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Getting the Most Out of Irrigation Water

Meeting the Challenge:
Farming In Uncertain Times
University of Nebraska Lincoln EXTENSION

By C. Dean Yonts

Irrigation Engineer
Panhandle Research and Extension Center

When we think about getting the most out of irrigation water, efficiency is often the word that comes to mind. Yes, we do need to apply water in an efficient manner, but there are different ways to relate efficiency to irrigation.

First, consider efficiency as it relates to water application. The goal when irrigating is to provide water to a growing plant. But if any of the water runs off of the field or moves below the plants' root system, application efficiency is reduced because the water that runs off cannot be used by the plant. This is the primary reason that application efficiency of furrow irrigation systems is less than that of sprinkler systems. So whether we use furrow or sprinkler, keeping the water on the field and limiting deep percolation helps to improve efficiency.

Another kind of efficiency is pumping plant efficiency. The pumping plant is composed of both the energy source and the pump itself. Electric motors require very little adjustment, but diesel or combustible energy units will run more efficiently and use less fuel with proper maintenance and routine tune-ups. Equally important is providing periodic maintenance and adjustments to the pump itself, so it can deliver the optimum amount of water for a given quantity of fuel. The pump is completely out of sight, but wear and abrasion of sand in water can slowly reduce pump efficiency.

A worn pump allows water to escape through the seal formed between the impeller and the pump bowls. When the seal gets worn, water must be pumped several times before being delivered to the surface. The University of Nebraska has conducted tests over the years and has found that, on average, pumps are using 30 percent more energy than should be needed. Given today's energy costs, poor pumping plant efficiency can be costly. (See accompanying photo)

Because of drought, irrigators have had to manage water efficiently. Although the drought has eased the past couple of years, we know that droughts occur in cycles and we will see dry periods again. But it is interesting to observe what has happened to crop production during the last drought cycle.

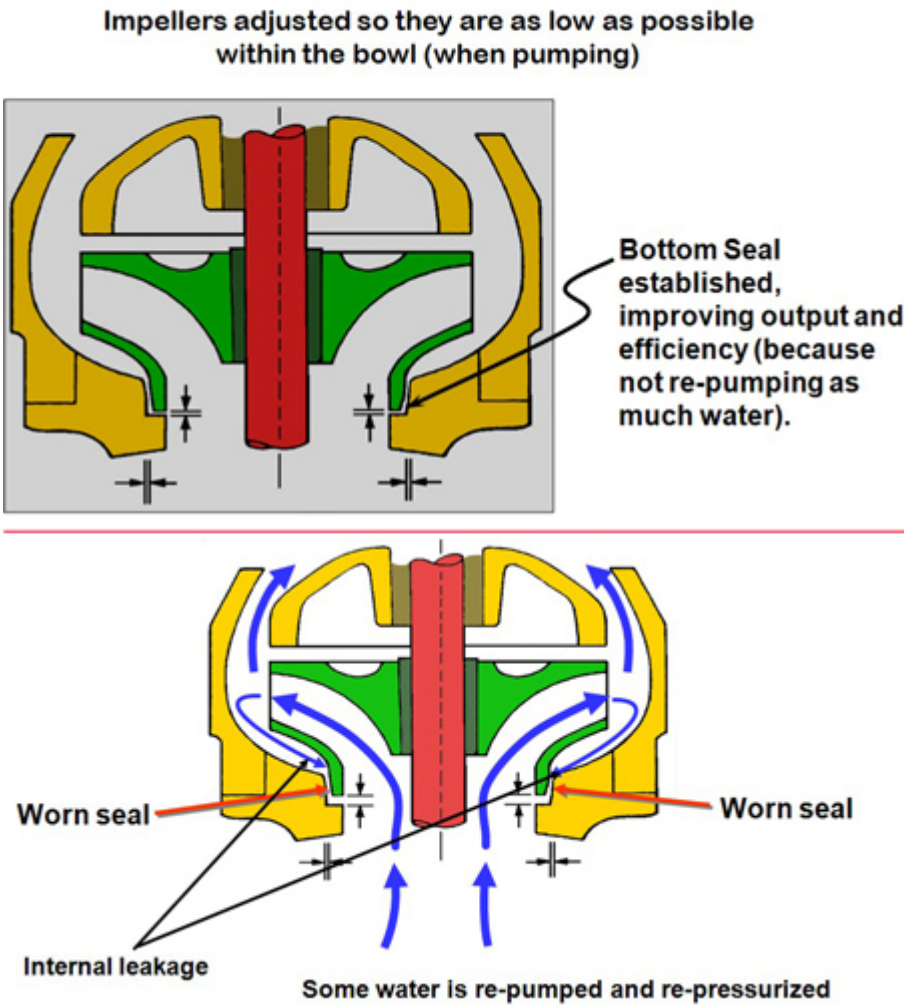
We would expect that drought years would bring lower crop yield. But according to statistics from USDA, that is not necessarily the case. Listed below are average dry bean and sugarbeet yields in Nebraska over the past 20 years.

Dry edible bean yields:		**Sugarbeet yields:**	
1989:	1,680 lb./acre	1989:	18.8 tons/acre
1990:	1,970 lb./acre	1990:	21 tons/acre
1991:	1,900 lb./acre	1991:	20.2 tons/acre
1992:	1,650 lb./acre	1992:	17.9 tons/acre
1993:	1,400 lb./acre	1993:	18.5 tons/acre
1994:	1,880 lb./acre	1994:	20.3 tons/acre
1995:	1,750 lb./acre	1995:	16.4 tons/acre
1996:	1,900 lb./acre	1996:	17.8 tons/acre
1997:	2,060 lb./acre	1997:	16.8 tons/acre
1998:	1,950 lb./acre	1998:	19.7 tons/acre
1999:	2,000 lb./acre	1999:	19.0 tons/acre
2000:	2,070 lb./acre	2000:	20.3 tons/acre
2001:	2,150 lb./acre	2001:	20.3 tons/acre
2002:	2,100 lb./acre	2002:	18.1 tons/acre
2003:	2,130 lb./acre	2003:	20.3 tons/acre
2004:	2,160 lb./acre	2004:	22.1 tons/acre
2005:	2,250 lb./acre	2005:	20.4 tons/acre
2006:	2,200 lb./acre	2006:	23.3 tons/acre
2007:	2,260 lb./acre	2007:	23.5 tons/acre
2008:	2,290 lb./acre	2008:	22.6 tons/acre

It is interesting that, during the drought years of 2002-2007, crop yield was actually greater than during the previous 10 years when rainfall was more plentiful and irrigation water more than adequate to meet crop demands. Certainly there have been other improvements in crop production practices, but it is important to note that a shortage of water did not automatically mean lower crop yields.

Improving irrigation-related efficiencies, and ultimately getting the most out of irrigation water, means giving the plant the water that it needs without over irrigating. Over-irrigating increases pumping costs, depletes water resources, and can decrease crop yield.

Properly Adjusted Pump (Top) and Worn Pump (Bottom)



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