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Tree Growth as Affected by Cover Crops

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TREE GROWTH
AS AFFECTED BY
COVER CROPS

Agricultural Experiment Station
South Dakota State College
Brookings, South Dakota

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Tree Growth as Affected by Cover Crops

by

L. L. Davis* and L. C. Snyder

A seven-row shelterbelt approximately one-half mile in length was started in the spring of 1938. The rows of the belt were planted north and south for about three-fourths of their length, and east and west for the remainder. The outer row on the west and north was Caragana followed by Russian olive, green ash, American elm, green ash, American elm and Ponderosa pine. The rows were all spaced six feet apart, and the Caragana about three feet apart in the row.

During the first growing season all of the shelterbelt received clean cultivation. The belt was then divided into twenty-one plots about seventy-five feet long and forty feet wide. Plots 1,4,7,10,13,16 and 19 were to receive clean cultivation; plots 2,5,8,11,14,17 and 20 were to receive one cultivation in October with weeds clipped during the growing season; and plots 3,6,9,12,15,18 and 21 were to receive no cultivation, but the weeds were to be kept clipped during the growing season. A clean cultivated strip about twenty-five feet wide separated each of the twenty-one plots.

Each fall, after the leaves fell, height and diameter measurements were taken on the trees in each plot. The Ponderosa pine had such a poor survival that no measurements were taken. The Caragana received clean cultivation on the fence row side on all the plots, while on the other side it was greatly out-topped in the second year by the faster growing Russian olive.

Average height and diameter measurements of elm, ash and Russian olive are presented graphically in Figs. 1,2 and 3. At the close of the 1938 season, when the plots were divided, there were no significant differences in height or diameter of the trees to be given the three treatments.

In all cases after the treatments started, both height and diameter growth were greatest where the trees received clean cultivation, less where the trees were cultivated once in October, and least where they were not cultivated. At the end of the fifth (1942) growing season, the Russian olives, receiving clean cultivation, were a full year ahead in both height and diameter of those receiving no cultivation. Russian olive under our soil and climatic conditions grows more rapidly than American elm, and elm more rapidly than ash.

The height and diameter measurements taken probably did not give a true picture of the total growth under the different treatments, since there were many more low branches under clean cultivation than with no cultivation. By the end of the 1941 growing season it was impossible to use a cultivator in the plots receiving clean cultivation while on the plots receiving but one cultivation it was possible to use the tractor cultivator even at the close of the 1942 season. It might be added that on plots receiving no cultivation the cost of clipping was about as great as clean cultivation.

Soil samples were taken in November of each year at six-inch intervals to a depth of three feet at several temporary locations on each of the twenty-one plots. They were analyzed for pH, total nitrogen, nitrate nitrogen and organic matter. In 1941 the soil analyses were discontinued. No significant differences were shown in these soil tests.

* This project was started by L. L. Davis, now at the University of Tennessee, and continued by L. C. Snyder in July 1941.

Fig. 1 - ELM - ROWS 2 & 4

Treatments

- #1 - Clean cultivation
- #2 - Fall cultivation
- #3 - No cultivation

Scale

Height - $\frac{3}{8}$ inch = 1 foot (entire bar)
 Diameter - 1 inch = $\frac{1}{8}$ inch (crosshatched)

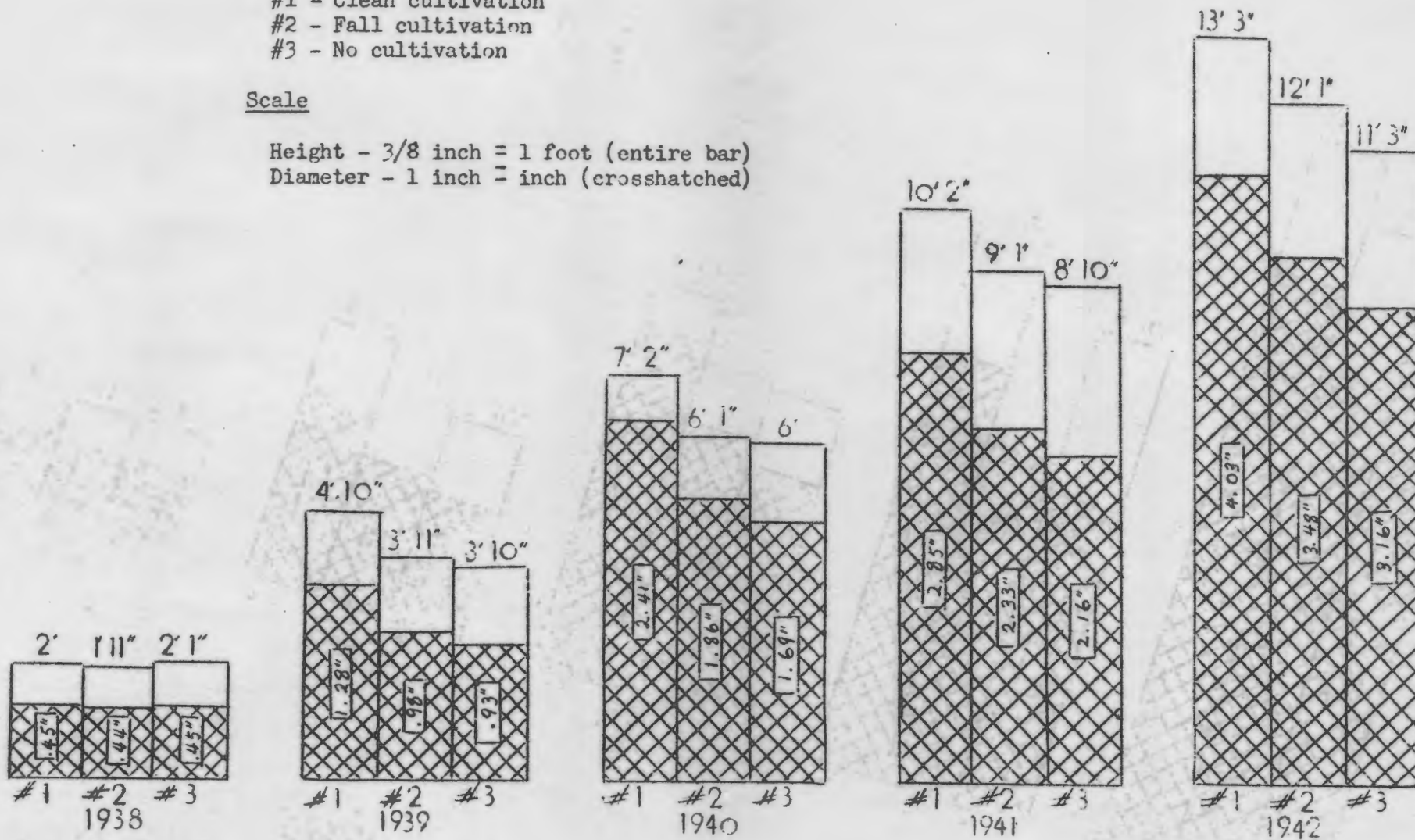


Fig. 2 - ASH - ROWS 3 & 5

Treatments

- #1 - Clean cultivation
- #2 - Fall cultivation
- #3 - No cultivation

Scale

Height - $\frac{3}{8}$ inch = 1 foot (entire bar)
 Diameter - 1 inch = 1 inch (cross-hatched)

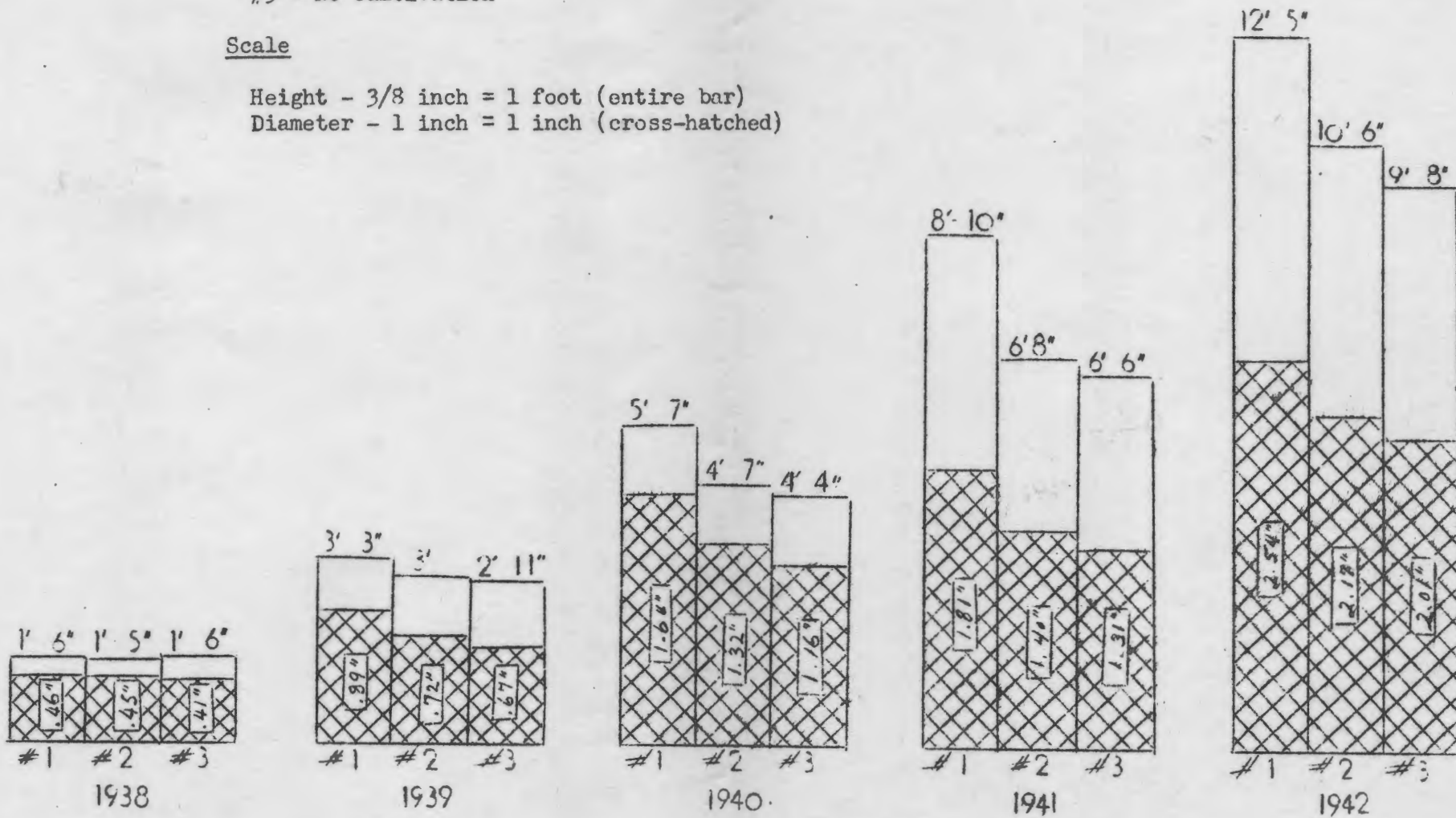


Fig. 3 - RUSSIAN OLIVE - ROW 6

Treatments

- #1 - Clean cultivation
- #2 - Fall cultivation
- #3 - No cultivation

Scale

Height - 3/8 inch = 1 foot (entire bar)
 Diameter - 1 inch = 1 inch (crosshatched)

