

Stubble Mulch Fallow for Moisture Conservation and Erosion Control

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Nearly 100 percent of all winter wheat plus important acreages of winter barley and grain sorghums in the West Central Great Plains are planted on land which has been summer fallowed. This includes more than 8 million acres in western Kansas, western Nebraska, and eastern Colorado. Consequently, "summer fallow" constitutes the most important cultural practice in the region.

How best to fallow is a question open to many controversies. Perhaps the question can best be answered by first asking what is the purpose of fallow? Good fallow should attempt to fulfill the following objectives:

1. Save the maximum amount of precipitation from harvest until the succeeding planting.
2. Release sufficient nitrogen so that plant growth can most efficiently utilize stored soil moisture.
3. Keep wind and/or water erosion to a minimum.
4. Complete the above three objectives as economically as possible.

In consideration of the highly variable qualities of rainfall, crop residues, soil types, machinery, and weed growth, there appears to be no magic system for fallow that will work most efficiently each year. However, if the operator asks himself what is most needed for a seed bed, he will tend to operate in such a manner that most of the objectives of fallow are

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obtained. The requirements for a good seed bed for wheat or barley include the following:

1. Reduce weed growth to zero.
2. Maintain about 1,000 to 1,200 pounds per acre of crop residue.
3. Maintain firm soil clods 1/2 to 3 inches in diameter.
4. Maintain soil moisture within 3 to 4 inches of soil surface.

By whatever means an operator can do these things, that becomes the best method of fallow.

Modern machinery now gives stubble mulch tillage as much chance to fulfill the objectives of good summer fallow as any other so-called system. However, all the questions regarding time of primary tillage and rates of residue to maintain have not been entirely answered.

Research recently has been initiated on some of these questions regarding primary tillage. Objectives are to determine the effect of fall, early spring, and mid-spring tillage operations on plant growth and response with three rates of residue on the soil surface--1,500, 3,000, and 6,000 pounds per acre. Soil moisture storage, soil nitrate production, and weed infestation as affected by rates of residue and different tillage operations are being measured.

Preliminary results secured the first year, presented in the following table, showed greater soil moisture gains with higher rates of residue. However, wheat seedlings made one-third more growth on the lower residue rate as compared to the 6,000-pound treatment. Further studies will be necessary to determine if the higher residue rates will influence yields.

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1963 - TIME OF TILLAGE AND RATES OF WHEAT RESIDUES
ON THE SOIL SURFACE
PRELIMINARY FIRST YEAR RESULTS

Treatment on summer fallow		Fallow operations	Amount of straw-end of fallow	Soil moist. gain. 13-mo.	Dry weights wheat seedlings 3-8' rows, Oct. 10	Nitrates in surface soil Oct. 10
Fillage*	Initial straw					
Time	Lbs./A.	Number	Lbs./A.	Inches	Grams	Lbs./A.
Fall 8-1	1500	6	310	2.12	9.3	19
Fall 8-1	3000	6	550	2.62	7.4	19
Fall 8-1	6000	6	1410	3.87	6.3	12
Av.		6	760	2.87	7.7	17
Spring 4-3	1500	5	250	2.41	8.2	16
Spring 4-3	3000	5	610	3.94	8.7	17
Spring 4-3	6000	5	1520	4.17	6.3	11
Av.		5	790	3.51	7.7	14
Spring 5-3	1500	5	380	1.88	10.8	12
Spring 5-3	3000	5	670	2.28	7.6	13
Spring 5-3	6000	5	1390	4.34	7.6	11
Av.		5	810	2.83	8.7	12
Av. all rates	1500		310	2.14	9.4	16
	3000		616	2.95	7.9	17
	6000		1440	4.13	6.7	11