

Making Cropping Decisions in a 12 Inch Precipitation Zone

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To give you a little background, I farm in northeast Oregon near the town of Heppner. My farm is approximately 3500 acres in size and has 3000 tillable acres. The 41 year average rainfall is 12.19 inches. The wettest crop year recorded was 18.58 inches and the driest crop year was 6.46 inches. The majority of the annual precipitation falls in the winter and early spring months. The summers are warm and dry with very low humidity. This type of climate favors early season cereal crops, but makes it difficult to grow warm season summer crops. Our soils are silty clay loam loess soils with a depth of only 2-3 feet. Most slopes are gradual up to 25%.

This area was homesteaded in the 1890's and the farming practice has been almost exclusively a winter wheat, summer fallow rotation. I began experimenting with growing annual spring crops in 1993 and had my first experience with direct seeding in 1997. In 1999 the entire farm was converted to a one pass direct seed system using a combination of annual spring crops and chemical fallow winter wheat.

Starting in 1996 I began annual cropping a larger percentage of the farm. Since then we have had three wet years in a row, five dry years in a row including two severe drought years (1999 and 2002), and one average year in 2004.

During this 9 year period I have experimented with a variety of rotations. In addition a 27 acre research plot sponsored by Monsanto was started in 1999. The objective of this plot was to compare traditional winter wheat, summer fallow against winter wheat, chemical fallow and several annual crop rotations. The chart on the next page shows the yields for each type of cereal crop that was grown from 1996 through 2004 and the available water for that crop using a calculation that will be discussed later in this summary.

After reviewing the yields for this period it is time to ask several important questions about future rotations.

- Can we grow continuous crops with acceptable yields?
- Can we do this every year?
- If not how can we make informed decisions on when to grow a crop and when not to?
- If we decide to summer fallow, should we use chemical fallow or conventional fallow?
- How should spring crops fit into these rotations?
- Should we just punt and go back to a winter wheat, conventional fallow rotation.

Yields from 1996 through 2004 on the Jepsen Farm

Year	Winter Wheat Fallow	Winter Wheat Chem Fallow	Winter Wheat Continuous	SW Spring Continuous	Barley Continuous	Total Water Available
1996	50	Not Grown	Not Grown	37	47	10.36
1997	50	Not Grown	Not Grown	52	72	10.52
1998	53	Not Grown	Not Grown	48	63	11.99
1999	20	Not Grown	3	10	21	4.17
2000	28	32	30	27	37	8.35
2001	28	35	15	21	23	7.16
2002	26	32	2	14	23	6.40
2003	19	25	15	15	24	9.05
2004	44	46	Not Grown	32	56	10.56

Can we grow continuous crops with acceptable yields?

As you can see from the chart, I was able to grow annual crops that rivaled summer fallow, winter wheat yields on the wetter years. The spring crop yields in particular held up very well. Barley was a consistently good yielding crop to grow on an annual basis even in the drier years.

Can we do this every Year?

On the driest years (1999 and 2002) all annual crop yields were very poor and the annual crop winter wheat failed. The answer to this question appears to be, "No, not on the driest years."

If not how can we make informed decisions on when to grow a crop and when not to?

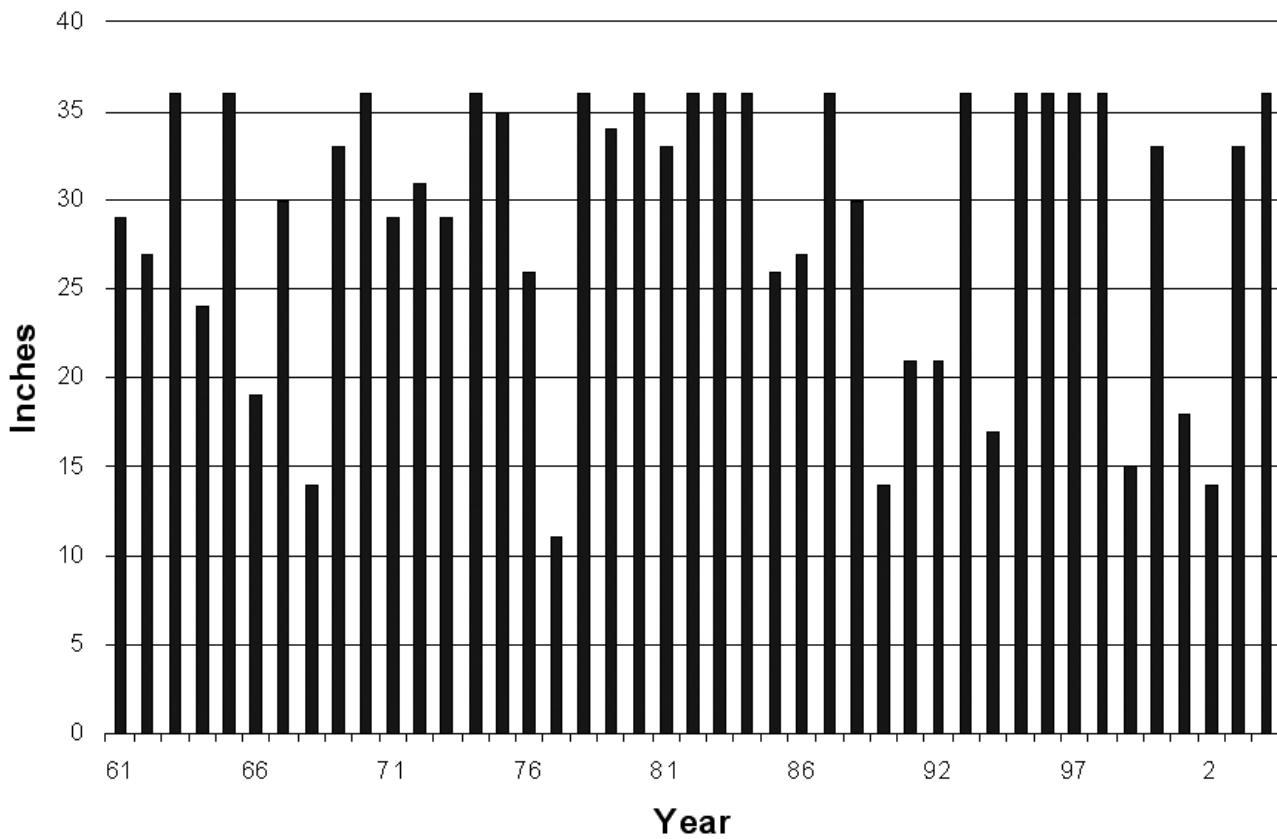
This is a tough one to answer and is the basis for this presentation. Since we receive most of our rain in the winter months, the crops grown have to depend on that stored moisture for a majority of water that will be available for growth and yield. The soils that I farm are only 2-3 feet in depth. The soil scientists tell me that my soils will hold approximately 2.33 inches of plant available water per foot of saturated soil. By probing the soil in the spring and converting that figure to inches of water, a fairly accurate assessment can be taken on how much water was stored over the winter. The chart below shows the depth of moisture penetration taken April 1 of each year since 1961. Notice that I have capped the maximum penetration at 36 inches because we have almost no soils deeper than three feet.

If you add the water stored over the winter to the amount of rain received in April, May, and June, a rough estimate of the total water available for the crop can be calculated. By going back through the years since 1961 and picking out the worst winters for moisture penetration, it becomes evident that annual crops would be difficult to successfully grow on those years.

The amount of water stored in the profile over the winter turns out to be the best predictor of yield potential on my farm.

This is a tool that I think we can successfully use to help decide what the crop potential can be. It is easy to measure with a soil probe. However the results must be tailored to each individual soil type.

Moisture Penetration in Stubble on April 1



The next issue to look at is whether there is any correlation between winter water storage and the following spring precipitation. If you look at the moisture penetration chart and take all years with less than 20 inches of moisture penetration, I found the April, May and June rains in seven out of eight years were average or below.

Now take a look at all the years where the soil profile was filled to three feet or more. The April May, and June rains for these years are average or above average in 13 out of 16 years.

The April, May, and June rains for the 20 to 36 inch moisture penetration years were all over the place and there did not appear to be any pattern to them.

When comparing moisture penetration to April, May, and June precipitation over 43 years, there is a definite trend for the driest winters to be followed by just average to below average spring precipitation. There is also a trend for the wettest winters to be followed by average to above average spring precipitation. This fact helps add a little weight to making a decision whether to grow a crop or not.

From this information I have developed a plan for my farm. It is a Flex Rotation. For the most part there will be no annual crop winter wheat seeding unless early very wet conditions favor fall crops. I plan on waiting until spring. If there is less than 20 inches of moisture penetration the decision will be made to stay with summer fallow. Winter wheat will then be seeded in the fall. The winter wheat crop will already be at risk because very little moisture was stored during the fallow period. Because of this, the maximum

amount of crop insurance will also be purchased. If the moisture penetration is greater than 36 inches all acres will be seeded and fertilized with higher yield goals in mind. On the in between years I plan to grow more drought tolerant crops and fertilize with lower yield expectations. Barley and dark northern spring wheat can fit well into this scheme. I may also fudge and do a mix of fallow and annual cropping. One item that really stands out with the flex rotation is the fact that on some years no crops will be grown. A farmer using this plan would need the financial means to withstand a very low income year.

How should spring crops fit into these rotations?

As you can see this plan hinges on doing a lot of spring cropping. That has been a hard sell to a lot of farmers in this area because the general historical past shows that spring crops do not yield as well as winter wheat. If you go back and look at the chart for the years I have been annual spring cropping, the yields have been very competitive with winter wheat on summer fallow. For annual spring cropping to be successful in this area several key factors need to be adhered to:

You need to become an expert glyphosate applicator.

Control the green bridge with a late fall or winter application of glyphosate.

Seed as early as possible.

Band all the fertilizer needs close to the seed.

Spread straw evenly at harvest and cut the stubble to a 12 inch height or less.

Use a one pass direct seed system. The direct seeded crops can be seeded earlier, and with less moisture loss. The fertilizer can also be banded near the seed. In this area the direct seed advantage gives a farmer the necessary edge in the ability to grow annual spring crops in a marginal environment.

If we decide to summer fallow should we use chemical fallow or traditional fallow?

It takes several years of direct seeding to improve the soil structure in the first few inches below the surface. One year of full width tillage could erase a lot of those positive effects. Increased water infiltration, the lack of crusting after seeding, and good erosion control are all reasons to stay with direct seeding even in a fallow year.

Dry land farming in the Northwest is constantly changing. Weather patterns, new farming technologies, farm programs, crop insurance, and markets are all factors that have to be included as cropping decisions are developed. The farmers that survive will be the ones that can quickly adapt to take advantage of the opportunities available.

If you have questions or comments feel free to contact me:

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