pointed at stem end, sides convex. Ripe August 29. One of the desirable varieties.

MOON. (*Prunus Americana*)

Trees planted in 1894 bore a few fruits in 1896, a heavy crop in 1897, and a light crop in 1898; they are not vigorous in appearance, and grow very slowly; young branches light colored; leaves medium in size, obovate, coarsely and irregularly serrate, stalks glandular. Fruits medium, round or slightly oblong, deep red or mottled on yellow ground, suture obsolete; skin thin, flesh moderately firm, of good flavor, sub-acid; stone cling, short oval, strongly convex, with no prominent margin. Ripe September 5.

OCHEEDA. (*Prunus Americana*.)

Trees of slow growth, forming round tops and producing many drooping branches, very thorny. They were planted in 1894, began bearing in 1896, gave a good crop in 1897 and a medium crop in 1898. Leaves large, oblong, acuminate, dark green, sharply and deeply serrate, pubescent below; stalks glandless or occasionally with two small glands, red, pubescent. Fruit of medium size, round-oblong; red on lemon-yellow ground with thick bloom; stem long; skin thick, flesh firm, of good flavor; stone cling, large, long-pointed, strongly convex on the sides, margin sharp, surface smooth. Ripe September 11.

OGON. JAPANESE GROUP. (*Prunus Americana.*)

Trees of very vigorous growth, but killing back to such extent each winter that they have borne no fruit. Young twigs light-colored, outer bark on two-year-old wood greenish-brown, showing many lenticles and cracks, on older wood becoming dark colored. Leaves lanceolate, glossy, light-green, crenate and glandular-denticulate; stalks short, glandular. Top grafts on native *Prunus Americana* inserted in 1894 have fruited for four seasons. Our description of the fruit is drawn from specimens produced in 1897. Round-oblong, slightly flattened at apex, oblique at stem end, cavity rather shallow; suture inconspicuous; color dull yellow with thin whitish bloom; stem short, stout; stone free, oval, sides strongly convex, margin prominent and sharp; flesh thick, firm, meaty, of inferior quality. Ripe Augt 14. Plate XII.

PEFFER'S PREMIUM. (*Prunus Americana.*)

Trees planted in 1894 are still quite small, but well formed; young wood glabrous. Leaves medium, broadly-ovate, light green, more or less doubly serrate, the teeth short, stalks red, with or without glands. Fruit of medium size, round, rather abruptly flattened at both ends; suture obsolete; color deep red on yellow ground, conspicuously marked by "leather cracks" about the stem end; bloom thin; flesh firm, quality good; stone cling, circular, sides convex, sharp on the margins, smooth. Season medium; ripe September 11.

PENNOCK'S HYBRID. (*Prunus Besseyi* X *Prunus Americana.*)

A few years since, in the nursery of Mr. C. E. Pennock, of Bellvue, there appeared among a lot of seedlings of *Prunus Besseyi*, one tree that, while bearing the flowers of *Prunus Besseyi* had the habit and foliage of *Prunus Americana*. The fruit borne by this tree is nearly the size of wild *Prunus Americana* but in color and flavor like *Prunus Besseyi*. The mixture of characters suggested hybridity and led Mr. Pennock to experiment in that direction. Pollen of *Prunus Americana* was successfully used on the stigmas of *Prunus Besseyi* and several hybrids resulted. These all resemble the plum in habit, but have the small flowers of the cherry. The leaf characters are intermediate, but generally most like the male parent. The fruit of most of the trees is

not valuable, being small and very acid. The color in all is dark, and in general much like the cherry. One tree, however, produces fruits that are considerably larger and much better than any of the others. It is to be introduced and may prove an acceptable addition to the list of varieties. This tree is of spreading habit, in general appearance like varieties of *Prunus Americana*. Leaves medium in size, varying from ovate to lanceolate. Flowers small, produced in profusion. Fruit of medium size, spherical; color deep blue, with light bloom; flesh firm, of excellent flavor, possessing none of the astringency so noticeable in the fruit of the other hybrids. The tree in bloom is illustrated by plate XIII, and a branch showing fruit in figure 1, plate XIV. It is worthy of further trial.

PRAIRIE FLOWER. (*Prunus hortulana*, var. *Mineri*.)

Represented by nine old trees of uncertain age, and one tree planted in 1894. The young tree fruited in 1897, the others have born for several years. The old trees are fully developed, as large as the trees of Miner, and of the same appearance. Leaves large, broadly to narrowly ovate-lanceolate, evenly crenate, lower surface pubescent, stalks long, stout, glandular. Fruit of medium size, round-oblong, obscurely pointed; color red on yellow ground, flecked all over with small light dots; suture evident; stem of medium length, stout; skin thin; flesh firm, sub-acid, of fair quality; stone cling, rather broad, short pointed at both ends, margin rather sharp, slightly roughened. Ripe September 21. Very productive.

PURPLE YOSEMITE. (*Prunus Americana*.)

In character of tree very closely resembling the wild plant: very thorny, and irregular in habit. Leaves of medium size, ovate or obovate, acuminate, doubly serrate, dark green, pubescent below; stalks glandless, or occasionally with two small glands. Fruit large, round-oblong, flattened laterally; color deep purplish-red; skin thick; suture obsolete; flesh firm, of fair quality; stone cling, flat, rounded at the ends, rather rough, margins not sharp. Season medium to late. Ripe September 24.

ROCKFORD. (*Prunus Americana.*)

Our trees planted in 1894 are still rather small, but thrifty in appearance, forming round regular tops. Leaves large, coarsely and deeply serrate, short acuminate; stalks dark red, pubescent, mostly glandless. Fruit of medium size, oblong, somewhat pointed, broad at base; color dark red on green ground; skin thin; suture inconspicuous; flesh firm, very acid until quite ripe, then of good quality; stone cling, broad at stem end and tapering to a rather acute, thick apex, sides strongly convex, margin narrow, but sharp. Productive, early; ripe August 31.

ROLLINGSTONE. (*Prunus Americana.*)

Trees typical of the species, well-formed and of fair vigor. Leaves large, broad, irregularly crenate; color dark green, stalks mostly glandless. Fruit large, round, flattened at both ends; deep red shading to pink on yellow ground; stem of medium length, skin thick; flesh firm, good; stone cling, broad oval, sides convex, margins sharp, smooth. Season medium, ripe September 12.

RUSSIAN No. 2. (*Prunus domestica*)

Trees forming roundish heads, and making less growth than other varieties of the same class. Leaves of medium size, broad, dull green, evenly crenate; stalks short, glandless. Fruit of medium size, inclined to be irregular in shape, often more or less constricted at stem end, and sometimes flattened at distal end; suture apparent, more deeply colored than surrounding parts; color deep purple, with heavy blue bloom, stem stout, of medium length; flesh firm, sub-acid; quality only fair; stone free. Season early, ripe August 15.

SPEER. (*Prunus Americana*)

Small, but vigorous trees of spreading habit, producing long, slender branches. Leaves large, broad, acuminate, deeply and sharply serrate, dark green; stalk red, nearly glabrous, usually bearing small glands. Fruit medium in size, round-oblong, often contracted about the stem; suture evident; color purple-red on yellow ground; stem short, slender; skin thick; flesh firm and of good quality; stone cling, short-oblong, rather flat, ends blunt. Season medium, ripe September 17. Very productive.

SUNSET. (*Prunus Americana.*)

This variety originated with Mr. C. E. Pennock, of Bellvue, Colorado. We have one tree planted in 1897 that produced a few fruits this season. The tree is well-formed with a somewhat spreading habit. Leaves of medium size, broadly lanceolate, margin doubly and irregularly crenate, stalks glandular. Fruit medium to large, oval or oblong, stem rather long, slender; color deep red on yellow ground, beautifully shaded as it approaches ripeness; suture apparent; flesh firm, of excellent quality. Early; ripe August 25. The original tree shows great productiveness, which with the handsome appearance of the fruit, and its good quality, recommends the variety as a valuable acquisition. Fig. 2, Plate XIV.

VAN BUREN. (*Prunus Americana, var. mollis.*)

Trees of slow growth, appearing like dwarfs; tops well-formed, spreading; leaves broad, doubly serrate, dark green, stalks ashy-pubescent, glandular; fruit of medium size, spherical, suture obsolete; color deep waxy yellow, in part over-spread with light red and having a deep red cheek; stem stout, of medium length; skin thick; flesh sweet and rich; stone free, flat, rather broad, margin sharp but not winged. Ripe September 22. Very productive. One of the most promising varieties. Plate XV.

WEAVER. (*Prunus Americana.*)

Our trees planted in 1894 are larger than those of any other variety planted at the same time. They are vigorous and well-formed. The tendency to produce long slender branches is quite marked in this variety. Leaves large, obovate or oval, acuminate, somewhat pubescent below, leathery in texture, dark green, deeply serrate; stalk long, stout, glandless, or with occasional small glands. Fruit medium to large, round-oblong; suture evident, sides often unequal; color purplish-red on yellow ground, the red mottled with light dots; flesh firm, sweet when ripe, of good flavor; stone semi-cling, abruptly pointed, smooth. Ripe September 18. Plate XVI.

WINNEBAGO. (*Prunus Americana.*)

Trees very vigorous, well-formed. Leaves large, broad, sharply serrate, produced in great abundance; stalks short, stout, glandular. Fruit medium to small, round, inclined to be irregular and one-sided; stem long, slender, cavity deep; color deep red on yellow ground; skin thin; flesh yellowish, soft, of inferior flavor, granular in texture; stone nearly free, elliptical, somewhat oblique; rather flat, rounded at both ends, roughish. Ripe September 18. Plate XVII.

WOLF. (*Prunus Americana.*)

Vigorous growing trees of spreading habit. Leaves large, ovate, acuminate, closely and sharply serrate, leathery in texture; stalks stout, ashly pubescent; on some trees wholly glandless, on others small glands are not uncommon. Fruit medium to large, round to round-oblong, slightly flattened, sometimes tapering somewhat toward the stem; stem short, stout, set in a small cavity; suture obsolete; color when ripe uniformly deep red, with heavy purple bloom; skin thick; flesh firm, of good quality; stone free, rather small, pointed at stem end, sides strongly convex, margin sharp and prominent, smooth. Season medium, ripe September 16. Fruit Fig. 2, Plate VI; Tree Plate XVIII.

WYANT. (*Prunus Americana.*)

Trees stocky, forming round heads, of slower growth than Wolf or Weaver. Leaves medium, crisp in texture, sharply serrate, dark green; stalks pubescent and glandular. Fruit large, round-oblong, flattened at apex; cavity large and deep; color purple red on yellow ground; stem short, stout; skin thick; flesh firm, of good flavor; stone free or nearly so, large, oblong, flat. Ripe September 18. Fruit Fig. 1, Plate VII.

YELLOW SWEET. (*Prunus Americana.*)

Trees small, stocky, very thorny; leaves large, oval-oblong, irregularly crenate, stalks commonly glandless. Fruit large, round, color yellow, lightly shaded with red, bloom thin; suture apparent; stem short, stout; skin thin; flesh firm, juicy, rich; stone cling, oval, pointed at both ends, sides convex, margin sharp. Ripe August 31. A very promising variety. Fruit Fig. 2, Plate VII; Tree Plate XIX.

REFERENCE TO PLATES.

PLATE I.

Fig. 1, Yellow Sweet; Fig. 2, Wolf, showing lack of affinity between stock and scion. The stock is being overgrown.

Fig. 3, Plate of Weaver plums, reduced nearly one-half.

PLATE II.

Illustrates the system of irrigation practiced.

PLATE III.

Showing the effects of the "Shot-hole fungus" (*Cylindrosporium Padi Karst.*)

PLATE IV.

Fig. 1, Black knot of the plum and cherry, (*Plowrightia morbosa* (Schw.) Sacc.)

Fig. 2, Plum pockets. (*Exoascus Pruni Fckl.*)

PLATE V.

Fig. 1, Cheney; Fig. 2, Deep Creek; reduced nearly one-half.

PLATE VI.

Fig. 1, Forest Rose; Fig. 2, Wolf; reduced nearly one-half.

PLATE VII.

Fig. 1, Wyant; Fig. 2, Yellow Sweet: reduced nearly one-half.

PLATE VIII.

Cheney.

PLATE IX.

Deep Creek.

PLATE X.

Forest Rose.

PLATE XI.

Hawkeye.

PLATE XII.

A branch of Ogon from top graft on *P. Americana*.

PLATE XIII.

One of Mr. C. E. Pennock's hybrids between *P. Besseyi* and *P. Americana* in bloom.

PLATE XIV.

Fig. 1, Fruit of Mr. C. E. Pennock's hybrid between *P. Besseyi* and *P. Americana*.

Fig. 2, Sunset plum, originated by Mr. C. E. Pennock.

PLATE XV.

Van Buren.

PLATE XVI.

Weaver.

PLATE XVII.

Winnebago.

PLATE XVIII.

Wolf.

PLATE XIX.

Yellow Sweet.

Plates 13 and 14 are from photographs by S. H. Seckner, all others from photographs by the author.

PLATE I.

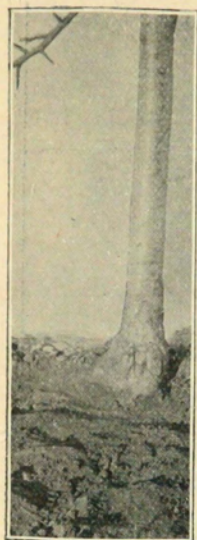


Fig. 1.

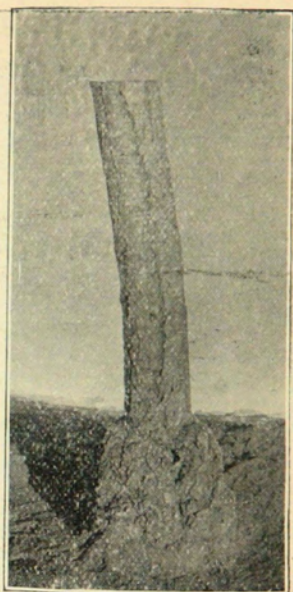


Fig. 2.

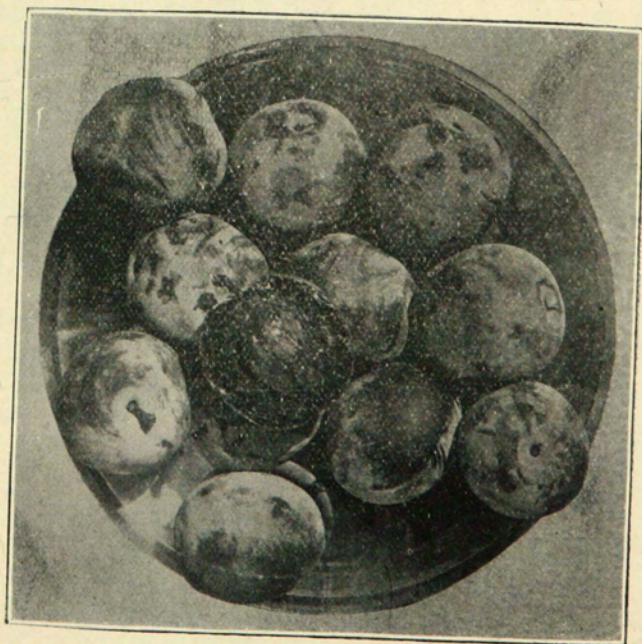


Fig. 3—Weaver.

PLATE II.—Irrigation.

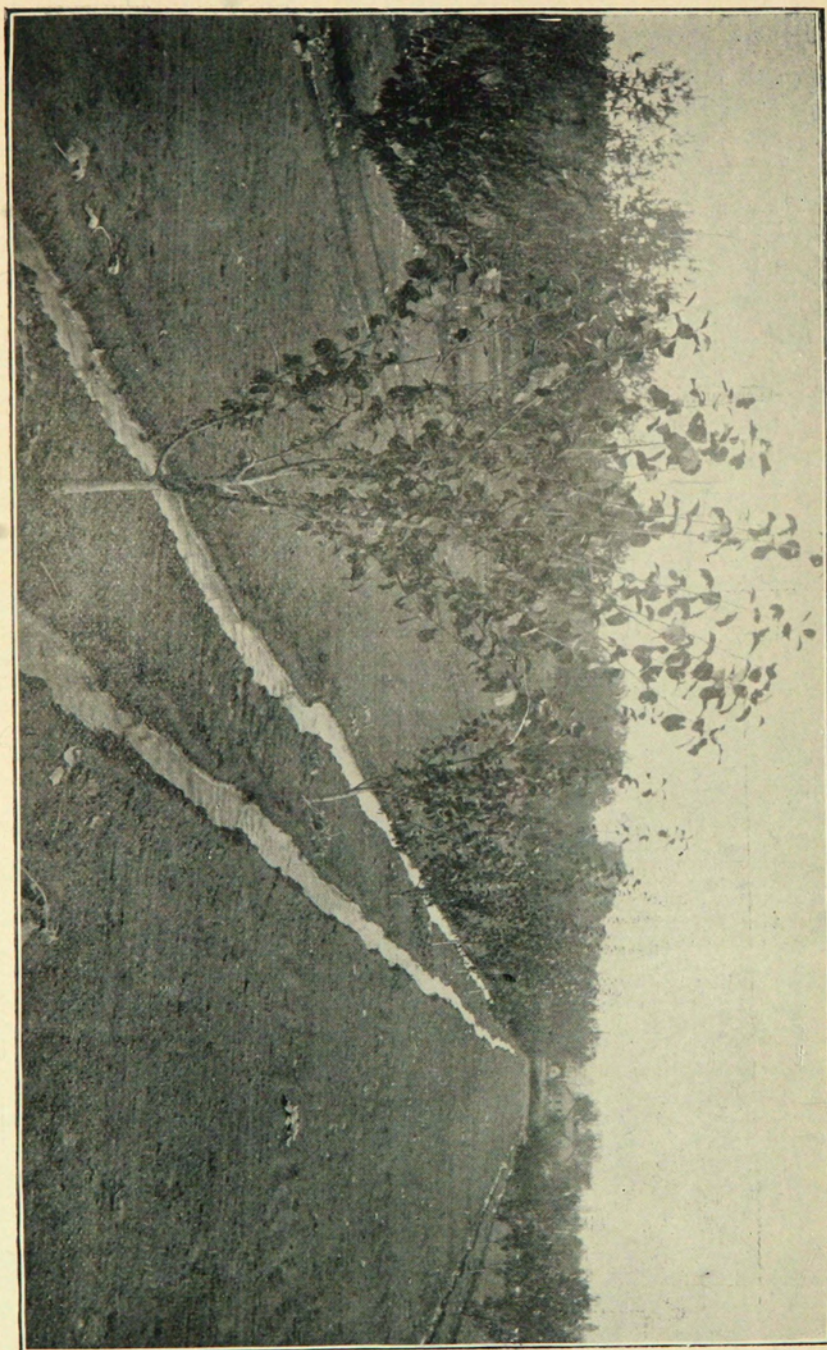
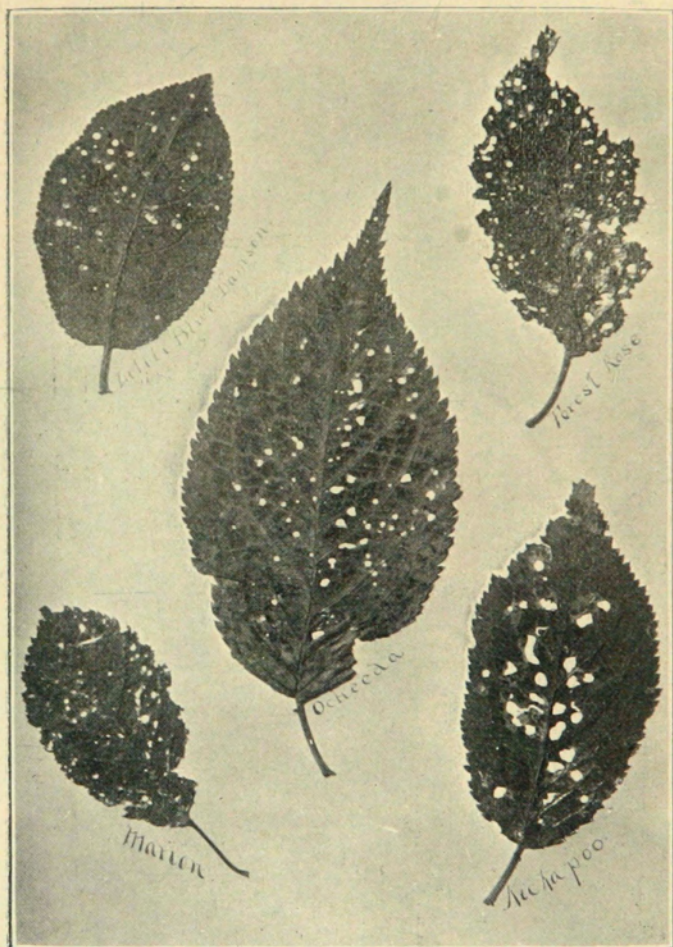


PLATE III.



Plum Leaves.

PLATE IV.

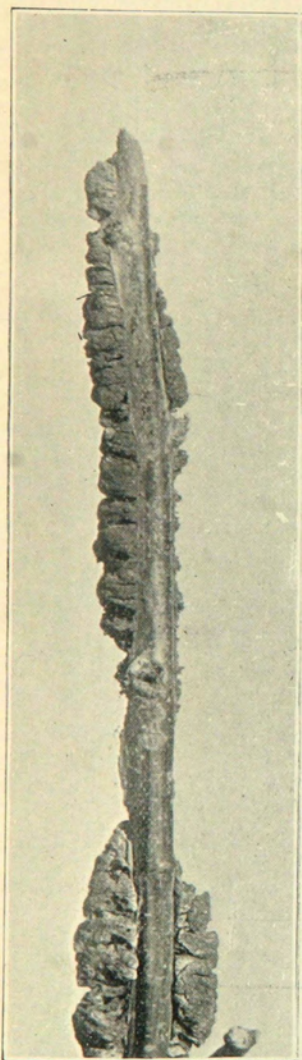


Fig. 1—Black Knot.

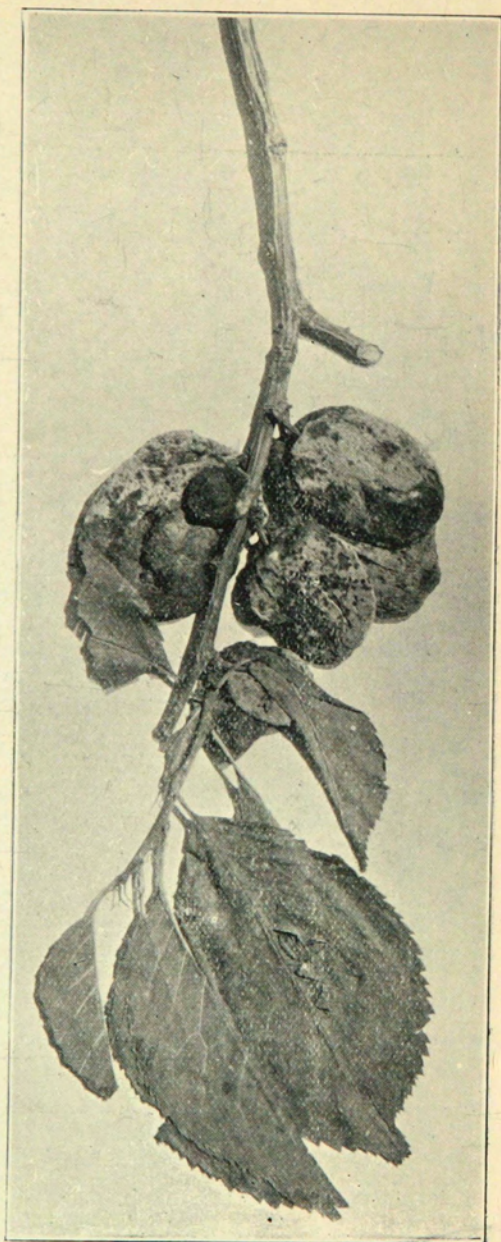


Fig. 2—Plum Locket.

PLATE V.

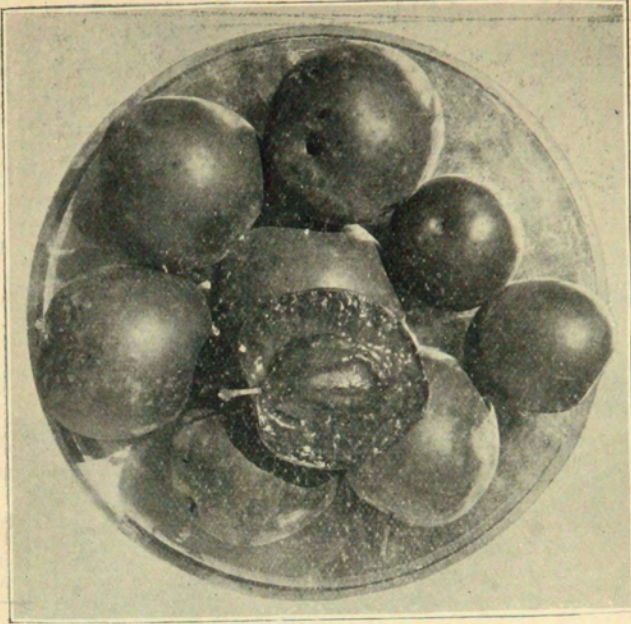


Fig. 1—Cheney.

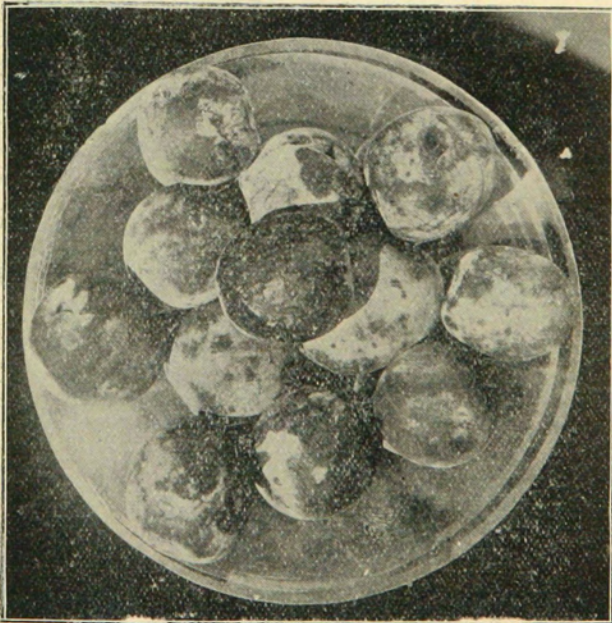


Fig. 2—Deep Creek.

PLATE VI.

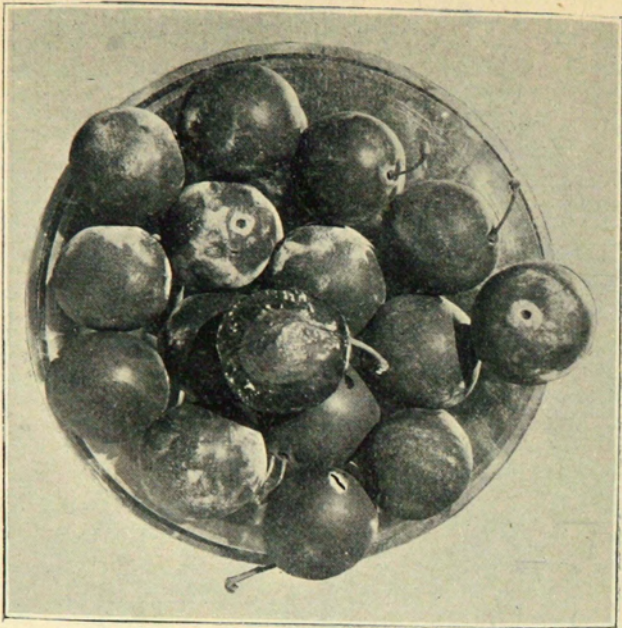


Fig. 1—Forest Rose.

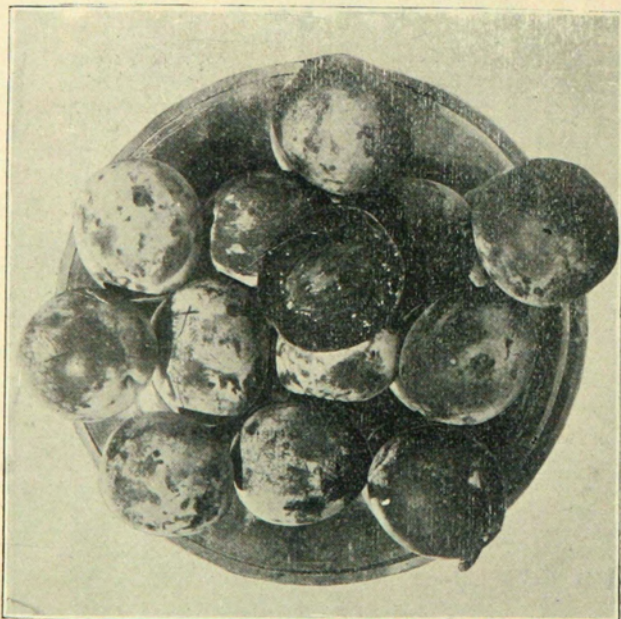


Fig. 2—Wolf.

PLATE VII.

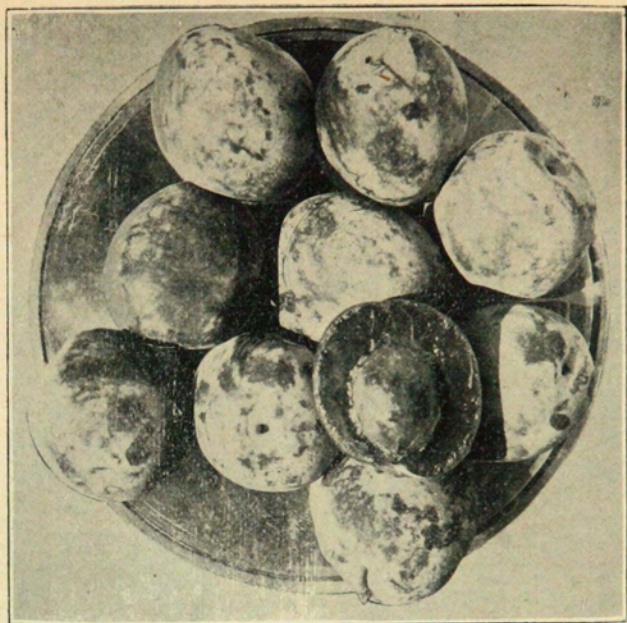


Fig. 1—Wyant

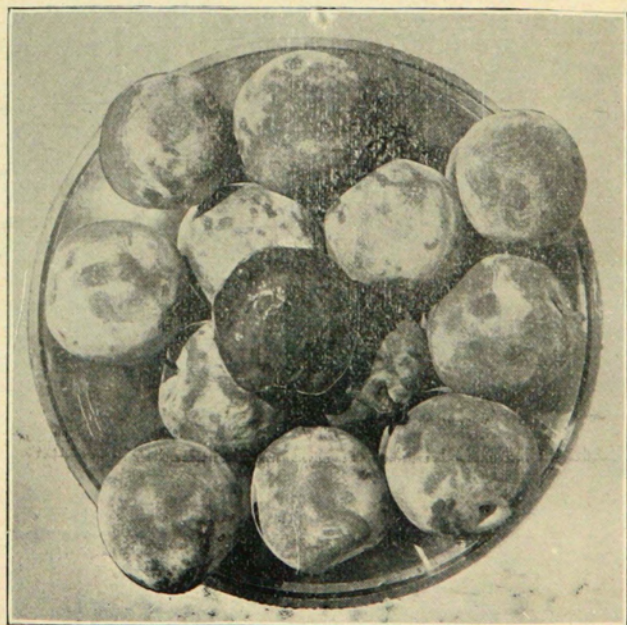
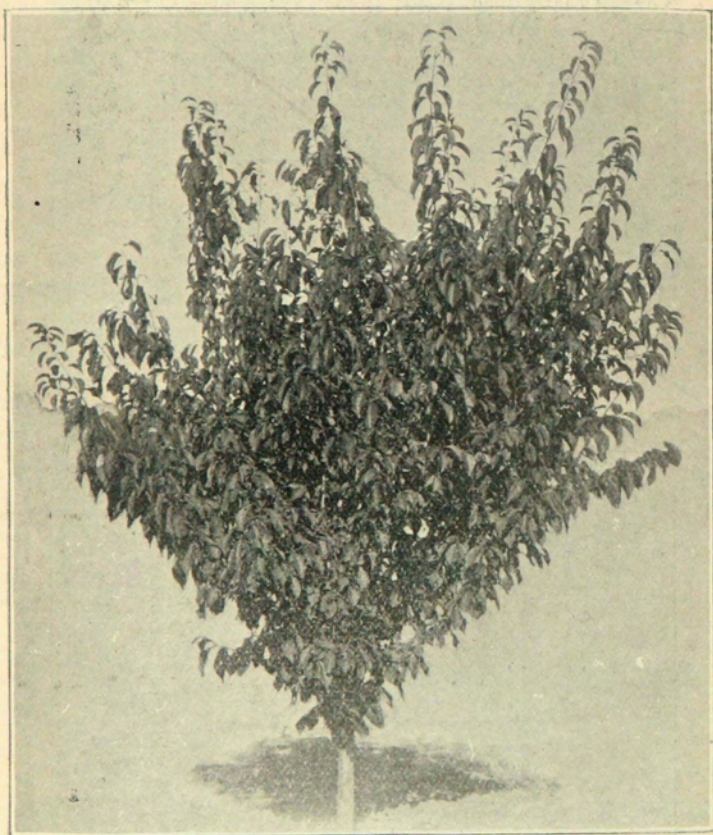


Fig. 2—Yellow Sweet.

PLATE VIII.



Cheney.

PLATE IX.



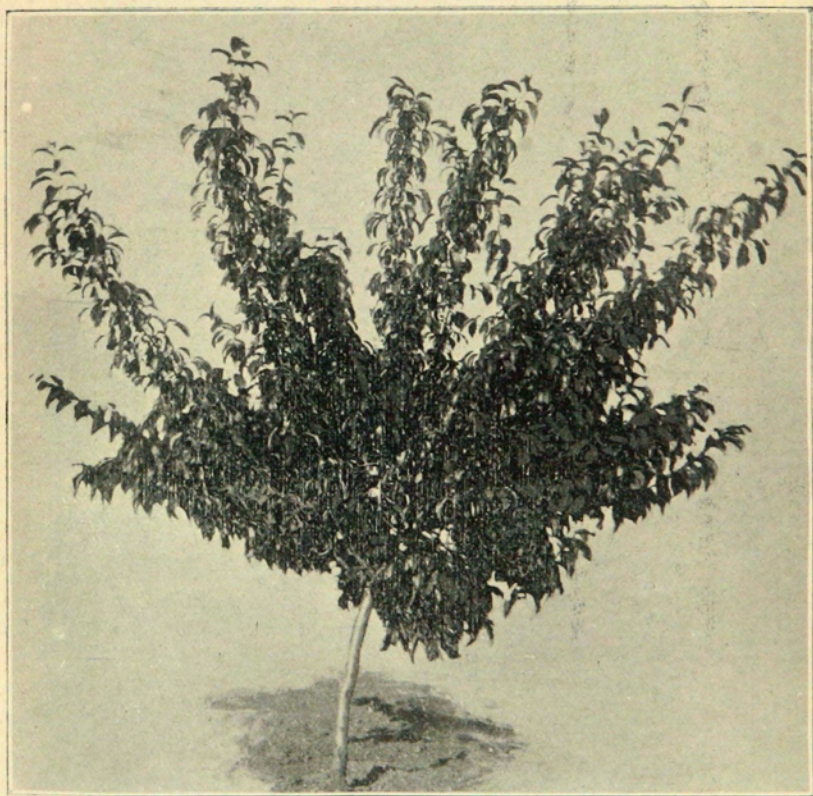
Deep Creek.

PLATE X.



Forest Rose.

PLATE XI.



Hawkeye.

PLATE XII.



Ogon.

PLATE XIII.

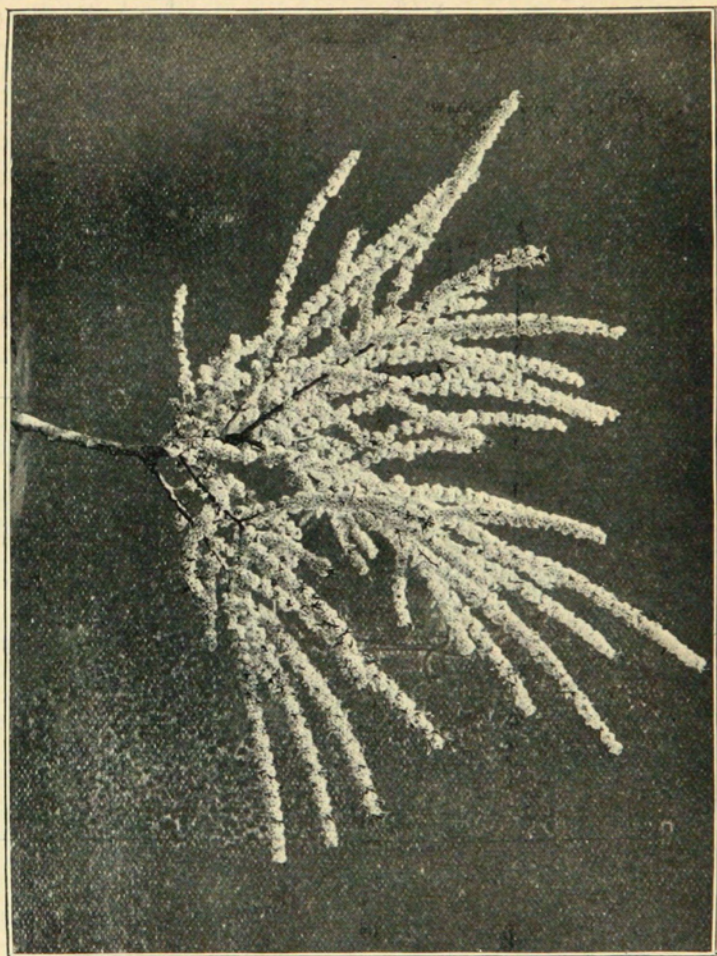


PLATE XIV.



Fig. 1—H, brid.

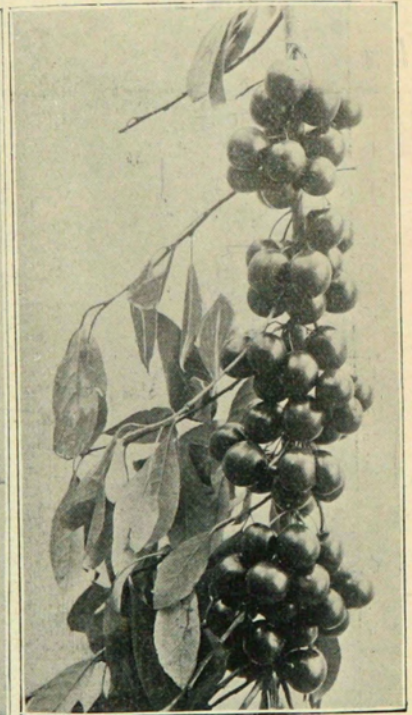


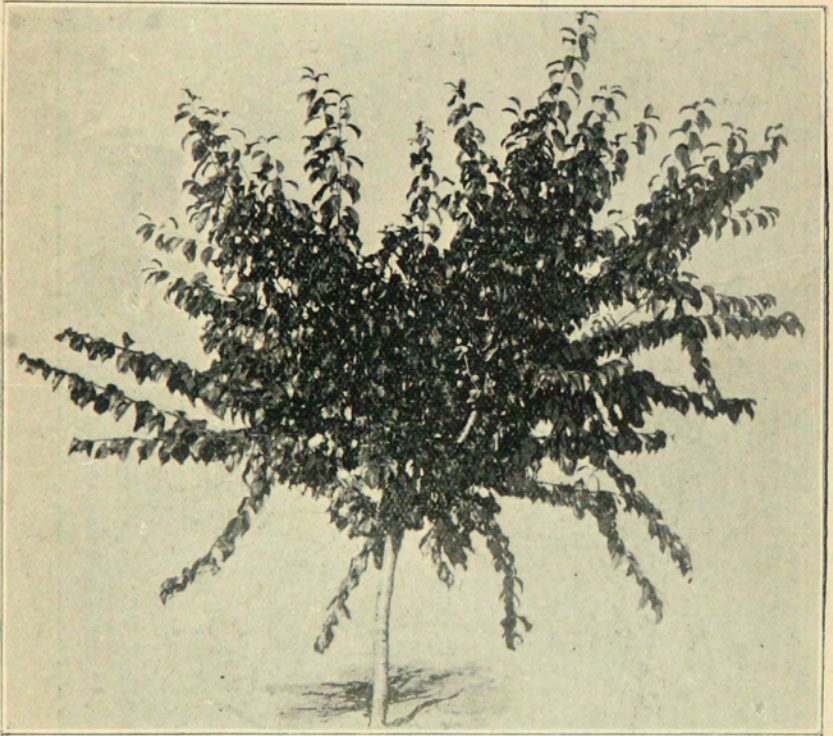
Fig. 2—Sunset.

PLATE XV.



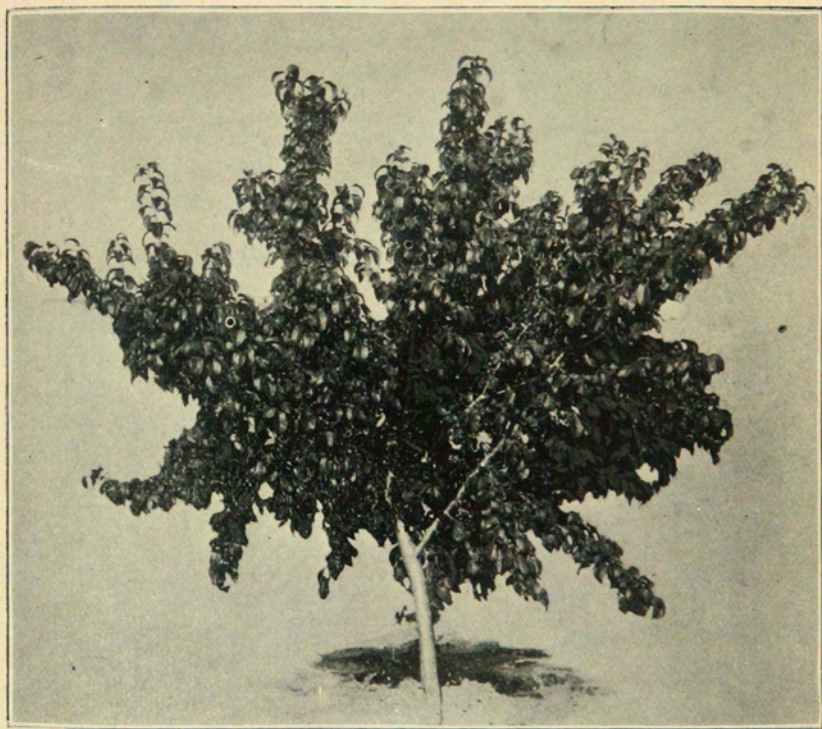
Van Buren.

PLATE XVI.



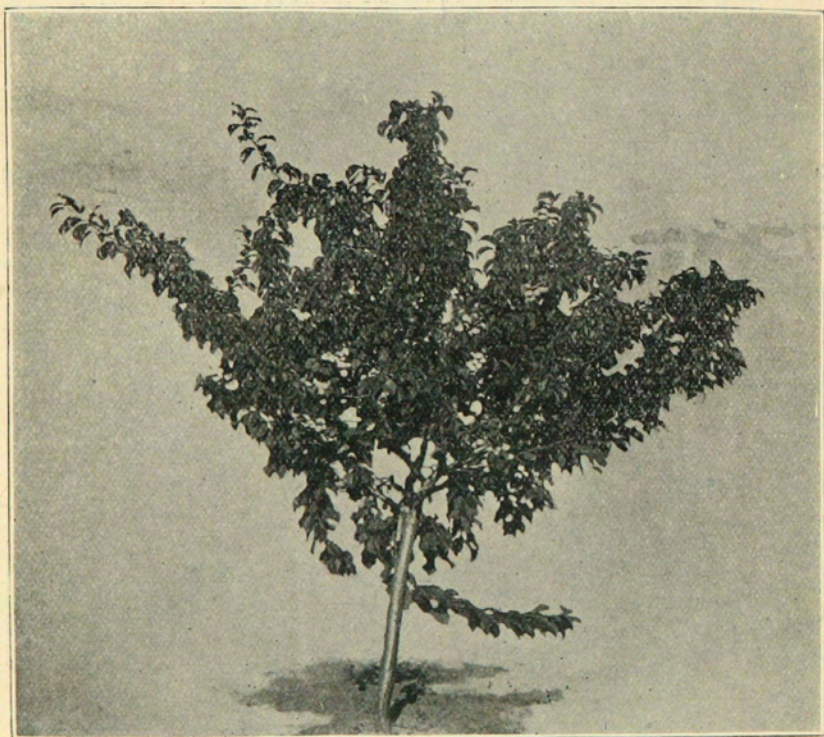
Weaver.

PLATE XVII.



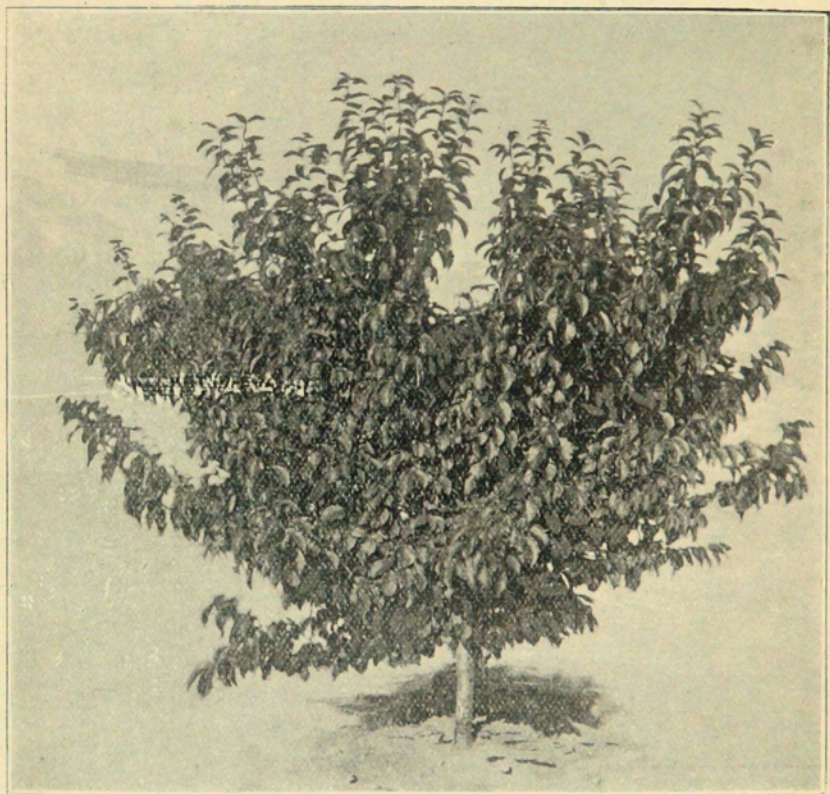
Winnebago.

PLATE XVIII.



Wolf.

PLATE XIX.



Yellow Sweet.

