Bulletin No. 192 - Growing Trees in Northeastern Wyoming

University of Wyoming Agricultural Experiment Station

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Chinese Elms Three Years Old. They Are Effective in Checking Wind and Snow and Add Beauty to the Farmstead.

Growing Trees in Northeastern Wyoming

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LARAMIE, WYOMING

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In cooperation with U. S. Department of Agriculture.
Growing Trees in Northeastern Wyoming

BY

PAUL K. THOMPSON, Superintendent
CAMPBELL COUNTY EXPERIMENT FARM

A semi-arid climate, combined with high evaporation, sudden changes in temperature, and high winds, produces a condition under which trees have not grown naturally as in areas where the rainfall is greater. Results from tests carried on at the Campbell County State Experiment Farm near Gillette, are showing that by the use of summer fallow and dry-farming methods hardy varieties of trees and shrubs can be grown successfully. Such plantings soon give protection and attractiveness to the farm home, making it a more valuable as well as a more pleasant place to live. Trees once started and cared for properly increase in value and beauty as years go by. They are a benefit to the present generation and also to posterity. On this page the picture shows trees getting a good start on the windward side of the buildings.

Four-Year-Old Trees on West Side of Buildings Afford Protection From Wind and Snow.
TABLE I, SHOWING AVERAGE PRECIPITATION BYMONTHS, 1911-1931, AND PRECIPITATION BY MONTHS, 1925-1931

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1925...</td>
<td>.38</td>
<td>.80</td>
<td>.64</td>
<td>1.96</td>
<td>2.93</td>
<td>1.96</td>
<td>.85</td>
<td>.91</td>
<td>.25</td>
<td>2.09</td>
<td>.13</td>
<td>.82</td>
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<td>1926...</td>
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<td>.15</td>
<td>.64</td>
<td>.74</td>
<td>2.17</td>
<td>.69</td>
<td>1.57</td>
<td>1.64</td>
<td>1.23</td>
<td>.79</td>
<td>.79</td>
<td>.71</td>
<td>12.47</td>
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<td>1927...</td>
<td>.70</td>
<td>.22</td>
<td>1.50</td>
<td>3.34</td>
<td>3.28</td>
<td>4.32</td>
<td>1.21</td>
<td>3.03</td>
<td>2.53</td>
<td>.81</td>
<td>.69</td>
<td>.62</td>
<td>22.17</td>
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<tr>
<td>1928...</td>
<td>.44</td>
<td>.45</td>
<td>.96</td>
<td>.90</td>
<td>1.79</td>
<td>3.50</td>
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<td>.93</td>
<td>1.50</td>
<td>.76</td>
<td>.98</td>
<td>.20</td>
<td>15.31</td>
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<tr>
<td>1929...</td>
<td>.33</td>
<td>.94</td>
<td>2.63</td>
<td>2.33</td>
<td>3.44</td>
<td>1.34</td>
<td>1.14</td>
<td>.34</td>
<td>1.91</td>
<td>1.06</td>
<td>.76</td>
<td>.22</td>
<td>16.43</td>
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<tr>
<td>1930...</td>
<td>.28</td>
<td>.22</td>
<td>.46</td>
<td>1.01</td>
<td>1.39</td>
<td>.86</td>
<td>1.08</td>
<td>1.43</td>
<td>.42</td>
<td>1.35</td>
<td>.40</td>
<td>.00</td>
<td>8.91</td>
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<tr>
<td>1931...</td>
<td>.60</td>
<td>.05</td>
<td>1.73</td>
<td>.73</td>
<td>1.45</td>
<td>1.54</td>
<td>1.49</td>
<td>.23</td>
<td>.94</td>
<td>.99</td>
<td>.50</td>
<td>.30</td>
<td>10.19</td>
</tr>
<tr>
<td>Average</td>
<td>.58</td>
<td>.40</td>
<td>1.22</td>
<td>1.57</td>
<td>2.34</td>
<td>2.03</td>
<td>1.46</td>
<td>1.21</td>
<td>1.25</td>
<td>1.12</td>
<td>.61</td>
<td>.41</td>
<td>14.17</td>
</tr>
</tbody>
</table>
CLIMATIC CONDITIONS*

The average annual rainfall 1910-1931 is approximately 15.70 inches. In that time the lowest annual precipitation was 8.76 inches in 1930. The greatest annual precipitation was 22.17 inches in 1927. The frost free period averaged over eighteen years is 113 days.

The elevation of the farm is 4,500 feet. The soil is high in mineral fertility, but rather lacking in organic matter. It ranges from a fine sandy loam, which blows badly, to a reddish clay. The amount of rainfall is the main factor which limits the yields of farm crops and growth of trees. The general effects of low and uncertain amounts of precipitation can be offset, to a considerable extent, by systematic dry-farming methods, and by selecting hardy varieties of trees and shrubs.

PREPARING GROUND FOR SEED

In preparing ground for trees at the experiment farm, sod is always summer fallowed to get the soil thoroughly worked and the sod broken as much as possible. Working the sod in this way makes possible the storing of a larger amount of moisture against the time the trees are planted than would otherwise be possible. Usually, sod land is better if farmed one or two years before the trees are planted to put it in better tilth for trees. In the spring before the trees are planted, as soon as the soil shows signs of drying, it is thoroughly disked or harrowed for the purpose of making a mulch to conserve the moisture already there and to put it in better condition to catch and retain any precipitation which may come during the spring months.

SETTING OUT THE TREES

The tree rows have all been ten feet apart, and most of the trees are ten feet apart in the row. Straight lines for the tree rows are laid off at the proper distances. A measuring stick is used to space the trees in the rows. Sometimes the points where trees are to be set are indicated by marking the rows crosswise with a horse drawn marker. The lines of trees are set as straight as

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*Based upon observations taken at Gillette, about 2 miles from the Experiment Farm.
possible as they are much easier cultivated and make a better appearance.

The trees have been obtained through the Department of Experiment Farms at the University of Wyoming. These trees are limited to varieties that are distributed to farmers and ranchers under the Clarke-McNary Act. For windbreak or shelter belt plantings the small trees are best. They cost less, are much easier to set out, recover sooner from the shock of transplanting, and, on the whole, are more certain to grow than are the larger trees. If it is impossible to plant the trees immediately upon their arrival, they are "heeled-in" on the shady side of a building until they can be set out properly. During the transplanting of the trees they are always kept in water until they are actually put into the holes. Each hole is dug just before setting the tree to prevent drying out the soil any more than necessary. The hole is dug large enough so that the roots may be spread out well and so the tree may be set a little deeper than it was previously. If the soil is dry a half gallon of water is put in the hole with the tree, and then the top soil is raked in first. If the soil is moist enough to ball up no water is added. The soil is tramped firmly around roots to within about three inches of top of hole, the remainder of the hole is filled with the loose soil for a mulch.

CARE OF TREES AFTER PLANTING

After the trees are set out no more water is given to them unless absolutely necessary as in the very dry year of 1931, when a small hole was dug at the side of each tree which showed the need of water. About a gallon of water was poured in each hole. After the water had been absorbed, a mulch of loose dry soil was raked into the hole to retard drying. Ordinarily, trees develop a deeper root system and withstand drought better if not watered after planting. With young trees the first few weeks are the most critical and so they are watched carefully to see that they start to grow. During the first year clean cultivation is kept up from the time the trees are set out, to keep a loose, rough mulch and to keep down all weed growth. The mulch is kept on the soil for the winter season also as it helps to prevent drying out and winter killing, factors which have to be guarded against. After the first
year, the trees are cultivated as often as necessary to destroy weeds and maintain the mulch. This work is begun in the spring when the soil shows signs of drying out and is continued until the latter part of September when the mulch is prepared for the winter months. Weeds too near the trees for the horse cultivator are cut out with the hoe, but if careful cultivation is given this hand work requires but little time. On the whole, less time is spent on the trees each year than on any other crop using the same amount of ground.

VARIE TIES

Table II gives varieties, and the number of trees in each variety planted, from 1927 to 1932. No record was kept in 1927-28 of trees dying, but since that time all losses have been recorded each year. Trees that are showing very hardy growing qualities, and which are attractive and make a good windbreak, or shelter belt, are: Chinese elm, Russian olive, caragana, northwest poplar, box elder, and green ash. Others which are proving quite hardy, but which seem to be less desirable for ornamental and shelter belt purposes, are cottonwoods and American elm. The western yellow pine is slow of growth and cannot withstand blowing soil very well, but where it can be started in sheltered places it is especially desirable for its green color in winter. The diamond willow is proving to be a rapid grower, but is not suited to extremely dry ground. The laurel leaf willow is showing signs of dying this year, possibly because the trees have become too large for the available moisture. Many of the trees lost during the past five years did not die from lack of soil moisture but from other causes, which tended to lower the vitality of the young stock. In the case of the pines the blowing of the soil during hard winds has caused nearly all the losses up to the present time. Occasionally a tree dies from no apparent cause, possibly because of a poor root system or a generally weak condition. Chinese elms planted three years are shown on the front cover.

Compared with other cultivated crops in this section, trees appear to withstand drought just as well, if not better, provided hardy varieties are used and reasonably good care is given to protect them from weeds and drought.
<table>
<thead>
<tr>
<th>VARIETY OF TREES</th>
<th>1927</th>
<th>1929</th>
<th>1930</th>
<th>1931</th>
<th>1932</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planted</td>
<td>Losses</td>
<td>Planted</td>
<td>Losses</td>
<td>Planted</td>
<td>Losses</td>
</tr>
<tr>
<td>Northwest poplar</td>
<td>74</td>
<td>22</td>
<td>48</td>
<td>24</td>
<td>84</td>
<td>25</td>
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<tr>
<td>Box elder</td>
<td>242</td>
<td>100</td>
<td>100</td>
<td>90</td>
<td>58</td>
<td>60</td>
</tr>
<tr>
<td>Green ash</td>
<td>28</td>
<td>22</td>
<td>25</td>
<td>10</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Caragana</td>
<td>174</td>
<td>227</td>
<td>227</td>
<td>227</td>
<td>227</td>
<td>227</td>
</tr>
<tr>
<td>Russian olive</td>
<td>190</td>
<td>111</td>
<td>111</td>
<td>111</td>
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<tr>
<td>Western yellow</td>
<td>129</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
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<tr>
<td>Pine</td>
<td>216</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<td>Willow</td>
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<td>100</td>
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<tr>
<td>Chinese elm</td>
<td>19</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<td>50</td>
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<tr>
<td>Diamond willow</td>
<td>202</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Laurel willow</td>
<td>167</td>
<td>7</td>
<td>7</td>
<td>7</td>
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<td>7</td>
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<tr>
<td>American elm</td>
<td>178</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Choke cherry</td>
<td>48</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>791</td>
<td>1249</td>
<td>1249</td>
<td>1249</td>
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</tbody>
</table>

Wyoming Agricultural Experiment Station Bul. 192
Dec., 1932 Growing Trees in Northeastern Wyoming

PLATE I - DIAGRAM OF TREE PLANTING

CAMPBELL COUNTY STATE EXPERIMENT FARM

CUSTER BATTLEFIELD HIGHWAY

ENTRANCE DRIVE

FIELD ROAD

MACHINE SHED

HOUSING

BARN

HOG PEN

GARDEN

KEY

TREE VARIETIES

1. RUSSIAN OLIVE

2. WESTERN YELLOW PINE

3. NORTHWEST CHINESE & AMERICAN ASH

4. ELM.

5. CHERRY, CHINESE & AMERICAN

6. GREEN ASH

7. CHERRY

8. CHERRY

9. CHERRY

YEAR PLANTED

1927

1928

1929

1930

1931

1932

A. BUDULE
ARRANGEMENT

Plate I shows each year's plantings at the Experiment Farm, and varieties used. The buildings are on a hill which slopes quite rapidly in all directions. The direction of the prevailing wind varies from north to west and south-west. The buildings are set well back from the highway which runs along the north side of the farm. The driveway was brought in from the north-west to obtain an easy grade from the highway. Each year's planting has been so arranged as to give more protection from wind and snow around the farmstead as well as to make the farmstead more attractive and comfortable.

For the shelter belts, from ten to twelve rows of trees give better results on the north side than the six rows west of the house and also make a much more attractive group. The 1928 and 1929 plantings were spaced 6 feet apart in the rows, except caragana, which were spaced 3 feet in the rows. The plantings of other years were spaced 10 feet apart in the rows. It appears now that the 10-foot spacing of the trees in rows 10 feet apart is none too much. In from four to five years these trees have taken nearly all the space between the rows. It is doubtful if there will be
moisture enough for the closer spacings after the trees get a little larger. Less space is required for caragana. In 1927, this variety, which has a bush habit of growth, was planted 10 feet apart in the rows. In this planting it is of little protection against wind and snow. Since that time the caragana plantings have been spaced only 3 feet in rows 10 feet apart. These caragana are on the windward side where they have made a good growth, forming a fairly tight hedge. The picture on page 10 shows caragana on the right of the driveway. The Russian olive is planted next to the caragana. It grows a little taller than the caragana and is also quite compact and bushy from the ground up. On the leeward side of the Russian olives there are several rows of northwest poplar followed by green ash. The planting contains some rows of box elder, more northwest poplar and Chinese elm, on the inside row. The latter variety is a rapid grower of dense branching habit and is very attractive. In the 1932 plantings, Russian olives have been set 3 feet apart as a hedge along the west side of a new garden plot, to form a snow trap.

PRUNING

Experience at the Gillette Farm has shown that the trees should receive little or no pruning. None of the lower branches should be cut off as they are necessary to catch snow and stop wind. They also protect the tree trunks from the sun in summer and from freezing in winter by holding drifted snow. A dense growth of branches, especially near the ground, tends to shade out weeds that would otherwise get a foothold and use moisture needed by the trees.

Dead branches should always be removed and also branches badly damaged by heavy snows or winds. Sharp pruning shears and saw are the tools to use. Injured limbs should be cut off as near as possible to their main stem. Pruning is best done during the dormant season of the trees. If the windbreak appears to be too dense some of the trees should be removed rather than pruned.

Evergreens allowed to grow naturally without any pruning attain a symmetrical appearance and afford protection close to the ground where it is needed during the winter months.
SUMMARY AND CONCLUSIONS

1. At the Campbell County State Experiment Farm hardy varieties of trees do well where set out in properly prepared soil and given proper attention even in our driest years on either a sandy or clay soil.

2. Sod land should be summer fallowed for one year at least before planting the trees to get the soil worked down and store moisture for the young trees. Old farm land should be summer fallowed or used for a cultivated crop for the year preceding the planting of the trees. Work on the tree plot should commence in early spring in order to save all moisture possible for starting the young trees.

3. Young stock, or whips, are much easier to set out, start better, and appear to make a more rapid growth than older trees.

4. Set young trees carefully, packing soil firmly around roots, adding water if ground is dry and allow plenty of space between trees for future growth.

5. Keep trees well cultivated all the time with a loose, rough mulch and free from weeds. Trees may dry out and winter-kill in winter. Mulch helps to prevent this.

6. Prune very little. Leave lower branches for tree protection as well as to stop wind and snow.

7. The shelter belt should comprise 10 to 12 rows on windward side of farmstead with lower, bushier varieties on windward side, and taller trees near the middle for best protection. Seventy-five to 100 feet is necessary between buildings and shelter belts to allow for drifting snow.

8. The shelter belt, if properly cared for, is a valuable improvement on the farm. It gives protection from wind and storms, and lends attractiveness to the whole farmstead.