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## EC171 Stubble Mulch Farming

F. L. Duley

J. C. Russell

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February  
1947

# Stubble Mulch Farming<sup>1</sup>

E. C.  
171

F. L. Duley and J. C. Russell<sup>2</sup>

## Value of Crop Residue on the Surface

When the soil is covered more or less completely with a growing crop or residue such as stubble, straw, or stalks from the previous crop, the soil is affected in several ways. (1) If raindrops hit bare ground, the soil runs together and becomes slick on top. Then water can go into the soil very slowly. In case of a hard rain, much of the water runs off. (2) If the soil is covered, most of the raindrops will hit the residue and not beat down the soil. The water will go into the soil more rapidly and there will be much less runoff. (3) Water running over a residue-covered soil does not pick up the soil particles readily and erosion is greatly reduced. (4) A good cover of crop residue on dry soil prevents the wind from picking up the dry soil particles and thus does much to prevent dust storms. (5) A covering of residue shades the soil and reduces evaporation immediately after rains. Since it also reduces runoff, it is possible to store more water in the soil with residue than where the land has been plowed and is bare.

To protect land against runoff and erosion, growing crops, particularly close growing ones, should be used as much as possible. Rotations may be planned so as to keep the land covered a large part of the time. At times when it is not possible to have a growing crop on the land, the residue from the previous crop may be used to protect the soil.



There are several types of sub-tillers, but they should work through residue without clogging and should pulverize the soil thoroughly.

In order to maintain residue on the surface while the land is being farmed, implements must be used that will work through and beneath the residue. Implements for this purpose have been called subsurface tillers.

## Preparation of Seedbeds Through Residue

In preparing soil for planting through crop residue the method is similar in its essential features for the various crops.

### General Procedure

1. Subsurface tillage for each major crop should be done at plowing depth - five to six inches.
2. To kill weeds, subtile two to three inches when soil and weather are dry as possible. This may be done either before or after the deeper tillage.

1. The experimental work on stubble mulch farming has been done cooperatively by the U. S. Department of Agriculture, Soil Conservation Service Research and the Nebraska Agricultural Experiment Station.
2. Senior Soil Conservationist, Soil Conservation Service and Cooperative Agent, Professor of Soils, University of Nebraska.

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University of Nebraska and the United States  
Department of Agriculture cooperating. W. H. Brokaw, Director, Lincoln.



3. Always sub till when the soil is in good plowing condition or a little drier if possible.

The Use of Treaders

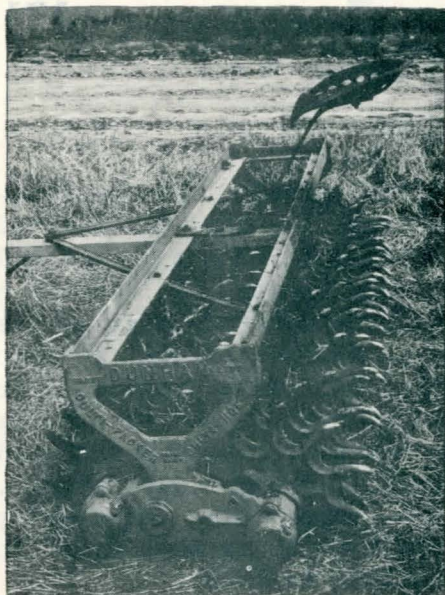
1. In the preparation of seedbeds with sub-surface working equipment, it is necessary to pulverize and smooth the soil for planting. This is done most satisfactorily with a treader.

2. Used in preparing the corn seedbed, the treader kills many small weeds, breaks clods, and smooths the surface so that cultivation is easier. The treader may also be used to break cornstalks, weeds, or old sweet clover residue ahead of the sub-tiller.

Preparing Land for Corn and Other Row Crops

1. If corn is to follow corn, the stalks should be cut or treaded when dry and brittle.

2. Subtill shallow to kill weeds before they get large enough to draw heavily on the soil moisture.



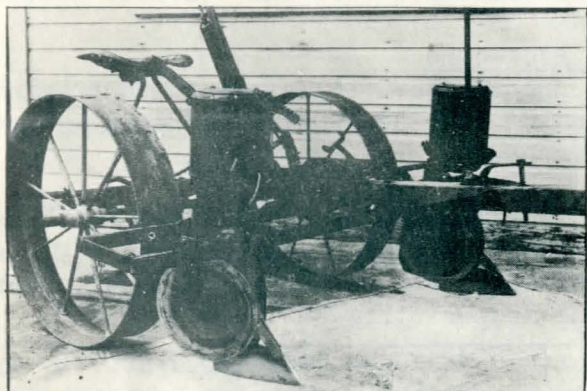
A "treader" made by reversing the wheels on this kind of rotary hoe. When pulled in this way it packs the soil, kills many weeds and is not clogged by the residue.

3. Subtill once, five to six inches deep before planting time. If many weeds start, another shallow tillage may be given.

4. A treader may be used to kill weeds after subtillage or ahead of planting. This also smoothes the land for easier cultivation.



Planting corn on contour on stubble mulched land.



Corn planter equipped with furrow openers and stub runners for working through residue. Corn is planted in small clean furrows with residue left between the row.

Planting Row Crops

1. Row crops should be planted on the contour, and in a manner to leave residue on the surface between rows.

2. Planting in furrows makes it easier to kill weeds in the row.

3. Furrow planting can be done with disk furrow openers on the planter, using subrunners to go underneath the residue.



4. Planting in a manner to leave residue on the surface may also be done with lister planters. The moldboards or disks may be removed and smaller shovels or points substituted for making the furrows.

#### Cultivating Row Crops

1. To maintain some residue on the surface throughout the period of cultivation, the cultivation must be done with sweeps that do not bury the residue.

2. Sweeps should be wide so that there will be no more than one shank on each side of the row.

3. Sweeps with wide tongues should not be used because they leave trenches and bury residue.

#### Preparing Land for Wheat

##### Fallowing Small Grain

1. A wheat seedbed should be well tilled, firm, and free of weeds or volunteer grain.

2. If wheat is to follow small grain the land should be subtilled immediately after binder or combine before soil has time to dry out.

3. Pull a treader behind sub-tiller. This double operation will plant shattered seed. The volunteer will usually come up quickly with even a little moisture, and can be killed at the next tillage.

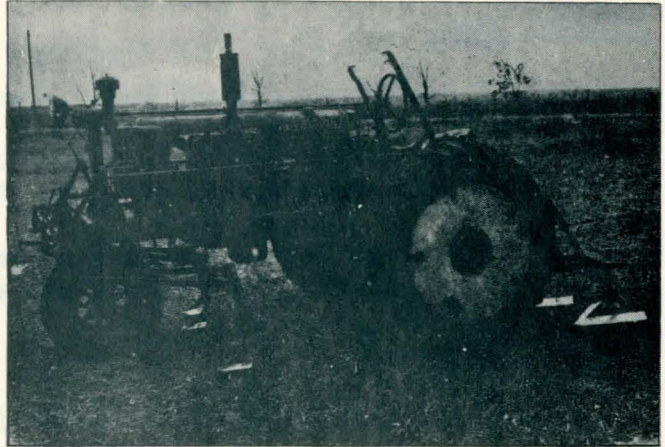
##### After Summer Fallow

1. If wheat is to be seeded on summer fallow, the land can be tilled with residue on the surface to protect it against erosion and soil blowing.

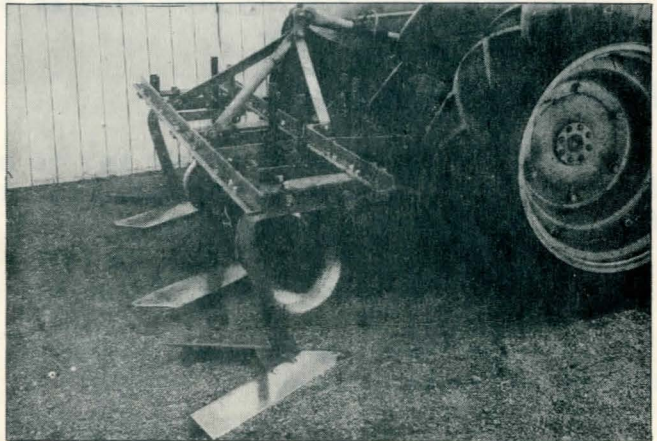
2. If residue from previous crop is heavy, the one-way disk may be used for first tillage. Set one-way at sharp angle so volunteer can be torn out without cutting very deep. Do not cover residue but put it down flat on the ground.

3. Let land lie until weeds have a good start again, then till with sweep-type subtiller or straight blade four to five inches deep.

4. Keep weeds down with subtiller or rod weeder until seeding time. Have seedbed firm and seed in moist soil.



This cultivator for working through residue was built by a farmer in Buffalo County, Nebraska.



Cultivator mounted on rear of tractor. One large 32" sweep used in middle. Small sweeps, 24" wide, at sides. Disk hillers attached for more effective weed eradication. Rear view mirror is attached to brace arm to aid in keeping on the row.



### Drilling Wheat

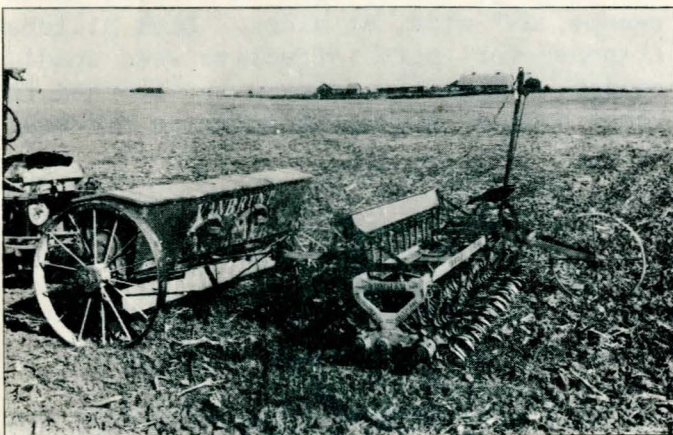
1. If residue is not too heavy, use an ordinary seven or eight inch drill.
2. Where there is more residue, wider spaced drills are more satisfactory. The ten-inch semi-deep furrow drill is widely used.
3. In western Nebraska and many other parts of the Great Plains, the deep furrow or 14-inch drill is used extensively.

### Oats Seedbeds

1. If oats are to be seeded after corn, cut stalks, subtile, tread and drill.
2. In place of this, if stalks are heavy, the common method of disking stalks and then drilling will leave enough residue on the surface to give considerable protection against erosion.
3. Seed with a drill that will go through the residue. Drilling is usually superior to broadcasting.

### Legumes and Grass Seeding

1. Alfalfa or sweet clover may be seeded on land that is covered with residue. The soil is thus protected until the crop is large enough to prevent rills forming in case of a heavy rain.
2. Prepare land with subtiller and treader.
3. Seed with drill that will drill small seeded legumes, or with treader having seeder attachment.
4. Brome grass may be seeded in similar manner except seeder box must be adapted to handle grass seed.



Seeding brome grass and alfalfa mixture on residue protected land. The brome is seeded through the lime sower, the alfalfa through the seeder attachment on the treader.

### Legumes in a Stubble Mulch System.

1. Legumes increase the nitrate available for the growth of crops. When used in a stubble mulch system, legumes prevent any shortage of nitrates which might result from having the organic material on top of the ground.

2. A crop like sweet clover, where it is adapted, may be subtilled in the spring of second year and land put to corn, or after two years growth the land put to wheat in fall or corn the following year. If subtilled in spring of second year, care should be taken that plants are killed before they absorb so much water from the soil as to endanger the crop.