UNIVERSITY OF WYOMING
AGRICULTURAL
EXPERIMENT STATION

Shelterbelts and Fruits

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SHELTERBELTS AND FRUITS*

By A. L. Nelson

INTRODUCTION

Trees can be grown on the plains of Wyoming under dry-farm conditions if given careful attention. Factors which are vital are the preparation of the soil, the kind of trees or shrubs, and the purpose for which they are planted. These factors have various angles which soon assume technical aspects; but for the farmer or rancher who wishes to have a shelterbelt around his farmstead, a limited variety of fruits for home consumption and the beauty of yard plantings, this circular will show to some extent what has been observed at the Archer Field Station† relative to trees and shrubs.

SOIL PREPARATION

The soil of southeastern Wyoming in its native condition is covered, for the most part, with a fairly thick sod of prairie grasses. The presence of these is evidence that so far they have proved to be best fitted to survive under the natural conditions which prevail in this region. Therefore, if any other plant is to be introduced into this region, special conditions must be provided or the plant must be equally or better fitted to survive than the native vegetation.

Since trees and shrubs do not grow of their own accord on the native open prairies, it is necessary to provide a special condition for the trees. This consists of breaking up the sod, killing the native vegetation, leaving the sod to decay, and destroying all weeds that may appear before the trees are planted; or, if the land has been previously tilled, it should be fallowed for a year, care being taken to keep it clean of all weed growth.

*U. S. Dept. Agr. Bul. 1301 contains results secured from experiments with shelterbelts, fruits, and shrubs at the Northern Great Plains Field Station, Mandan, North Dakota.
†This station is conducted cooperatively by the Office of Dry-Land Agriculture of the United States Department of Agriculture and the Division of State Experiment Farms, Agricultural College, University of Wyoming.
This process of tillage results in storage of moisture, which is vital in the life of a newly planted tree, especially during periods of drought. Plant food also accumulates, which is necessary for the newly planted tree if it is to grow well. It should be borne in mind that when a tree is transplanted it goes through a serious operation. A great mass of feeder roots are cut off, and it is necessary for the tree to reproduce these roots and at the same time live. Hence a transplanted tree needs special care and is not in a condition to compete with weeds and grass, its ancient and deadly enemies.

AGE OF TREES TO PLANT

It has been found that young trees or shrubs when transplanted suffer less loss of root in proportion to top growth than old or large ones. As a general rule, it is wise to plant young, thrifty stock, and if older stock is planted it should be pruned severely.

SHELTERBELT

The shelterbelt, by which is meant an arrangement of plantings of hardy trees and shrubs on the prevailing windward side of the farmstead for the purpose of protecting it from the winds and catching snow driven by the wind, should consist of four or five rows of shrubs and trees. The efficiency of the shelterbelt is largely determined by the kinds of trees and shrubs planted, the planting plan, and the care it receives.

When selecting trees and shrubs for a shelterbelt it is well to bear the following principles in mind: A row of shrubs like the wild currant, caragana, or chokecherry will, when a severe storm is in progress, check a large amount of snow and make a drift which extends about 100 feet beyond the trees. The same type of drift is formed by the green ash. The boxelder forms a shorter, deeper drift. The boxelder and green ash at this station are each about 15 feet in height. The shrubs are not tall enough to make a deep drift, and the green ash at this station has not produced as many branches and twigs, especially close to the ground, as the
boxelder and therefore does not make a good windbreak when planted alone. Thus it is seen that a row or two of low-growing shrubs, such as the wild currant, caragana, and chokecherry, are good plantings for the windward side of a shelterbelt. They should be followed with trees that grow taller, such as the boxelder, green ash, and Chinese elm.*

The Northwest poplar has proved of value at this station. It is a fast-growing tree, having reached a height of about 20 feet in a period of nine years. However, it possesses the habit of sending up suckers wherever the roots are injured. The silver-leaf maple has proved hardy in certain localities. The American elm has not responded very well at this station. The Russian olive has done well since it received the protection of a shelterbelt, but previously this tree winterkilled badly. The cottonwood does not live long under dry-land conditions.

The boxelder, green ash, Chinese elm, and Northwest poplar are the trees to be preferred for the tall plantings. If the space for a shelterbelt is limited and quick growth is desired, a row of boxelder and a row of Northwest poplar will prove to be very good.

SHELTERBELT SPACINGS

The spacing in the rows of the shelterbelt is not so important as the spacing between the rows, owing to the problem of tillage with ordinary farm machinery, which is of great importance in keeping the shelterbelt free from weeds. Unless the rows are sufficiently far apart to permit the use of ordinary farm machinery the trees are apt to be neglected. The space between the rows should be 10 to 12 feet. A good spacing in the row is three feet apart for wild currants and caragana and six feet apart for chokecherry. The larger trees should be planted eight to ten feet apart in the row. If a permanent evergreen shelterbelt is desired it is well to plant the trees about six feet apart in the row. If poles are desired the trees may be planted two feet apart in the row.

*From reports it is probable that the Chinese elm will kill back badly at altitudes higher than 6,000 feet.
EVERGREENS

Western yellow pine, jack pine, Norway pine, and Scotch pine have been planted at the Archer Field Station. Of these species the western yellow pine has proved best adapted. The jackpine, after becoming established, made good growth. When first planted it did not withstand the effects of the wind as well as the western yellow pine. The Scotch pine and Norway pine did not survive. If the jackpine had had more protection when first planted it is probable it would have done much better.

The Black Hills spruce and the Colorado blue spruce did well when protected from soil blowing. The soil carried by the wind cuts the needles of the young trees, thereby checking their growth. To prevent this damage a row of Sudan grass was seeded on the windward side about five feet away and proved effective.

The evergreen is the most effective shelterbelt tree. During the first two or three years it is slow of growth, but after this period it grows rapidly. If protected when young, evergreens are longer-lived than most of the deciduous trees; therefore, if planted on the protected side of the shelterbelt they will reach a suitable size by the time some of the quick-growing deciduous trees begin to die. Since the evergreens retain their leaves throughout the season they are more efficient as shelterbelt trees, two or three rows being sufficient to furnish protection.

PLANTING

The planting of the shelterbelt trees should be well planned in order that the work may be accomplished as quickly and efficiently as possible. At the Archer Field Station the land is laid out by placing stakes where the rows of trees are to be planted, after which a lister is used to open up furrows. In order to make the furrows deeper a lister is run in them a second time with the driver standing on the beam. To make straight rows a good team and careful driving are necessary.

The trees are put in barrels or tubs containing water and are placed on a low wagon. As soon as the furrow is made, planting is started so that the soil will not dry before the trees are planted. Other barrels of water are also on the wagon, as water is nearly
always used in planting. About two quarts of water are poured on the loose soil placed about the roots. This insures root contact with the soil. More soil is then added and made firm about the roots.

With wagon, trees, barrels of water, and two men, one measuring the distance and placing the trees with some loose soil about the roots and the other pouring the water and covering with more soil, the planting is done rapidly. So far the soil has been placed about the trees by hand. The remainder of the soil can be filled into the furrow with a one-row corn cultivator, care being taken not to disturb the trees. The trees should be planted a little deeper than they stood in the nursery row. This method has been found suitable for shelterbelt plantings but not for fruit trees, where the distance between the trees in the row is much greater. Holes are dug for planting fruit trees at the Archer station.

When planting evergreens the roots must be kept wet and out of the sunlight. In order to accomplish this, the bundles of evergreen trees are dipped into water as soon as they are received at the station, after which the roots are placed in a slushy mud mixture, where they remain until planted. The earth for this mixture is taken from a buffalo wallow. When mixed with water it does not settle as readily as ordinary field soil and forms a muddy coat over the roots of the young evergreens, which protects them from the sun and keeps them moist during the planting. The remainder of the planting operation is the same as for other trees. There must be no pruning. By handling young evergreens in this manner this station has had no greater loss than with deciduous trees.

**CARE OF TREES**

Clean cultivation is essential, and for two or three years hoeing in the row is necessary. Shallow cultivation, especially after the first year, is much better than deep cultivation. Plowing generally does considerable damage by cutting the roots. The roots feed close to the surface and deep tillage injures them. Pruning should not, as a general rule, be practiced. The trees will grow faster, live longer, and catch more snow when not pruned. If dead wood develops it should be cut out.
Fruits

The plantings of fruit trees and bushes at the Archer Field Station have been limited, but from these plantings the following facts have been observed: The fruit trees do much better when protected by a shelterbelt or otherwise than when not protected. Fruit production will probably be limited to hardy varieties of apples, plums, cherries, gooseberries, and currants for home consumption. Everbearing strawberries produce well when irrigated. Other fruit trees may be developed, such as a hardy apricot, which the station now has under study. Commercial production of fruits in this section will probably not become a common practice because the seasons are short and uncertain as to temperatures, precipitation, and damaging summer storms. Nevertheless, a small home orchard should not be omitted in the process of home building on the arable dry-land areas of Wyoming.

From experience it has been found that, as with other trees, fruit trees must be allowed to follow the process of low heading, even at the surface of the ground. Efforts to grow the trees to head higher have failed. It is probable that the tree should be allowed to produce its natural conical shape with but very little pruning.

Varieties of Fruits

The Wealthy, Oldenburg, Patten, and Longfield apple trees have proved hardy. All have produced fruit during the last three years. A later planting of Delicious is making a good growth. The Wealthy has produced the largest yield of fruit.

The Sapa and Opata plum trees have proved hardy and have produced fruit for a number of years. No doubt there are other varieties of plums and probably varieties of cherries that will prove hardy. In 1930 a number of such plantings were made at the Archer Field Station.

The Oregon gooseberry has done well at this station, producing large crops of fruit almost every year. The Houghton gooseberry is not well adapted. The Carrie gooseberry died, but this variety is generally considered hardy and should probably be
given another trial. The Victorian and Red Dutch currants have survived and generally produce good crops of fruit. The Beta grape has survived and produced some fruit. In 1930 the vines were transplanted to a more desirable location in the hope of better results. A number of varieties of raspberries were planted in 1930, and it is hoped that some of them will prove hardy.

**SHRUBS**

Figures 5 and 6 show what can be accomplished in two years by yard plantings made under dry-land conditions. This has been attained by testing various shrubs as to their hardiness. Some shrubs will withstand the winds when planted on the north and west sides of a building, but others require the protection of the south and east sides. The wild or yellow flowering currant, smooth sumac, cotoneaster, Persian lilac, Cistena purple-leaved sandcherry, and cut-leaf elder are hardy for the west side of buildings. The first three have proved hardy on the north side of buildings. All of the above named shrubs can be used on the south and east sides, but such shrubs as spirea Vanhoutte or Bridal Wreath, Spiraea froebelii, Spiraea arguta, and golden elder are suitable for plantings in protected places.

A few rose bushes such as Persian Yellow and Hansa (Rugosa hybrid) have survived. A number of other shrubs such as the May Day bush, fragrant (aromatic) sumac, Chinese apricot, and a number of wild shrubs can be grown to make the farm home more attractive.

The Chinese elm* is probably one of the best deciduous trees for yard plantings. The green ash is also very good but is late in leafing. Among the evergreens the Colorado blue spruce and the Black Hills spruce are to be preferred. The object of these plantings is to make the farm home more beautiful. The establishment of a home is an attainment, and trees and shrubs should be an important part of it.

*From reports it is probable that the Chinese elm will kill back badly at altitudes higher than 6,000 feet.
PHOTOGRAPHS SHOWING RESULTS OF SHELTERBELTS,
FRUIT PLANTINGS AND SHRUBS

The following photographs have been included in this publication in order to show what can be accomplished by the planting and proper care of trees and shrubs in making the dry-farm home more attractive and life more pleasant on the plains in this region.

Fig. 1. The farmstead of the Archer Field Station as it appeared from the south side in 1922, surrounded with barren desolation where blizzards rage and pile up great drifts of snow, cutting off communication. These conditions kill aspirations and shatter the nerves. The effects of such barren surroundings cost more in health at times than the planting and care of trees.

Fig. 2. The farmstead of the Archer Field Station as it appeared from the west side on September 11, 1930. Some of the leaves of the Northwest poplar have fallen. Trees have changed the outlook and made living more pleasant.
Fig. 3. The farmstead of the Archer Field Station from the west side in the summer of 1921. A few slow-growing trees planted in 1914 had not made much of a showing. Experience was in the making.

Fig. 4. The farmstead of the Archer Field Station after the snow of September 8, 1929. Photograph taken from same position as Figure 3. Plantings of Northwest poplar made in 1925 and 1926 have changed the view.
Fig. 5. A cottage erected at the Archer Field Station during the fall of 1927. Note the naked desolate setting.

Fig. 6. The same cottage as shown in Figure 5, as it appeared in the summer of 1930. Note the change brought about in two years' time by the planting and care of a few shrubs. The native sod has been preserved.
Fig. 7. Northwest poplar at the Archer Field Station laden with the snow of September 8, 1929. These trees were started from cuttings in 1925. The whips were set out in 1926. About 400 whips were produced in four rows one foot apart and two rods long. The cuttings were watered from the well.

Fig. 8. Russian olives at the Archer Field Station bowing under the snow of September 8, 1929. These trees winterkilled back badly until a shelterbelt of boxelder and Northwest poplar planted on the west side gave them protection. Note the western yellow pine at right.
Fig. 9. Northwest poplar and boxelder planted alternately four feet apart in the row. The Northwest poplars were taken out in the spring of 1925 and the boxelders covered the space by the summer of 1926. The trees were set out as whips in the spring of 1921.

Fig. 10. Northwest poplar on the left and boxelder on the right in summer of 1926. These trees were set out as whips in 1921. The child is standing in the center of the ten-foot space between the rows. Note there has been no pruning. The masses of branches and twigs make an excellent windbreak.
May, 1931

Shelterbelts and Fruits

Fig. 11. Snow drift in the lee of the boxelder and Northwest poplar, shown in Figures 9 and 10, resulting from the storm of May 8, 1927. The Russian olives are located where the boy is standing. They are practically covered. The mess house, the corner of which shows, is too close to the trees. It should be at least 50 feet from the shelterbelt.

Fig. 12. Snowdrift in the lee of the shelterbelt, shown in Figure 27, resulting from the storm of May 11, 1922. Gooseberry and currant bushes are in the foreground. Back of these are apple trees. Drifts of this nature either delay blooming or protect buds, which are about to open.
Fig. 13. Snowdrift on the north side of the machine shed and horse barn, the result of a storm January 14, 1926. Note the snow is up to the eaves. The snow drifted over the buildings and fell on the south side, making it necessary to shovel large amounts in order to get the horses out of the barn. All but one tree of the four rows of cottonwood planted in 1916 along the north side of the farmstead died during the winter of 1922-23, thus permitting the snow to drift into the yards.

Fig. 14. A snowdrift in the farmstead yard after the storm of May 8, 1927. This condition has been prevented the last two years by the growth of trees planted in 1926-27. Snow kept out of the yards by a shelterbelt decreases work during and after a storm.
Fig. 15. Right—The only surviving cottonwood tree out of four rows one-quarter mile long planted in 1916 on the north side of the farmstead of the Archer Field Station. The dying of these trees was a great disappointment and caused a great amount of extra work. Plant hardy trees.

Fig. 16. Below—Snowdrift one-quarter mile long on the north side of the farmstead of the Archer Field Station. Result of storm November 17, 1930. Photographed January 30, 1931. A shelterbelt planted in 1927 caused the drifting snow to lodge at this point instead of in the farm yards.
Fig. 17. Boxelder planted as whips in 1921. Photographed January 28, 1931. Note the bushy growth and mass of low, spreading branches, which make a very good windbreak and snow catch.

Fig. 18. Green ash in the right foreground planted as whips in 1927. Photographed January 30, 1931. Note the scarcity of branches close to the ground. This condition is in contrast to that shown in Figure 17.
Fig. 19. Row of western yellow pine at the Archer Field Station planted in the spring of 1921 from six-inch stock. Northwest poplar on left and Russian olive on right.

Fig. 20. Western yellow pine planted in the spring of 1921 from six-inch stock compared with Northwest poplar planted as whips in 1921. Photographed January 28, 1931.
Fig. 21. Western yellow pine planted in 1927 from four-inch stock. These trees are at a stage after which growth is generally rapid. Northwest poplars at left were set out as whips in 1926.

Fig. 22. A group of Colorado farmers and specialists from the Colorado Agricultural College studying shelterbelt and fruit trees at the Archer Field Station, June 15, 1926. Some of these farmers traveled long distances to learn the methods used in growing various kinds of trees.
Fig. 23. Oregon gooseberries in 1923. Gooseberries produce well almost every year. They come on early and last for a considerable period, as they can be used at almost any stage of maturity. They are well adapted to dry-farm conditions.

Fig. 24. Sapa plums in 1926. Sapa and Opata plum trees produced fruit during most years. The jam, jelly, and preserves from these plums will do much to make the average farm meal more delightful and furnish variety at a very low cost. A number of other varieties are being tested at the Archer Field Station to determine their adaptability to dry-farm conditions.
Fig. 25. Wealthy apple tree in 1924. Note the bushy growth. All fruit trees at the Archer Field Station take on this form of growth. During the last three years this tree has produced fruit.

Fig. 26. Same tree as shown in Figure 25. Photographed during the winter of 1930-31. This tree has not been pruned since taking on the bushy form of growth. Experience indicates that very little pruning or none at all gives best results.
Fig. 27. Green ash at the Archer Field Station. Photographed in 1925 at the age of 11 years.

Trees are things of beauty, especially on the plains. Trees and beauty, home and comfort, plenty and contentment should be the aim of every man, the desire of every woman and the light of every child. Most people have a desire for beauty. The degree to which a man appreciates and establishes beauty by his own efforts distinguishes him from the savage. The hope which most new settlers possess can be attained if a fair amount of beauty can be had in addition to the necessities of life. A discouraging and gloomy outlook can be changed if beauty is attained. Beauty holds the civilized man to the spot, but ugliness drives him away.