

PROGRESS REPORT

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CHEMICAL FALLOW FOR DROUTH INSURANCE¹

 D E. Smika and
 B. W. Greb²

INTRODUCTION

Drouth is a common occurrence on the semiarid Central Great Plains. Low subsoil water levels and sparse spotty rainfall usually make wheat production prospects look dismal. However, there is hope for growing a profitable crop in this area with less than average rainfall. The technique involves using herbicides to control weeds instead of tilling during summer fallow beginning shortly after wheat harvest. Using the best mechanical tillage methods available today, fallow period precipitation storage efficiency can not be expected to exceed 35 percent. However, by using only contact and pre-emergence herbicides, fallow period water storage has been as high as 60 percent and averages above 52 percent.

DISCUSSION

Why is the use of herbicides for fallow a better means of coping with drouth than tillage? Although tillage controls weeds, each operation of the implement results in drying the soil. This can amount to as much as 0.33 of an inch in a 24-hour period during July and August when evaporative potentials are high. At the same time, herbicides kill weeds without drying the soil. Tillage generally is not performed

until weeds are two to three inches high whereas pre-emergence herbicides kill weeds in the seedling stage, thereby reducing the amount of water lost by the weeds.

During extended dry periods following tillage, the soil ultimately dries to the depth of tillage. By contrast, where weeds are killed with herbicides, no soil disturbance occurs and only the top 1 to 1½ inches of soil dry. In addition there is no indication of increasing depth of soil drying with prolonged absences of rain. Although subsurface tillage destroys only 10 to 15 percent of the residue per tillage operation, weed control with herbicides does not destroy any residue. This leaves available the maximum residue for soil surface protection. Because the threat of drouth always is present in the Great Plains, the use of this technique to provide maximum soil water storage has paid big dividends.

Winter wheat yields for conventional mechanical tillage with and without fall weed control, reduced tillage fallow systems where part of the tillage operations are replaced with herbicides, and complete no-tillage fallow where all tillage operations have been eliminated with the use of herbicides are given in the following table.

No-tillage fallow has not been practiced during the entire length of time that reduced and conventional fallow yields are shown, but in two years, there is a slight advantage for the no-till system over the reduced tillage system. The reduced tillage system is, in turn, considerably better than the best conventional tillage fallow system. Research has shown that replacing tillage with chemicals for weed control will, in areas subject to drouth, result in more dependable crop production. A major fringe benefit will be cleaner air because leaving all crop residues on the surface will provide protection against wind erosion which is frequently associated with drouth conditions.

Fallow System	Soil Water Storage In.	Fallow Eff. %	Grain Yield	
			6 Yr. Avg.	2 Yr. Avg.
			— Bu/A —	
Conventional without fall control	3.8	25	36	34
with fall control	5.3	35	40	34
Reduced Tillage	5.8	38	44	43
No Tillage	7.8	52	—	44

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²Soil Scientists, Central Great Plains Research Station, Akron,
 Colorado 80720.