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THESIS

THE APPLE IN WESTERN MARYLAND

EDWARD L. MARKELL

1911



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THE APPLE IN WESTERN MARYLAND.

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Thesis  
by

Edward L. Markell.

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C.T.



## Early History of the Apple.

The apple tree is included in the natural family of plants called Rosaceae, for the rose, the type of the family, comprising most of the fruits grown in the temperate zone. Botanists are agreed that all the varieties of the apple have been derived from the wild crab apple of the woods and hedge rows, and are therefore artificial productions, the result of skillful selection, breeding and cultivation, being susceptible of indefinite improvement, and of an increase of varieties without limit.

*Pyrus Malus*, the common name of the apple, is derived from the Greek *apios*, the Celtic *api*, and the Saxon *æppel*, each signifying a fruit. The original crab is armed with small thorns, the leaves are usually small and serrate, the fruit small and exceedingly acrid, and indigenous to most parts of Europe. It is not known positively from whence the Europeans derived the cultivated apple, but it was probably from Asia, the home of most of our native fruits.

There can be little doubt that the apple was known in England before the political conquest of the Romans. Twenty nine varieties were known in Italy at the time of the Christian era, and this number was greatly increased by the time of the Roman Conquest. Pliny makes the following statement in regard to the apple industry, "there are many apple trees in the villages near Rome, that let for the yearly sum each, of





2000 sesterces (about \$60), some of them yielding more profits to the owners than a small farm. A careful study of fruit growing was made at this time which led to the invention of grafting.

Virgil writes-

- "Graft the tender shoots,

Thy children's children shall enjoy the fruit."

Professor H. E. Van Deman outlines the development of the apple industry in the United States as follows,-

"With the first white settlers who landed on the shores of America were brought the fruits they had in their old homes across the sea. Chief among these was the apple, which to them was like a part of those very old homes. They had grown this fruit, and so had their fathers for generations before them from which to make cider chiefly. The old homesteads of England, France, Germany, and to a small extent those of neighboring countries had their cellars stored with musty barrels of the the hardest of cider, and to keep up a like supply in their homes in the new world, was the main reason for planting apple orchard here. Little thought was then given to the consumption of apples in the thousands of ways that we now use them, and least of all as a dinner fruit. There were then the juicy Jonathans, aromatic Grimes, spicy Spitzenburgs or melting Primates. The apples of that day were mostly small,



sour and forbidding to the taste, except as the juice was expressed and allowed to ripen into an alcoholic drink. The art of budding and grafting was then but little known and practised still less. For the most part seedlings sufficed, for anything that would fill the cider barrell was good enough.

"As the civilization of the American Colonies progressed, the apple orchards were extended, but not only in size and numbers, but in quality of their fruit. From hard cider, the beverages were changed in some degree to the more intensified "apple jack", an eye watering brandy, fresh from the neighborhood stills, until it became an article of export. Apple butter got to be as common in the household economy as bacon. This required good apples and the seedlings grew less and less satisfying and grafting grew apace. The rich mellow Fall Pippin and its like, was in demand for thickening the boiling cider in the great copper kettles hung over log fires in the making of the toothsome apple butter. Dried apples became an equally popular article of diet, and invaded the public market. All of this called for better apples and more of them. The climate and soil of North America seemed to be the long looked for Paradise that the old world apple had been seeking for centuries, in which to flourish and come into its intended supremacy as the fruit of the temperate zones. The varieties thought to be good were changed to still better ones, until now we have the best in all





the wide world. In no other country are there such apples found as grow here . And the territory is by no means restricted; for apple orchards flourish from the Atlantic to the Pacific."

Notwithstanding the almost universal cultivation of the apple in the temperate zone, it will be generally admitted that location and soil affect both quantity and quality. Cox, one of the earliest writers on American Pomology, maintained that "the middle states are most favorable to the production of fine table apples and cider. It will probably be found that the River Mohawk, on the north and the River James on the South form the limit of that district of the country which produces apples of that degree of richness and flavor for both purposes.

It will not be denied that apples grow well in the interior and elevated parts of the Southern States, as well as in the favorable exposures in the Northern and Eastern. Most of the fine varieties have been produced within these limits. Handsome and fair apples are grown in Maine and Nova Scotia, but they do not possess the fine flavor of the apples of the middle States. The same is true of the apple orchards produced in the plains of Georgia and the hills of St. Domingo. Cold and heat are equally necessary to the production of fine apples, - neither predominating in too great a degree."

The preceding paragraph clearly shows that the natural



advantages of the eastern part of the United States for fruit growing purposes were realized as early as the first part of the nineteenth century. The cultivation of the apple in the southern part of this section, however, did not keep pace with the advancing civilization. The following letter printed in Hovey's Magazine in the year 1846, gives an admirable description of conditions that lasted until comparatively recent years in Maryland.

"In a brief newspaper account of the late Horticultural Exhibition at Boston, which has fallen under my eye, it has been seen with surprise and admiration that apples and pears are cultivated in that vicinity in greater variety than most people suppose to exist in all of the world. How different are the tastes and habits of your people, in this respect, from those who reside south of the Chesapeake, where estates of 500 or even a 1000 acres, exhibit no sign of anything like systematic horticulture. Instead of one hundred and fifty two varieties of pears, and twenty six sorts of apples, as presented by Mr. Manning of Salem, it is by no means uncommon to find in the south large estates without a single choice pear or palatable apple on them.

"True, you may see some of them near the old family mansions, the stumps and decaying remnants of large old orchards



and there too, you may trace the faint outlines of extensive gardens gone to utter ruin.

"Before the Revolution, and even after that time, our ancestors continued, as it would seem from mere force of habit, to plant fruit, but even that habit has died away in the boasted "march of intellect"..Very few think now of planting anything , the fruit of which can not be enjoyed in less than ten or fifteen years, and the trees that are planted are for the most part abandoned, as fondlings by their unnatural parents, without care or culture, exposed to all of the buffetings and peltings of the pitiless storm, and other ills that trees, as well as flesh are "heirs to".

The conditions described above, lasted through this region until comparatively recent years. The industry had gone into a rut, and was destined to remain there until modern scientific methods were applied to uplift it, and place it upon a sound basis. Within the past twenty five years, there has been an almost complete revolution in the cultivation of fruit. The day of the ignorant farmer, with his improvident careless methods , and his large acreage of improperly cared for land, is fast becoming a thing of the past. His place is being taken by the educated man who applies to the profession of modern agriculture and horticulture improved and scientific methods, that enable them to make a fortune on a small fraction of the





acorage of the farmer of yesterday. The application of sound business principles has been combined with the requirements of scientific horticulture, and this has resulted in an industry of great profit, and undoubted stability.



## Conditions in Western Maryland.

There has been very little known until recent years of the horticultural possibilities which exist in certain sections of Western Maryland, particularly in some of the mountainous districts. There is evidence everywhere, however, that the possibilities are great, especially in the development of the apple industry. The soil over a large portion of this region is well adapted to apple growing. Widely scattered over the territory are numerous seedling apple trees- many of which are over a hundred years old- as hardy and vigorous as an oak. All through some of these sections grow impenetrable thickets of wild crab apple (*Pyrus coronaria*) and h wthorn. So rank is its growth and so abundant is its fruit, that one can not help from noticing it when riding past. Where the native apple grows so abundantly, it seems strange that commercial fruit growing has not sooner become an important industry. The explanation however, is obvious. Nearly every farm in these sections have had orchards for generations past. There are almost numberless such orchards, varying in size from 50 to 200 or 300 trees, and in some cases as many as 600 or 800 trees. The most of these orchards recieved no care, or at best, only indifferent attention; the fruit wass as a whole correspondingly poor and more than that, there seemed to be only a slight disposition on





the part of the growers to market their product. The majority of them did not seem to realize that their orchards might be made a source of income. One of the old farmers, living south of Mountain Lake Park, has at least eight hundred apple trees. He reported some time ago, that his orchard had been there for forty eight years, and in all of that time failed but twice to give good crops. Yet he marketed two wagontloads only, one for the cider mill, and one for the local merchant for "store goods." In many cases the trees seem to have been stuck in the ground and left there to fight it out as best they could. An orchard was seldom cultivated, but was generally filthy with weeds and refuse. in most cases the orchards were never trimmed. The trees were large, stocky, lichen covered, and with such bushy tops, that scarcely any sunlight could enter. Spraying seemed to be unheard of. Yet, despite this, the trees were sturdy and they bore wonderful crops of fruit. Here and there, however, an orchard was given some attention, and its response to this treatment was only indicative of what might be expected if a first class system of orchard management were adopted.

The elevation in Western Maryland ranges from 500 feet or more in Alleghany County to 2000 or 3000 feet in parts of Garrett County. In the latter regions, the climatic con-



ditions are, in some respects, not unlike the climatic conditions in some of the apple sections further north. In fact, many of the varieties which are most satisfactory in these northern regions are the ones which are the most pleasing in the highly elevated portions of Western Maryland.

The Baldwin apple is a specific example. In Garrett county, the behavior of this apple is not unlike its behavior in the northern sections. Over practically the remainder of Maryland, the Baldwin is a poor fall apple.

In allegany county, where the elevation is much less than it is further west, the conditions, as indicated by the behavior of many varieties of fruits is intermediate between the extreme western part of the state, and the coastal plain. Yet, the presence of enormously large seedling apple trees and an abundance of native crabs, give evidence of a natural adaptability to this fruit.

Western Maryland is in the midst of one of the greatest apple districts in the eastern part of the United States. It is not far from the world famed Albemarle Pippin section of Virginia, and it is in the same general section that Mr. John Miller has his famous York Imperial orchard. It is largely through the success of the Miller Brothers in their peach and apple undertakings, that an impetus was given to the apple



industry, not only in Maryland, but in the adjoining states as well. The industry is still in its infancy, and is probably less developed in Maryland than in Virginia and West Virginia. The opportunities are just as great in Western Maryland, however, and the people are rapidly awakening to a realization of them.

The apple soils of this region are composed chiefly of gravel, the result of the breaking down of shale, mixed with clay from a further decomposition of the same shale, and with a small percentage of sand.

The price of land for orchard purposes varies with the character of the soil. Brush land, which when cleared will produce good orchards, can be had for from \$10.00 to \$25.00 per acre. It costs from \$15.00 to \$20.00 to clear such land at the lowest estimates. Cleared land ranges in price from \$15.00 to \$60.00 per acre, while land upon which orchards are growing, is hard to buy, and is held at from \$75.00 to \$200.00 per acre. These prices readily suggest that the value of the orchard land is little realized in this locality. Many investors have taken advantage of this opportunity, and have bought large areas, upon which they are promoting orchard developments. The value of land in these sections is rapidly rising, and is destined to rise even more rapidly within a few years when the new plantings are made.

(-11-)



when the new plantings begin to bring in their large returns.

The cultivation of the orchards is largely governed by the character of the soil upon which they are planted. In some sections, all hill orchards are kept in sod. Sometimes this is cut for hay, but more often, it is pastured by hogs or sheep. The lowland orchards are frequently cultivated in ordinary farm crops such as corn, potatoes, or melons. In the Western section, clean cultivation, with buckwheat or rye as a cover crop is the rule.

Little attention is paid to the use of commercial fertilizers in the apple regions, and barnyard manure is seldom used.

The apples of this state do not suffer to any great extent from insect enemies. The very common pests of the tree and fruit are the only ones worthy of mention. The apple tree suffers from borers in the tree and at the root. Trunk borers are both the common round headed and flat headed together with *Scolytus rugulosus*. The woolly aphid is one of the worst pests in young stock. The foliage suffers greatest damage from the green aphid, particularly upon young trees. The tent caterpillar is the most annoying upon older trees. Insects troubling the fruit of the apple are few outside of the





codling moth. The curculio is less injurious in this region than in New York.

The diseases attacking the apple are chiefly the blight of the twigs, the rust of the fruit, branches and leaves, and the scab in leaves and fruit. The leaves also suffer from brown spot (*Phyllosticta pirina*), in some of the higher localities.

This brief sketch of conditions as they exist in Western Maryland gives some idea of how naturally well adapted to the culture of the apple this section of the country has always been. More rapid advancement along horticultural lines in this section of the country was largely prevented by coal mining and other commercial industries that occupied the attention of the people of Western Maryland. Fruit organizations were overlooked, and each grower was left to hunt a market for his products. At present, however, the people are not only planting large orchards, but they have organized strong companies which are fast transforming the wild, ragged, brush covered mountain tops into beautiful and profitable orchards. Cold storage has been receiving attention of late, and many growers are planning storage facilities. Spraying is becoming more general, and the commercial orchards are, as a rule, receiving several applications. Orchard and nursery inspection



is now being given careful attention. Picking, grading, and packing the fruit does not receive the attention it merits, and for this reason more than any other, the fruit gives far from maximum returns.



### General Characteristics of the Region.

The section of the state, commonly known as Western Maryland, consists of the three counties, Washington, Alleghany, and Garrett. This region is largely broken up by three mountain ranges, the Blue Ridge, the Appalachain/ and the Alleghany. The Blue Ridge, in the eastern part, is the lowest of the three mountains. It consists of a series of rolling ridges, many of which are not over 500 feet above sea level. This region is devoted to general farming, and fruit growing is not commercially important. Between the Blue Ridge and the Appalachain Mountains is a broad valley, extending from Virginia Through Maryland and up into Pennsylvania. This valley affords excellent farming land, but is not well adapted to fruit growing. The Appalachain Range is about fifty miles wide in Western Maryland, and consists of numerous ridges, having an altitude of 1500 feet or over. The valleys between these ridges are usually not more than a mile and a half to three miles wide, and most of them run north and south, or are turned slightly to the East of west. The elevation of the valleys is about 500 feet. These valleys are generally smooth and regular, with an average grade of about 2.2 percent. The slope of the valley sides is naturally somewhat greater, but



in most cases the slope in all directions will not exceed an average of 5 percent. It was chiefly along these mountain sides that many of the famous peach orchards of Maryland flourished a few years ago, and many that have survived the attacks of the yellows are still thriving in this section. Apple orchards are being set out in many parts of this region, and the prospects are that within a few years all of the best land for the purpose will have been purchased for orchard planting or for speculation. F. Mertens Sons, of Cumberland, Maryland, have invested in a large area of land in the Green Ridge Valley, and they are planting thousands of peach and apple trees every year. This valley is located in the eastern ridge of Alleghany county, and occupies almost the entire area, from the boundary line of the state of Pennsylvania, in the north, to the Patomac river, in the south. Not far from here, near Hancock, is the Tonoloway Orchard Company. Mr. Cahill, who organized this company, has been growing apples in this section for a number of years, and has been very successful. This company has twelve hundred acres under its control, seven hundred of which are already planted with 51,000 trees. The Alleghany mountains, in the extreme western part of the state have the greatest altitude of the three ranges. Some of its





ridges are 5,000 feet, or more, above sea level. Their sides are not too steep for orchards, and many excellent locations for commercial apple growing industries may be found in this region. The western ridge, between the border of Western Maryland and West Virginia, has been purchased, and is being rapidly cleared and planted with fruit trees. About 50,000 peach and apple trees have been set out here within the past five years.

The soils of Western Maryland are chiefly of limestone origin, and may be divided into two distinct types, according to their location. The soils of the valley are generally clay shale, or slate loams, or mixtures of this. The agricultural value of these soils differs considerably. The slate soils are considered practically worthless. The clay and shale loams in the valleys, and on the mountains are very productive, and are highly esteemed for fruit growing, as well as for general agricultural purposes. The soils of the greatest importance for fruit growing are those on the mountain ridges, which are chiefly three distinct types, Hagerstown stony loam, Porter's stony loam, and Cecil loam.

Hagerstown stony loam consists of a medium brown loam, which is about eight inches deep. Occasionally the amount of fine sand is sufficient to give the soil the character of



a fine loam, but such cases are of small extent. The subsoil consists of a heavy yellow loam which grades into clay loam at an average depth of thirty inches. The amount of stones present in both surface and sub-soil varies greatly. From 25 to 40 percent of chert, quartzite, and hardened sandstone, are commonly found, and the amount is greater than this in local patches. Some of the ridges are covered to such an extent with chert, that no fine soil can be seen. Apple trees are reported to do particularly well in these localities. They grow very vigorously and bear at an early age. The Hagerstown stony loam is derived from a cherty form of limestone, and the principal part of the stone content of the soil consists of fragments of chert which were originally imbedded in the parent limestone rock. These soils, where the topography is such as to secure good drainage, are best adapted to the production of apples and peaches.

The surface soil of the Porter's stony loam consists of light to heavy brown loam, or occasionally clay loam from eight to twelve inches deep. The immediate subsoil is heavy loam, but with increasing depth, this material grades into a clay loam which usually extends to a depth of thirty six inches, though in places it is replaced by a light red clay



at a depth of thirty inches. The stone content varies widely. The most level portions contain from 20 to 50 percent of gneiss fragments, quartz, conglomerate, etc., but with few large stones. The gneiss fragments are usually small, and because of their presence, this soil is usually termed, "Mountain Gravel land". The ridges and steep slopes are more stony than the more level areas, and the latter often lead to rougher land on the higher slopes or tops of the hills and ridges. Numerous patches of rock outcrop, or rough stony land are often found scattered about the steepest parts of this land. Along Green Ridge, such areas occur as a strip along the top, outcropping here and there in irregular series. The topographic features of the type are much diversified. In general, its moderately, or steeply rolling surface is much broken by many steep sided hills and ridges, the tops and upper surfaces of which have been mapped usually as rough stony land. Good surface drainage is provided for this type by its position, and in the steeper places, the drainage is often excessive. In these places slight washing results, and the crops are unable to withstand the drouth. This type of soil seems eminently adapted to the production of apples and peaches. The trees thrive, and fruit of excellent quality is pre-



duced.

The surface soil of the Cecil loam, to an average depth of ten inches consists of heavy red loam or clay loam. The subsoil consists of light red clay loam or clay, which usually grades heavier in texture with increasing depth., but in places it begins to grow lighter at a depth of thirty inches, and grades gradually into a mass of disintegrated rock. Both soil and sub-soil often contain a large percentage of stones and boulders. Where not too numerous, the boulders have been removed and used in the construction of fences about the fields. Surface drainage is so rapid in most places where this soil is found that washing often occurs on cultivated land. The subsoil is so retentive of moisture, however, that the type seldom suffers from drouth. The least stony areas are well suited to the growing of apples, and where well drained, offer good opportunities for the profitable development of the industry.

The red appearance of many of the soils of Western Maryland is due to the presence of a large amount of iron.

The mean annual temperature in Western Maryland, as established by records extending over a period of thirty seven years is 51.5 degrees. Through the period of observation, the





Lowest temperature recorded was -19 degrees, and the highest 109 degrees. By a remarkable coincidence, the temperature is almost identical with that of Hood River. Each also records the exact same minimum and maximum temperature. The mean temperature averages in Western Maryland for the same months were:

January	30.8	July	73.1
February	32.2	August	71.1
March	38.0	September	64.2
April	50.3	October	59.3
May	60.9	November	41.4
June	70.1	December	33.5

During the long days of the growing season from May 1st to October 31st, this region enjoys an excellent division of sunshine and rain. The complete record for the year 1909 will serve as an illustration. During this whole season of 183 days there were 58 days upon which rain fell, leaving 125 dry days, thus giving the region every benefit that could be desired, both as to the amount of sunshine and moisture.

The average rainfall over the center of this area, as established by an unbroken record of twenty four years, is



32.86 inches a year. The mean averages for each month of the year for the same time show:

January	2.16 inches	July	3.36 inches
February	2.57 "	August	3.09 "
March	2.90 "	September	2.71 "
April	2.49 "	October	2.40 "
May	3.33 "	November	2.17 "
June	3.75 "	December	2.20 "

This shows a well distributed annual rainfall, with a maximum during the summer months and a minimum during the winter months. The actual number of days throught the year 1909 upon which rain fell was 117.

During the long period of years in which observations have been recorded, unseasonable frosts have rarely been known, and when they have occurred, they were, with few exceptions, not of sufficient severity to endanger the apple crop. As looking to the future, it is a safe assertion that the trees will never be endangered. Judging from the records of the past thirty seven years, late spring frosts may occur at very rare intervals and endanger the fruit crop, but this is a condition that is common to all fruit growing sections.



The fruit, however, can readily be protected against frost in any case by the smudging process so widely practised in western orchard sections, where its use every season is a necessity. The latest unseasonable frost recorded in spring was May 12th, and the earliest in autumn September 23d.

Soil and air drainage have been carefully investigated in many sections of Western Maryland, and have been pronounced excellent for fruit growing purposes, especially in hilly and mountainous sections.



## Suggestions Regarding Orchard Management.

It is practically impossible for any one to formulate a set of rules that will enable a grower to realize the largest possible profits from his orchard. The personal element determines success or failure in any line of industry, and where this is absent, the results are doubtful. The general principles and practices apply to most cases, and they must be thoroughly understood by everyone who wishes to make a success of fruit growing, they must be applied together with special practices.

Well grown one or two year old trees are the best for Maryland. One year old trees have certain decided advantages over two year old trees. They are cheaper, easier to handle, and they may be headed where desired. Apple trees should be headed low, and from three to five branches should be selected to form the foundation branches. These branches should be at least five or six inches apart, and well placed, so as to form a symmetrical top. Nurserymen usually cut off these branches in growing higher headed trees. Unless a two year old tree has been headed low in the nursery, it is usually necessary to force the development of new main branches low on the trunk, and these are not always well placed. In addition to this is the factor of price which is worthy of consideration.





eration.

Budded trees seem preferable to root grafted ones, because the danger from crown gall is greater in the latter type. The necessary cuts made in root grafting prove easy points of infection for the spores of this disease.

Except in the very coldest parts of the state fall planting is recommended, and for several reasons. The weather is usually good at this time of the year, and the trees can be planted out as late as the last of November, or the first of December. Other work is not heavy at this time of the year, and labor is not scarce. The trees become well established in the ground during the winter, and get an earlier start in the spring. The danger of other work or bad weather delaying spring planting is overcome.

If spring planting can be done early, it is entirely satisfactory, and late planting is better than no planting at all. The point is to do the planting in the fall, or before the growth starts in the spring.

Most of the Maryland soils will grow good large trees, and forty feet apart each way is about the right distance for planting, thus requiring twenty seven trees to the acre. These are the permanent trees, and since it will be many



years before they will need all of the ground, a temporary tree, or "filler", may be set between each two permanent trees in the row, and also a filler row between each two permanent rows. This arrangement makes the trees twenty feet apart each way, and requires 108 trees per acre. The planting arrangement is subject to a great many modifications and may be adapted to a great diversity of conditions.

The roots of the young trees should be pruned somewhat before they are set out. All injured wood should be removed, and the remainder of the roots cut back to a length of from three to four inches.

If a one year old whip is planted, it should be cut back very severely in the spring. Branches are selected later to form the framework. The pruning of a two year old tree is different. Select from three to five branches well distributed around the trunk at different heights, to form the main branches. Cut these back from one third to two thirds, depending upon variety characteristics, etc. Make the cuts close to an outside bud to facilitate healing, and to open up the head. If the tree is to be headed low, the first of the main branches should be two feet or less from the ground. If it is to be high headed, the first branches should be three or four feet from the ground.



The low headed trees have the advantage over the high headed ones in being easier to spray, prune and gather fruit from. They are less liable to injury from heavy winds, and the dropped fruit will be less bruised. The fruit will color and ripen as well on low trees as on high ones.

In planting the trees in mellow and well prepared soil the holes need be only deep enough to receive the tree easily. In hard ground or sod the hole should be three feet or more in diameter, and deep enough to set the tree two inches or more below the point at which it stood in the nursery row. The top soil and subsoil should be placed in separate piles, and the top soil placed in the hole first. The soil should be well worked among the roots and firmed by tramping with the feet. The hole should be well filled with the subsoil placed on top. A little loose soil should be sprinkled on top in spring planting to act as a mulch to retain the moisture.

If the trees can not be planted as soon as they are received from the nursery, they should be heeled in at once. This consists in digging a trench in which to stand or recline the trees, and shoveling earth over the roots and a part of the trunk. This keeps the roots from drying out until the



trees are wanted for planting.

The pruning operations recommended for young trees in Maryland are as follows:

1st year- This consists of the pruning done when the trees are planted, but if any new shoots tend to make the tree unsymmetrical the tips should be cut off in summer to check their growth. This summer pinching of unsymmetrical shoots should be done whenever necessary in the following years.

2nd year- Cut out all surplus branches, and prune back the foundation branches from one third to one half of their growth, making the tree symmetrical, and leaving the central shoot longer than the others. Avoid the formation of crotches as they are sure to split down with a load of fruit, and ruin the trees.

3rd year- Prune as much as mentioned for the second year. If twigs have grown on the foundation branches near the trunk do not touch them except to cut back to one or two buds to induce the formation of fruit spurs. This may need to be done several times during the summer. Do not let two branches rub or cross, but remove one of them.





4th year, and following- Until the trees begin to bear the foundation branches should be cut back annually to make them short and strong to support heavy loads of fruit without breaking down. After fruiting begins, not much pruning is necessary except to thin out excess growth and keep the head well enough opened to let the sunlight in and permit all of the fruit to become well colored.

In cutting or sawing a limb from the trunk, or a small limb from a larger one, the cut should be made close up to the surface from which it is removed, so as not to leave a stub. Wounds made by proper pruning heal over readily, but stubs seldom heal over, but they decay, and lead the decay into the trunk, thus weakening and eventually killing it.

Wherever the orchard land in Maryland is not too steep, intensive cultivation should be practised. It should be plowed in the spring, as soon as the land is in good plowing condition; and then be thoroughly harrowed to work the soil into good tilth. Every ten days or two weeks the harrow should be run over the ground to loosen it up, unless a heavy rain has packed it down in the meantime when it should be harrowed as soon as dry enough. The point is to maintain a fine loose dust mulch on the surface of the soil to prevent



the evaporation of soil moisture.

This harrowing or cultivating should be continued until about the first of August when as soon as weather conditions are favorable, the seed for the cover crop should be sown. The commercial fertilizer, if used, should be applied and worked into the soil just before the cover crop is sown. In this way the cover crop gets the immediate effect of the fertilizers and when the cover crop is plowed under the following spring it soon decays and makes available plant food for the trees. The cover crop thus checks the loss by leaching, and renders the plant foods in a much more available form for the use of the trees the following year. The cultivation for the succeeding years it about the same as that suggested for the first year.

In very hilly or mountainous sections, this complete cannot safely be adopted in the orchards on account of serious washing away of the soil. It may be necessary to plow strips eight or ten feet wide along the rows in the spring, and cultivate these until August when the middles may be plowed, the fertilizers applied, and the cover crop sown. A cover crop used successfully in Western Maryland is a mixture of crimson



and red clover. The crimson clover grows rapidly in the spring and after it blooms and dies down on the unplowed middles, the red clover takes its place, thus making a live cover crop until the ground is plowed in preparation for the fall sowing.

It is a good practise to grow some early maturing hoed crop between the rows of young trees until they come into bearing, but extra fertilizer or manure must be applied for this crop so the trees will not be injured. Such crops as early potatoes, tomatoes, melons, sweet corn, and anything that is not late maturing is best. Late cultivation for late maturing crops may cause late growth on the trees, and if this growth fails to mature it may be winter killed.

After the trees are in good bearing, the orchard ought not to be planted to any other crop. Most varieties will bear fruit five or six years after planting and usually a profitable crop is produced two or three years later. The age of bearing varies with varieties and location.

Small grains like wheat, rye, or oats, should never be allowed to mature in the orchard, because they require so much moisture which they use at the expense of the trees. Furthermore, they cannot be cultivated so as to prevent the loss



of moisture by evaporation.

In a few favored localities, orchards do well in sod. There must be plenty of moisture so that neither trees nor grass will suffer. Usually sheep or hogs are pastured in these orchards and they add considerable fertilizer to the soil. Hogs root up the ground more or less, thus cultivating it in patches, but this is expensive cultivation. If the grass becomes large enough it is cut and allowed to remain where it falls. Sod culture is not recommended for Maryland where it can be avoided.

Mulch culture is a great improvement over sod culture. In this system not only the grass growing in the ground is cut and allowed to remain, but a large amount of straw, manure and other coarse material is added to form a heavy mulch especially under the trees.

It is impossible to say what is the best fertilizer to use because it all depends upon the age of the trees, condition of the orchard, the kind of soil, and the treatment it has received for several years. Some soils are rich in potash and deficient in phosphoric acid, while others are just the reverse. Stable manure in large amounts is always acceptable, unless the trees are making a rank growth. Cover crops





add much plant food and humus to the soil and are necessary. Commercial fertilizers are depended upon to supply what is still needed. If a regular system of fertilizing and cover-cropping is followed, the fertilizer ought to be applied when the ground is fitted for the cover crop seed in August. In other practices it should be applied early in the spring. A well regulated system of cover cropping should, in most cases supply all of the plant food elements necessary, without the application of the commercial fertilizers.

Spraying is a hitherto much neglected operation in Maryland, but its importance is being recognized, and many of the growers are spraying their orchards carefully. It is beyond the scope of this article to go into the details of spraying, but an idea of the value of this practise may be gained from the following article taken from Bulletin Number 142 of the Maryland Agricultural Experiment Station.

"The profits from spraying are even harder to estimate than the cost of the operation. In the <sup>1</sup>experimental orchard at Marshall Hall in 1908, the crop of apples from the unsprayed trees was negligible, scarcely worth the picking, while on the trees sprayed, even those which recieved but a single



treatment, the crop was, in spite of the fact the trees were small and the blossoms very light, worth two and a half dollars per tree. Previous to this time the owners had not realized anything from the orchard.

"The yield of apples obtained from the sprayed trees in the orchard of the station, is at least double that from the unsprayed trees, and when, as in the case here, the yield per tree is in the neighborhood of ten bushels on the sprayed trees, the profits from spraying are easily above two dollars per tree. In several of the demonstration orchards, the profits were even more marked than those given above.

In an orchard where there are forty trees per acre, with an outlay of less than twenty cents per tree or eight dollars per acre, the orchard can be made to pay from eighty to a hundred dollars more than it would otherwise have paid. No one can doubt the wisdom of the investment. The average farmer would not hesitate to invest a like amount in fertilizers for his crops, if he were sure of a proportionate increase in the yield. The orchardist cannot neglect spraying any more than he can allow his fields to go unfertilized."

It is well said that half of the profits of fruit grow-



ing depend upon the manner in which the crop is handled at harvesting time. The fruit should be allowed to remain on the tree until it is fully grown and well colored, and the greatest care should be exercised in picking it. The apple should be removed from the tree by a rolling and bending motion, and not jerked. Careless picking destroys many fruit spurs, and injures the fruit by bruising. If the stems are pulled out, the skins broken, or the flesh bruised in any way, the fruit will not keep well and its value is greatly reduced. All of the work in connection with the handling of the fruit should be most carefully supervised.

Picking baskets of all descriptions are manufactured for picking the fruit in, and most of them serve the purpose very well. The main precaution about using a basket is to see that it is well padded to prevent the bruising of the apples during picking. Pickers frequently prefer to use sacks instead of baskets, and there are numerous styles of these. Most of these, however, are too bulky to handle easily, and the fruit is often severely bruised by crushing them against the ladder. Pails for picking are very popular in some of the apple sections of the west, and they are well adapted for



handling the very fancy varieties of fruit.

The very best fruit should be packed in boxes as it is in the west. The commission men and city dealers advise against it, because there is not as much money in the bushel box for them as in the barrel. Nevertheless, the box should be used and forced upon them. It is certainly the coming pack for fancy eastern apples. The second grade apples, and those to be used for culinary purposes may well be packed in the barrel.





## Varieties of Apples for Western Maryland.

The list of apples reported to be adapted to and successfully grown in Western Maryland is very large. Over one hundred and fifty different varieties of prize winning apples are recorded to have been exhibited by orchardists in this section withing the past five years. The following list of varieties and number of trees planted will give some idea of the chief commercial varieties and their relative importance. This is a list of the trees planted by the Tonoloway Orchard Company up to the fall of 1910. This is one of the largest orchards in Maryland.

Variety	Trees	Variety	Trees
Yellow Transparent	3000	Duchess of Olden.	3500
Wm. Early Red	1000	Red Astrichan	600
Summer Rambo	1000	McIntosh	300
Wealthy	4000	Jonathan	6000
Yellow Bellflower	1000	Grimes	7000
Winesap	2000	Stayman	1000
Baldwin	4000	Ben Davis	3000
Rome Beauty	1000	York Imperial	12000

From the above list one would have no difficulty in selecting



the varieties that are best adapted to the section in which this orchard is located.

The following is a list of the varieties that are authoritatively classified as well adapted to successful cultivation in this region. This includes all of the standard commercial varieties, and the most popular of the non-commercial varieties.

Varieties that can be grown successfully:

Akin	Boiken
Alexander	Buckingham
American Summer Pearmain	Carter Blue
Arkansas Black	Chenango Strawberry
Bailey Sweet	Colton
Baldwin	Cox Orange
Bayard	Delicious
Beach	Dominie
Ben Davis	Early Harvest
Bismark	Early Ripe
Black Ben Davis	Early Strawberry
Blue Pearmain	English Red Streak



Esopus Spitzenburg.	Lady
Falawater	Lady Sweet
Fall Phippen	Lawver
Fall Wine	Longfield
Fameuse	Lowell
Gano	McAfee
Golden Russet	McIntosh Red
Golden Sweet	Magnet
Gravenstein	Maiden Blush
Green Newtown	Missouri
Grimes Golden	Mother
Haas	Newtown Pippin
Henry Clay	Nickajack
Hubbardston	Northern Spy
Jacobs	Northwestern Greening
Jonathan	Oldenburg
July	Ortley
Tompkins King	Paragon
King David	Peerless
Kinnaid	Pewaukee



Porter	Trenton Early
Primate	Vandivere
Rambo	Virginia Beauty
Red Astrichan	Wagener
Red June	Walbridge
Redstripe	Wealthy
Rhode Island Greening	White Pippin
Rome Beauty	Williams Favorite
Roxbury Russet	Williams Red
St. Lawrence	Wilson Red June
Shiawassee	Wine
Smith Cider	Winesap
Smokehouse	Winter Banana
Stark	Winter Paradise
Starr	Wisner Dissert
Stayman Winesap	Wolf River
Summer Champion	Yates
Summer Rambo	Yellow Bell flower
Sweetheart	Yellow Transparent
Talman Sweet	York Imperial





It is by no means advisable to plant all of the varieties given in the accompanying list. The selection of varieties is one of the most important points to consider when contemplating orchard planting. Most of the varieties in the list will grow in Western Maryland, but many of them will do far better in other sections of the country and their cultivation should be confined to those regions best suited for them. A most careful study of all available information relative to the adaptability of the different varieties to a region, should be made before selecting.



Description of Varieties of Apples and Their  
Adaptation to Western Maryland.

The following descriptions of varieties of apples and their adaptation is taken chiefly from Bulletin 130 of the Bureau of Plant Industry, United States Department of Agriculture. The information is the result of a survey made in 1908 by Mr. H. P. Gould, Pomologist in charge of fruit district investigations. This survey was very carefully made, and the results are quite reliable. He states in regard to the variety problem, "The range of varieties is large, though the commercial sorts which are extensively cultivated, are few in number. This territory, especially the Blue Ridge, is rich in local varieties, and seedlings which are not propagated in any nursery are known only in the localities where they are grown. It is probable that some of the local varieties may fill an important place in the future development of the apple industry in these regions. Some of them have received local names, but many of them have no particular designation."

Varieties.

Faldwin.

"Though one of the most important winter sorts in the



North, the Baldwin apple is relatively unimportant in these regions. It is frequently found in the older orchards, especially in the Virginia portions. The tree is rather irregular in bearing in most of these orchards, and the fruit drops badly, particularly at the lower elevations. In the mountain orchards, fruit of exceptionally fine appearance for the variety is frequently produced. Its behavior in typical piedmont and Blue Ridge locations is indicated as follows:

On Porter's black loam at elevations of 1,500 to 2,500 feet, probably also on Porter's sandy loam at similar locations, fruit of high quality for the variety is produced. This is of excellent appearance, and may be expected to keep until the holidays, under favorable conditions. Good fruit is produced on Porter's clay at 1,500 feet elevation, but it does not have the keeping qualities of those from higher altitudes. In other sections, particularly in Bedford county, Virginia, it is growing to some extent on other types of soil, such as Cecil clay, Cecil sandy loam, and Murrill clay loam, with an elevation of 1,000 feet or less. Under these conditions, it matures as



early as September, and frequently rots and drops before it is ripe. A few growers who have the Baldwin apple in the mountain orchards, particularly those in the northern portion of the Blue Ridge region, find it fairly satisfactory for local markets. There are other varieties, however, that are more reliable croppers and better adapted to these conditions."

The Baldwin is not a reliable variety for commercial planting in Maryland.

Ben Davis.

"There are few varieties of fruit as widely distributed in as many sections of the country as the Ben Davis apple, and in the Piedmont and Blue Ridge regions it is one of the comparatively small number of varieties which have attained a recognized commercial importance. The tree has no conspicuous faults; it begins to bear moderately early, usually producing considerably by the time it reaches six or seven years of age. The crops are produced mainly in alternate years. The fruit when well grown is very attractive in appearance and is valuable for its keeping and shipping qualities, but it is notoriously poor in dessert quality.





"In general it may be said that this variety is well adapted to the conditions in these regions, aside from those at the highest elevations, though there are apparently some exceptions to this, which are probably due to local conditions. In the Georgia and South Carolina portions of the Piedmont sections and extending to an elevation of perhaps 1,400 or 1,500 feet, some excellent results have been obtained with it where the trees have been given moderately high culture and thoroughly sprayed. Fruit grown under these conditions, however, should be marketed by the holidays, as it may be expected to deteriorate rapidly if held later than this."

The Ben Davis apple is not recommended for planting in Maryland.

Esopus.

"No important commercial plantings of this variety exist in these regions, but in very limited number of trees, it may be found in a few widely separated orchards.

At the lower levels it usually drops prematurely, and even on the Porter's black loam at 2,000 feet elevation, it often rots and drops seriously. In Albemarle County, Virginia, at an elevation of about 1,000 feet, and on what is pro-



bably Cecil clay loam, it is said to be unusually promising as indicated by the behavior of a limited number of trees."

Not recommended for Maryland.

Grimes.

"The occurrence of this variety is quite general throughout these regions, and though not as yet grown in many of the orchards, it is of recognized commercial value, the importance of which is undoubtedly increasing. The tree is considered by fruit growers generally as short lived, but no particular complaints of this kind have been noted by the growers here. However, most of the trees are comparatively young. The tree is satisfactorily productive as a rule, though under the usual cultural conditions, it has "off" years, as do most of the varieties.

"Experience thus far indicates that Grimes is a desirable variety to grow both for home use and commercial purposes in most of the Piedmont and Blue Ridge sections where the conditions are suitable for the planting of apple orchards. The relative elevation appears to be an important factor in its effect upon the durability of the fruit. Produced at elevations of 2,000 feet in the upper sections of the



Blue Ridge region, it may be kept under fairly favorable conditions until early winter. Grown in Cecil County at 1,000 feet elevation it lacks its rich color and high flavor, the size is somewhat smaller, yet this combination of conditions appears to meet the requirements of the variety fairly well."

Grimes attains highest perfection in this section, and is highly recommended for Maryland.

Jonathan.

"This variety occurs only rarely, and reference is here made to it because of the possible value it may possess for these regions. The tree is not always as vigorous as might be desired, but usually no serious difficulty exists in this respect. Fairly early bearing is a characteristic. Normally its season is late fall or early winter, but if grown at moderately high elevations it would probably reach maturity sufficiently late to permit of its being handled in cold storage, for which it is especially well adapted. It possesses exceptionally high dessert quality and ranks as an important commercial variety in some sections of the country.



"Its behavior in the few places in these sections where it is known to occur indicates that it is worthy of careful consideration by those who are planting orchards at an elevation of 1,200 to 1,500 feet or more within these regions. The finest specimens found in these regions have come from the orchards which have the highest altitude of any of those in the Blue Ridge. Observations have been confined to young trees. "

The Jonathan is highly recommended for Maryland.

Maiden Blush.

"This is not a prominent variety for these regions, and has been mentioned only occasionally, but most of the reports concerning it are favorable. On Cecil sandy loam at elevations of 900 to 1,000 feet, it is inclined to rot severely, but on the more clayey soils of the Piedmont region it does well. Its season of ripening varies considerably, ranging from summer to early fall. In some sections of the country where apples are grown extensively, this is a commercial sort of importance."

It would be well for fruit growers on the higher elevations to give Maiden Blush a trial.





Rome Beauty.

"Although this is a well known variety and well distributed, it is rarely found in the regions in question. As a rule, wherever it has been planted it is growing under some other name, and only a tree or two of it in a place. Most of the trees in this region are young, hence the variety has not been tested for a sufficiently long period of time to definitely determine its merits. It appears, however, to be promising for this section, especially in the Blue Ridge region, and to be worthy of attention by those who are planting orchards or even small collections for home use.

Rome Beauty is well recommended for Maryland.

Winesap.

"This is one of the four or five great commercial varieties of the Piedmont section, and as a general-purpose winter apple for the Piedmont conditions, it is one of the most uniformly successful and satisfactory sorts grown in this region. The trees often begin bearing when they are three or four years old and usually produce paying crops when six to eight years old. While not producing heavy crops



every year, they are more nearly annual than those of most varieties, especially when the trees are maintained under good cultural conditions.

"} } } conditions in the northern part of the Piedmont region at 1,000 to 1,200 feet elevation do not produce the best results, and in the southern counties of Virginia, the conditions produce very excellent fruit, but less satisfactory results are secured at points having elevations which much exceed that of the piedmont region, while still further south this variety can be grown at higher altitudes than is possible in the northern portion of the Piedmont. Its behavior thus indicates in an interesting way the corresponding relationship between altitude and latitude in their influence upon the behavior of this variety."

The Winesap is well recommended for Maryland and is especially well adapted to the lower elevations.

Yellow Newtown. Synonyms: Albemarle Pippen, Newtown Pippen, New York Pippin, Virginia Pippin.

"In these regions, the synonymy first mentioned is the name by which this variety<sup>t</sup> is universally known, though the leading varietal name, according to the rules of the Amer-



ican Pomological Society, is as indicated. It is one of the few prominent commercial sorts of these regions, and doubtless ranks first in importance. It is grown to some extent the entire length of the Blue Ridge region, but more extensively in Virginia and North Carolina, than at points further south. While it ranks as one of the leading commercial sorts of these regions, and doubtless bears a more flattering reputation than any of the others, there are comparatively few growers who consider it as profitable as some of the other varieties, and it is being planted extensively at present only in a few restricted sections. The greatest possibilities of this variety can only be realized when it is grown under the best cultural conditions. As better methods of orchard management are adapted in these regions, it is possible that it will increase in commercial importance in the future for planting in locations to which it is especially well adapted, because of the high favor in which the fruit is regarded both for export and domestic markets, and the relatively high prices which it generally brings.

"The tree makes a slow growth, and under usual methods of culture in these regions is late in coming into bearing.



It seldom produces crops that are of commercial value until it is twelve years old, and in the experience of many growers, not until it is 18 or 20 years old. It is unusual for the tree to bear fruit of commercial consequence more often than every other year, and many orchards do not produce crops oftener than every three or four years, and even less in numerous cases. The orchards which are given the best cultivation are, as a rule, the ones which bear most regularly and abundantly and are relatively the most profitable. The tree is quite subject to twig blight in comparison with many other varieties, and bitter rot attacks the fruit quite seriously in some cases. The latter, however, yields readily to spraying, and hence is regarded with less concern than formerly."

Yellow Newtown is not highly recommended for Maryland, but would probably do well in some sections under the best conditions.

York Imperial.

The distribution of this variety is quite general throughout the southern apple growing region. The tree is fairly vigorous and healthy aside from its susceptibility to blight





which is sometimes serious. The tree begins to bear comparatively young, and frequently produces profitable crops at six or seven years of age.

"It appears to be less influenced by soil conditions than by elevation. In the Piedmont orchards having less than 1,000 to 1,200 feet elevation serious rotting and premature dropping are apt to occur, and while frequent exceptions to this have been observed, it is sufficiently constant to suggest that extensive plantings of it in this region should be made cautiously, if at all, except in the northern portion where it appears to be more free from serious faults than almost any other commercial variety that is being grown and is considered one of the most profitable sorts. In the Blue Ridge region above an elevation of 1,200 to 1,500 feet premature dropping is generally less severe than at lower points. Especially satisfactory results have been usually obtained on Porter's clay at these middle elevations, where heavy crops are expected at least in alternate years. If heavy droppings occur in such cases, a sufficient quantity of fruit usually remains on to result in a heavy crop. At higher altitudes this is considered a valuable variety especially in North Carolina, where it has grown at 2,500 to 3,500 feet altitude.



"It is frequently found advisable to harvest the crop of this variety somewhat earlier than that of most of the other commercial sorts on account of its tendency to drop, but this is not necessarily an objection in large orchards where the harvesting must extend over a considerable period of time."

The York Imperial is a popular and reliable variety in Maryland, where it is a large producer and a good keeper. It is a very profitable second grade commercial apple, for which there is a uniform demand.

Other varieties recommended for planting in Western Maryland are the following;

Stayman Winesap. This variety is claimed by some to be the best commercial apple for Maryland. The fruit both in size and quality is far superior to the variety Winesap, from which it originated. It is hardy, vigorous, and long lived. It comes into bearing early and yields profitable crops the 6th or 8th year.

King David. A standard high grade apple. In size medium to large. Good keeping qualities. Tree is a vigorous grower and hardy. It is an early bearer, frequently yielding a



good crop by the fifth year. The variety ripens in early winter.

Winter Banana. The fruit is medium to large. The skin is thin and of a light yellow or cream color. Owing to its thin skin and tender flesh, its shipping qualities are considerably impaired. It is a very fancy fruit and brings the highest prices when grown to perfection. It is an early winter variety, and is not a late keeper. The tree is hardy and vigorous. It bears early and frequently yields crops the fifth or sixth year.

Wealthy. Medium to large in size. It has both good quality and good keeping qualities. Ripens in the late fall, but the fruit keeps well until early winter. The tree is vigorous and hardy and yields well under most conditions in the regions to which it is adapted. It frequently bears by the third or fourth year, and for this reason it is recommended as a filler, but it is a good permanent variety as well.

Wagener. The fruit is of medium size, highly flavored, and of good quality. Usually comes into bearing very early but is often short lived. An early winter variety. The tree yields a fair quantity of fruit. This variety is recommen-



ded only as a filler.

The varieties recommended above are merely suggestive, and are by no means conclusive. An attempt has been made to include the best varieties adapted to this section of the country, but there are probably others which are as good or better, but they have not been sufficiently tried out as yet. In general, therefore, these varieties are adapted to Western Maryland conditions, but the grower must select those best suited to his own locality.





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## Bibliography.

- American Pomology by John A. Warder.
- Fruit Trees, by William Coxe.
- Culture and Management of Fruit Trees, by William Forsyth.
- The Practical Fruit Gardener, by Stephen Switzer.
- The New American Orchardist, by William Kendrick.
- American Fruit Culturist, by John J. Thomas.
- Fruits and Fruit Trees of America, by Charles Downing.
- Principles of Fruit Growing, by L. H. Bailey.
- Encyclopedia Of American Horticulture, by L. H. Bailey.
- Magazine of Horticulture, by Hovey. 1843, etc.
- Pamphlets, descriptive of conditions in Western Maryland,  
published by Mertens Company, Cumberland, Maryland.
- Apple Culture, Bulletin 144, Maryland Experiment Station.
- Plant Diseases and Spray Calender, Bulletin 143 , Maryland  
Experiment Station.
- Bulletin 151, Bureau of Plant Industry, United States  
Department of Agriculture.
- Summer Apples in the Middle Atlantic States, Bulletin 194,  
Bureau of Plant Industry.
- Orchard Fruits in the Piedmont and Blue Ridge Regions of  
Virginia and the South Atlantic States, Bulletin 135,



Bureau of Plant Industry.

The Apples of New York, by S. A. Beach.

The American Apple Orchard, by F. A. Waugh.

Year Book of the U. S. Department of Agriculture, 1907 -'10.

























































