

NURSERY STOCK AND ITS EFFECT UPON ORCHARDS.

J. C. Cunningham.

Nursery Stock and Its Effect upon Orchards.

The United States is becoming the greatest fruit consuming nation in the world. The interest in the work of planting parks and lawns as well as landscape gardening is increasing year by year and we hope Professor John Craig of Cornell University is right when he says "Beautiful America is coming." In traveling through the eastern portion of the United States one especially notices the lack of young orchards and that the old orchards that have yielded such large returns must soon be replaced. Throughout the irrigation districts, as well as in the Southern Central states, large commercial orchards are being planted every year.

One of the most important features of orchard work is the increasing number of "Small Family" orchards. More and more do our people realize the pleasure and profit of having fresh, home grown fruit for family table use.

To furnish well formed trees, free from disease or injury and true to label is the mission of the nurseryman. In considering the effect of nursery stock upon the subsequent trees and shrubs only a few of the most prominent features will be discussed.

Tree Breeding. We might properly speak of this as the "Thoroughbred Age" Animals, grain and even trees must have "pride of ancestry" before they meet with the approval of the progressive American. No doubt the term "pedigreed trees" has been used to increase business yet every honest nurseryman will exercise the greatest care in the selection of scions, buds, cuttings and seeds to be used in propagation.

In fruit plantations it is a well known fact that some trees will produce superior fruit in size, flavor or color to others of the

same variety. Just how far this characteristic will be transmitted by buds or scions is not definitely known. It seems reasonable to assume however that better results will be obtained if the nurseryman propagates from the tree yielding the best fruit. Leading nurserymen now greatly prefer to propagate from trees with a record although they realize that soil and light effect in a great measure the merits of the fruit. In large nurseries it is impossible to select all scions from bearing trees yet scion orchards can be planted from time to time using only carefully selected scions.

In forest and shade trees the selection of seed is of utmost importance as there is as much variation in these trees as in any other plant. The standing of a firm depends largely on honor so the wholesale seed firms are very particular about the plants that bear the seeds they sell and no nurseryman can afford to be heedless about the selection of tree seed.

Winter Injury. The severe winters of 1899 and 1905 resulted in serious injury to most of the nursery stock left in the field. Most of the apple trees were black-hearted while much of the wood of the previous year's growth was killed. As a result of this most nurserymen cut back the two year old apple trees to the one year wood and the one year old to the ground. Drawing No. 1 illustrates the amount of injury caused by the extreme cold. Below the snow line, or at A, the wood is perfectly normal while above the line, or at B, the wood beneath the cambium layer is a brownish black. If such a tree was allowed to grow new wood perhaps would cover the injured portion but it would never be a strong tree for the center would be weak and liable to attack by fungus.

Blackheart caused by low temperature must not be confused with the effect of root-rot caused by the fungi, Clytocybe parasitica

and Ammellena mellia With apple trees it depends upon the variety as to the extent of the injury and the following table indicates the extent of the blackheart caused by the severe winter of 1905 and the effect upon the same variety budded and grafted.

Grafted Stock.

Iowa Blush	- - - - -	very little injury.
C. E. White	- - - - -	blackhearted.
Red June	- - - - -	blackhearted.
Duchess	- - - - -	1 yr. wood damaged, 2 yr. sound.
Grimes Golden	- - - - -	blackhearted.
Early Harvest	- - - - -	very badly blackhearted.
Maiden Blush	- - - - -	badly blackhearted.
Wealthy	- - - - -	1 yr. wood sound; older wood damaged.
Florence Crab	- - - - -	no injury.
Jonathan	- - - - -	Heart wood dry, rather brown.
Whitney No.20	- - - - -	perfectly sound.
Janet	- - - - -	1 yr. wood damaged; 2 yr. sound.
Winesap	- - - - -	slightly blackhearted.
Missouri Pippin	- - - - -	blackhearted.
Yellow Transparent	- - - - -	no injury.
Ben Davis	- - - - -	blackhearted.

Budded Stock.

C. E. White	- - - - -	damaged more than grafts.
Red June	- - - - -	blackhearted.
Duchess	- - - - -	about like grafts.
Grimes Golden	- - - - -	blackhearted but not as badly as grafts.
Florence Crabs	- - - - -	no injury.
Whitney No.20	- - - - -	perfectly sound.
Winesap	- - - - -	blackhearted.

Budded Stock. (con't)

Missouri Pippin - - - -badly blackhearted.

Yellow Transparent - - no injury.

Ben Davis - - - - - 1 yr. wood blackhearted.

Note: Seedlings were perfectly sound in both cases.

The facts set forth in this table are well known to nurserymen and have led to the classification of tender and hardy, or ironclad, varieties. At the North Dakota station it has been found that the roots of both orchard and nursery trees were severely injured by severe winters. They therefore recommend the roots of the hardy crabs, such as Florence or Whitney No.20, for stocks.

As one year's growth is sufficient for all stock beside the apple and as others can then be dug and the roots protected during the winter the apple is the only one to suffer greatly from winter injury. It is the duty of the nurseryman to send out only sound trees but many trees and roots are injured by cold after being placed in the orchard.

Crown Gall. A disease known as Crown Gall attacks apples, peaches, plums, pears, raspberries and blackberries and in rare cases some varieties of shrubs. The exact cause of this disease is not known but it is doubtless due to some parasitic fungi. Professor Toumey, of Arizona, has named a slime mold which seems to cause the disease on almonds and is inclined to believe this the cause of all crown gall. Doctor Bessey, of Nebraska University, thinks the investigations have not been extensive enough to warrant the conclusion. The disease is easily recognized by the spongy, wart-like enlargement usually at the surface of the ground but it may appear upon the roots or upon the lower part of the body of the plant in numbers few or many and varying in size from the mere nodules to knots as large as hen's eggs. Figures II and III show the different positions and forms the

galls may assume.

Authorities differ as to the effect it has on the trees, one prominent grower saying he has no fear of it whatever while another says effected trees will not live more than three or four years. The general opinion however, is that the gall has a serious effect on orchards. Professor Howard, of Missouri, says that trees with crown gall have been found to die during drought while those not affected lived. Professor Selby, of Ohio, considers it a very serious detriment to any tree or bush. Crown gall is perhaps the most common disease found in nursery stock and as no satisfactory treatment has been found to eradicate it it remains for the nurseryman to prevent its spread by the method of rotation in fields where nursery stock is planted.

Woolly Aphis. The woolly aphis, Schizoneura lanigera, is very commonly found upon both orchard trees and nursery stock. These insects are easily recognized by the woolly cottony substance with which they protect their bodies. They live by sucking the juice from the roots of living plants and when they begin depredations on a nursery row small nodules appear which may cause deformed roots.

Drawing No. IV illustrates the first effect of the woolly aphis. Drawing No. V is after C. L. Marlatt in Circular No. 20, second series, U. S. Department of Agriculture, Division of Entomology and illustrates how young tree roots may be deformed by these insects.

There is no question but that damage results from the work of the woolly aphis but how far this is spread by nursery stock is an open question. Professor Emerson, of the Nebraska University, thinks that the insects are so widely distributed that trees need to be treated against them so that when they appear on the roots of the trees it need cause no alarm. Many orchardists are of the same opinion.

Budded vs Grafted Stock. There is perhaps no question in prop-

agation which has caused more controversy than the subject of the relative merits of budded and grafted fruit trees. The discussion is confined chiefly to the apple as cherries, plums, peaches and pears are almost exclusively budded. The popularity of the method depends largely on the locality. In the eastern states root grafting has been almost entirely replaced by budding as the orchardists in that section believe they can thus secure a stronger tree. But Professor Bailey says it does not matter so much which method of propagation is used as the way the stocks are trimmed and handled.

Western fruit growers believe they get a hardier tree if it is upon its own roots. Drawing No.VI shows a tree rooted from the scion. Some horticulturists who opposed to grafting say that less than ten per cent of the varieties of apples will not root graft.

Drawing No.VII illustrates the crown gall in apples. Some have called this a union knot as it appears at the union of the scion and stock. It consists of a knot covered by a mass of fibrous roots. It is caused by the same organism as that which produces crown gall in other fruit trees. Recent experiments show that the crown gall in apple is caused by diseased stock. This has increased the prejudice against grafted trees although it would seem the defect might be found in budded stock. The conclusion from long experience and much investigation is that the fruit grower need not pay a fancy price for budded or whole-root grafted trees as it depends upon the roots of the individual tree rather than the method used in propagation.

Storage. The method of caring for the nursery stock during the winter varies with different nurseries. In the southern states the trees can be left in the field with safety but in the central and northern states they must be dug in the fall and protected during the winter. Following are some of the methods used: Heeled in with tops exposed; heeled in with tops completely covered; heeled in cellars; ricked in

cold storage with slight root protection.

The first method is not used where the temperature may fall below 20° F. The next three are used only in small nurseries while the larger companies are adopting the cold storage method. Stock placed in cellars where the temperature varies is often attacked by a mold, therefore the question is reduced to "which is the most desirable stock, that which is heeled in with tops protected or that kept in cold storage?" When trees are taken from the field and well heeled in the ground with tops well protected very little evaporation takes place and the trees come out in the spring fresh and bright with their roots in normal condition.

In cold storage more or less evaporation takes place and this is especially true where the roots are not extra well protected, in which case the bark will have a slightly wrinkled appearance. When placed in the orchard row side by side with those that have been heeled in properly they will be several days later in starting. Trees which have been heeled in are liable to send out leaves before they are shipped which is a detriment to stock. The conclusions reached by the best authorities is that when the roots of trees in cold storage are well protected by moss or straw that is the best method for winter storage.

Many diseases and orchard pests can be and often are disseminated by the resetting of nursery stock and this can only be detrimental to the interests of all parties concerned. There is a long list such as peach tree borers, peach yellows and rosette, San Jose scale, the black knot in plums and raspberry anthracnose, and others that make serious trouble for the owner of the nursery and his patrons. As with every thing else there is a demand for "cheap trees" which leads some growers to propagate in a cheap and careless manner and they then

are obliged to confess that 50% of their stock is not fit for planting.

"The dealings of a nurseryman" is a term popularly supposed to be synonymous with deception yet the proprietors of the leading nurseries are as careful of and take as much pride in their reputation as any wholesale firm. People are beginning to realize that a tree or shrub that is to stand for years should be in the best possible condition from the start. This makes it possible for some men to continue in the nursery business who are intensely interested in producing the best fruit and in beautifying the country.

I.



II.



III



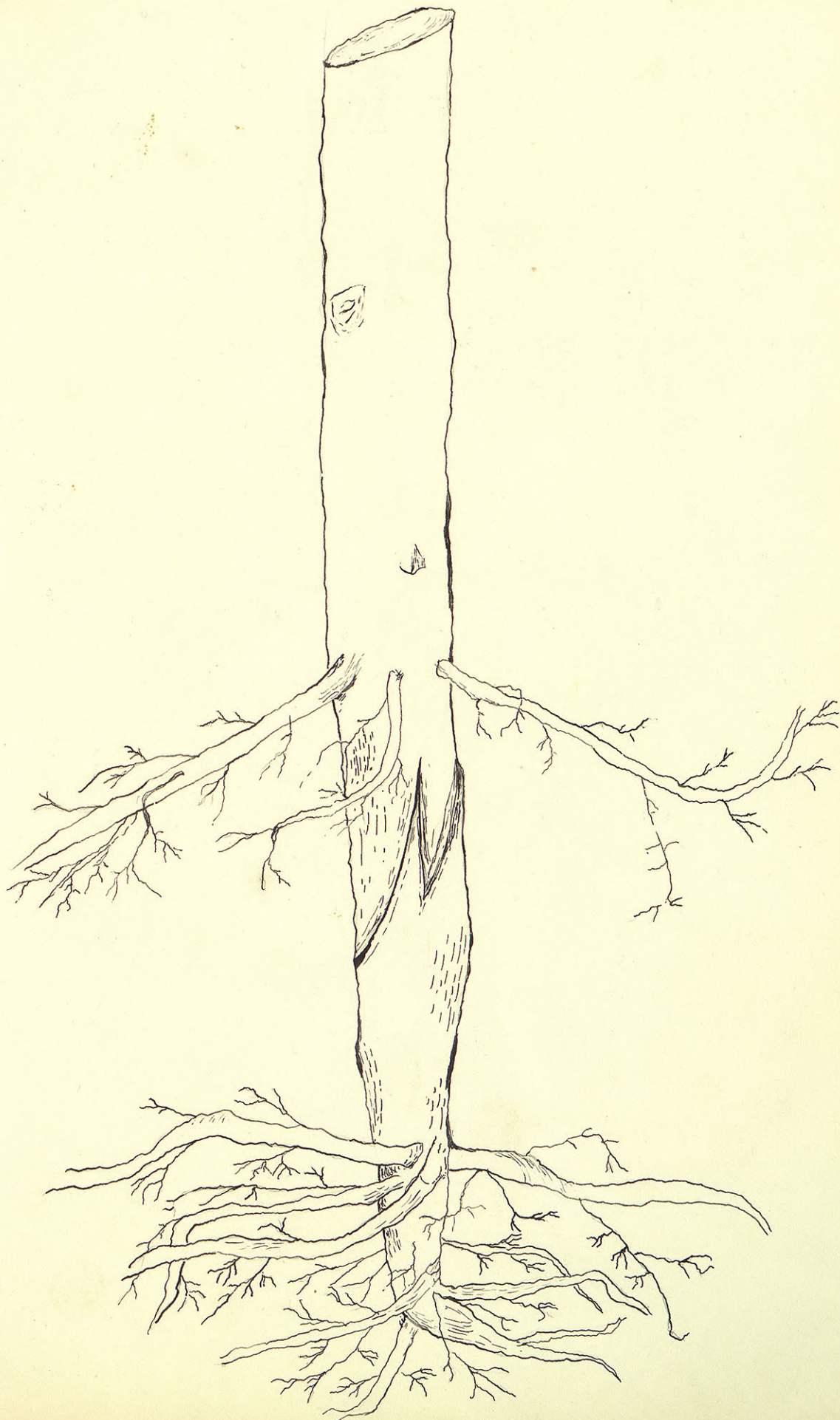
IV.



V.



VI.



VII

561

