Irrigating with Limited Water

Water allocations in drought years can be reduced in many irrigation districts due to limited runoff and storage. Some irrigators may have no water at all if they either bid back their power supply or sold their water. Some may have water early but not during grain fill, others may have limited water but can allocate throughout the entire small grain season.

There can be a variety of available water situations for individual operations. Each will

It is hard to imagine winter wheat making do with so little water added during grain filling in these trials, especially during 1986. We don't know if yield was actually sacrificed in either year from lack of moisture during grain fill. But we do know that adding water at the early dough stage had no effect on yield.

While yield was not affected, watering at early soft dough resulted in increased black point in both years and increased lodging and lower test weight in one year.

The canopy was still green at the early dough stage and the only indication of approaching maturity was a partial loss of green color from the head and kernels. With such green growth still evident, few irrigators would have guessed that no additional water was needed.

The soil continued to lose moisture beyond the early dough stage (2.4" in 1986 and 1.5" in 1987), but this moisture was not effectively used for increasing yield.

Spring wheat and barley responded similarly to late season irrigation at Parma in 1994. Barley yield, protein, and test weight were unaffected by last irrigations scheduled for mid milk

early soft dough stage (July 9) and late soft dough-hard dough stage (July 19) during the 1987 season.

More recently, Howard Neibling, the Cooperative Extension Irrigation Specialist, has

Grain Quality and Market Class Considerations?

Drought Websites

There are drought related websites that you may find useful in dealing with the limited water supplies. Many of these sites are related to coping with drought from a livestock perspective, so they deal with forages to a large extent.

Montana State University
Agadsrv.msu.montana.edu/Extension/Beef-JP/Drought/DroughtMngt.htm

Washington State University
http://drought.wsu.edu

Stretching Available Water

Alternating Furrow Irrigation

Furrow irrigation, with the associated runoff, is less efficient than sprinkler irrigation. Frequently every furrow is wetted during each irrigation. This results in considerably more water applied than is necessary to fill the profile.

Assuming furrows are spaced 30" apart, one method to stretch available water is to irrigate every other furrow, and alternate the furrow wetted with each set. Alternating the wetting of every other furrow in three irrigations was evaluated for winter wheat in 1992 at the OSU Malheur Experiment Station. Water was shut off in the 1/8 mile runs when water reached the end of the run in nearly all furrows.

The every row furrow irrigation resulted in a total application of 33.8 acre inches of water per acre, roughly twice the amount applied with alternating the wetting of every other furrow. Grain yield and test weight were unaffected by the furrow wetting treatments. Yield averaged 127 bu/A.

The researchers also found that soil N was used more effectively by the wheat if furrows were alternately wetted. Watering every furrow apparently resulted in significant leaching of soil nitrates. Another potential advantage of alternate wetting of furrows is that the crop may be less susceptible to lodging.

There were substantial water savings by irrigating alternate furrows with no loss in yield. This is perhaps the easiest and most convenient means to stretch available water in furrow irrigation systems. In addition, only half the siphon tubes are utilized for the irrigation. More details of this research are available in Oregon State University Special Report 936, "Malheur County Crop Research Annual Report, 1993."

Soils differ in their infiltration rate and moisture holding capacity and not all soils will be fully replenished by the time water reaches the end of the field. But many of our silt loam soils will likely behave similar to the soil at the Malheur Station.

It is not unusual to find some small grain fields corrugated with spacings wider than 30". If the wetting front advances well enough into the bed during the set, furrow spacings can likely be extended beyond 30" without sacrificing yield or quality.

Reducing Flows and Shortening Sets

In most furrow irrigated fields runoff occurs during most of the irrigation set. Without question most of the infiltration occurs during the first half of the set. Runoff can be reduced and limited water supplies stretched by reducing the flow rate into each furrow after the water reaches the end of the furrow. This entails more labor and a closer watch during the set. But it can reduce wasteful runoff if irrigators have the time.

Some runoff from each furrow may be necessary to insure adequate wetting if the water supplied to the field fluctuates. Fluctuating water occurs for a variety of reasons; plugged weed

screens, altered diversions upstream. Even given a uniform water supply to the field, infiltration in the furrow may change if earth worms open up large channels during a set.

Shortening the irrigation set can also extend limited water supplies. The savings will depend on the relative inefficiency of the normal set. The more inefficient the set length in terms of water that runs off and is not utilized, the greater the potential water savings. This also entails