TECHNICAL NOTES
U.S. DEPARTMENT OF AGRICULTURE BERKELEY, CALIFORNIA SOIL CONSERVATION SERVICE

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FALL CHISELING - EFFECT ON MOISTURE CONSERVATION

The attached Technical Note, prepared by J.W. Turelle, Regional Agronomist of the Technical Service Center, Portland, entitled, "Effect of Fall Chiseling on Soil Moisture Infiltration, Runoff, and Erosion" has application in much of the state of California. Chiseling is an accepted practice in much of the dryland farm areas of the state. This Technical Note provides information on the comparative values in moisture conservation of various combinations of tillage.

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Attachment

TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE — SOIL CONSERVATION SERVICE
WEST REGIONAL TECHNICAL SERVICE CENTER - PORTLAND, OREGON

CONSERVATION AGRONOMY NOTE NO. 26
J. W. TURELLE, REGIONAL AGRONOMIST

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EFFECT OF FALL CHISELING ON SOIL MOISTURE INFILTRATION, RUNOFF AND EROSION

Available soil moisture is the principal limiting factor that determines crop production in dryfarming areas. However, during a half century or more of dryland farming, runoff and soil losses by water have become serious problems in many sections of the Western Region. These problems are increased on soils that normally freeze during the winter season.

Post harvest chiseling in the fall is a land treatment that helps to overcome soil losses and runoff (including snow melt) by increasing soil moisture infiltration.

Significant research results of fall chiseling are:

1. Increases, in most cases, the amount of moisture stored in the soil during the first winter after harvest.

2. Chiseling should occur when soil is dry for better shattering and heaving of clods on the surface.

3. Chiseling is more effective on finer textured soils. Little or no increased soil moisture storage occurs when coarse textured soils are chiseled.

4. Chisels with shank spacings of 3 feet or less were generally more effective in storing moisture than when wider shank spacings were used.

5. Several types of chisel points are effective but the diamond point is one of the better types. These points are about 3" wide and 6" long with the ends pointed in a diamond shape.

6. Chiseling implements leave a major portion of stubble standing.

7. Areas treated with a one-way disk usually average less stored moisture than chiseled or non-treated areas. This reduction results from loss of "snow trapping" effects of standing stubble.

8. Infiltration of soil moisture increases when tillage is across the slope on the contour.

9. Implement working depths vary but a common effective depth is from 8 to 12 inches.

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Five-year average available moisture gains in the six foot depth from harvest until spring on well drained loessal silt loam soils. (Upper Snake River Valley, Idaho).

Implement	Working depth (Inches)	Average soil moisture gain (Inches)
Diamondpoint chisel	10	6.55
Diamondpoint chisel	8	6.47
One-way disk	7	4.82
Standing stubble	-	5.08

Five year average total moisture in 5 ft. profile of a deep well-drained silt loam soil (Davenport, Washington; 13-15" annual rainfall)

Fall Stubble Treatment	Average total moisture as of April 1 the following spring
Chiseled	15.3 inches
Moldboard plowed	13.5 "
Disked	9.7 "
Standing stubble (no treatment)	13.2 "

Effects of tillage treatments on silty clay loams, Sheridan, Wyoming, 1961 through 1964.

Treatment	Average wheat yields Bu/Ac - 4 yr. average
Fall chisel and sub-surface tillage	42.6
Sub-surface tillage (spring after harvest)	43.9
Plow and mechanical tillage (spring after harvest)	40.7

The fall-chiseled plots trapped more moisture runoff and soil water intake rates were much greater before runoff than on the treatments without fall tillage. The fall chiseled soil also exhibited greater tilth and mellowness in the spring than soil which had not been fall chiseled.