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## ATION FOR LEADERS IN LAND MANAGEMENT

Research and Extension in land management technology for farm profits and conservation of soil and water.

# ANNUAL CROPPING ON SHALLOW SOILS

### The Problem

Annual cropping on shallow soils (less than 40 inches) is an alternative to wheat-fallow rotation in low rainfall dryland wheat production areas. Depth, texture, and restricting layers limit moisture storage to one winter season in shallow soils.

For example, a shallow (30 inches) Condon series soil near Kent, Oregon, holds only about 4.5 inches of water. Annual precipitation there is 10.7 inches. Of this, 7 inches occurs during the winter season. Studies show that the average winter storage efficiency is 70%. This means fallowing could put about 5 inches (70% of 7 inches) into storage for later use.

It follows then, that one winter of precipitation usually would fill the soil to capacity, leaving no space for storage of spring precipitation. Without a crop growing on that land during the spring and summer, the spring rain, and much of the following winter's precipitation, would be lost.

This, along with several recent production practice innovations, makes it desirable to examine annual cropping on traditional wheat-fallow rotation shallow soils in the Columbia Plateau.

### Production Innovations

New herbicides and new application techniques have proven to control weeds and volunteer cereals when using minimum

tillage techniques. You can compensate for the lack of available nutrients in the soil (because they are tied up in fresh residues) by changing fertilizer practices. Band phosphorus and some of the nitrogen with the seed. Band the remaining nitrogen near or below the seed.

One limiting factor for annual cropping on these soils is the requirement for minimum or no-till planting equipment because of the need for timeliness. Fortunately, drill design has improved. New drills of improved design are available, or some older models can be modified. On shallow soils with residues usually less than 2½ tons per acre, use modern drills with 10- to 14-inch row spacing to drill through residues where the straw and chaff are uniformly distributed. Prepare for this process when harvesting the previous crop. If you plan to minimum or no-till plant, uniformly distribute the straw and chaff as it comes out of the combine.

Annual cropping does not have the advantage of cultivating for weed control in the spring and fall. Herbicides are substituted for cultivation.

### The New Approach

The key to annual cropping is available moisture. If the average annual precipitation is more than 15 inches (including 6 or more inches of growing season rainfall) and if weeds can be controlled, it may pay to rotate cereals with an alternate spring crop on both shallow and deep soils.



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In the transitional zone (12 to 15 inches average annual precipitation), consider re-cropping if the soils are shallow, or if they contain 6 or more inches of available water on March 1. Consider fallowing if the soil is deep and there is less than 6 inches of available water on March 1. The success of fallowing depends on each season's rainfall, soil depth, government farm programs, and costs.

In the deep soil and low rainfall zone (less than 12 inches average annual precipitation), follow a standard cereal-fallow rotation. If the field remains uncropped through a winter season and the soil is dry at 5 and 6 feet, it is deep enough to respond profitably to wheat-fallow rotation.

On land with shallow soils in the low rainfall zone, use summer fallow only occasionally with annual cropping or for control of weeds, insects, or diseases under special circumstances or severe infestations.

### Suggestions

The steps necessary for annual cropping:

1. Evaluate soil moisture status at planting time in the fall. If the soil has 1 to 2 inches of available water in the surface foot, apply herbicides and plant the fall cereal of your choice. If not, check soil moisture about March 1. If the soil profile is full (or within 1 inch of full), spray herbicides and plant the spring cereal of your choice. If not, fallow.

2. Control weeds by careful and judicious use of herbicides. Ask your Oregon State University Extension agent in your county for recommendations.

3. Spray with the proper herbicide and seed with a no-till drill. A no-till drill places seed and fertilizer properly with respect to each other and operates through the residues. This may be an improved commercial model or a modification of an older model. Apply phosphorus with the seed, but apply no more than 15

to 20 pounds of nitrogen per acre with the seed. Band the remainder at seeding below the seed or below the seed and several inches to the side.

4. Use minimum till planting in lightly disked or sweep-plowed ground with most of the residues on the soil surface. Ordinary furrow or double disk drills can be used, but seed-nitrogen separation may be difficult. More research and development work is needed on drill opener design.

It is unknown if mold-boarding and fallowing can be eliminated. It depends on what happens with insects, diseases, weeds, and soil condition. It may be best to park the plow, but not to sell it.

Check with your county Extension agent for more information.

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