KINGS RIVER CONSERVATION DISTRICT

IRRIGATION NEWS

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Common Problems Affecting You?

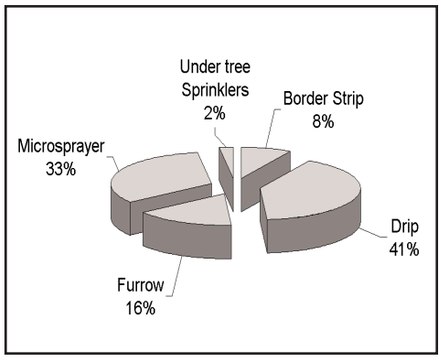
Since the Kings River Conservation District began the Irrigation Review program in 1993, the primary goal has been to provide assistance and advice enabling growers to run their irrigation systems in the most efficient manner possible. The process takes a holistic approach by considering the crop, soil and irrigation method as three separate but interdependent pieces of the same picture. KRCD has performed irrigation reviews for many kinds of systems over the past 10 years and has encountered several common problems.

The most common problems encountered are **pressure** related. Pressure is the key component in drip, microsprayer and sprinkler systems. It is this force that moves water from the pump to the furthest reaches of the system and determines the flow rate at each emitter. Undersized, out of adjustment or worn pumps deliver inadequate pressure. Friction within the filter and the laterals due to foreign material or improperly operating valves can also hamper system performance. All of these situations lead to poor distribution uniformity, loss of yield due to water stress and excess energy costs.

Another problem common to drip/micro systems is **plugging**. Plugging degrades emitter performance by reducing the flow through the emitter. This reduction in flow generally occurs very slowly and is often unnoticed until crop damage has occurred. Plugging is usually random in its distribution within a field although the ends of the laterals are more likely to plug. Causes include hard water, improper filtration or organic debris within the system.

Multiple emitter sizes occur when the emitters are replaced but not matched to the original equipment. This can lead to wide variances in flow rates causing the loss of uniformity for the system.

Furrow and border strip irrigation often suffer from **variable set times** often caused by uneven flow rates into the field or changes in infiltration rates due to soil variations. The differing advance times impact uniformity since some areas of the field are getting too much water while other areas are water stressed. Areas with times that are too high are subject to increased leaching of nutrients below the root zone. While some leaching is desirable for salt control, excessive amounts can cause water table problems, groundwater quality problems and wastes energy.



Breakdown of Irrigation Reviews for the Past 10 Years by System Type

Water penetration problems are also present in many fields. These are usually caused by either water chemistry issues or plugging of pore spaces with fine soil particles such as clays and silts. If standing water is present for several days after irrigation, this can cause water logging of plants and pest problems. Low penetration often causes uniformity to suffer and also increases the risk of runoff.

These problems, alone or in combination, can cause considerable reductions in yield and increases in production costs. The back page of this newsletter discusses the diagnosis for each problem and offers simple solutions.

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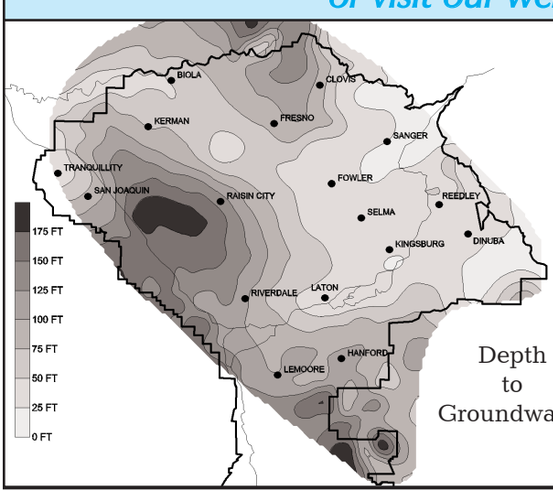

Depth to Groundwater

Groundwater Levels Continue to Decline

Groundwater is a crucial resource for the Kings River service area. The average depth to groundwater in the spring of 2001 was 80 feet, an increase in depth of 17 feet since the spring of 1986. While some areas have remained static, other areas have declined in excess of 40 feet.

The declining groundwater levels have created an overdraft of more than 2 million-acre feet from the groundwater basin. This is the equivalent of 2 times the capacity of Pine Flat Reservoir.

KRCD, in cooperation with other local agencies, is investigating options for reducing the rate of groundwater decline, thus improving the stability of the local groundwater supply.

Here's Some Solutions

The front page listed the most common problems encountered during irrigation reviews. The effects of each problem on an irrigation system can be serious singularly and devastating in combination. Proper maintenance is the best medicine for some of these problems while changes in irrigation practices and soil management will cure others.

Most **pressure** problems require a physical measurement to detect, not just an observation. The first place to watch is the pressure out of the pump. A continued drop here may be traced to the pump. However, changing water levels and system problems such as emitter wear have similar symptoms. A pump test is the best way to determine if the pump is the cause. Impeller wear is the most common pump problem but bearing failures and motor wear are also possibilities. Ultimately, the solution is pump repair or replacement and may include well redevelopment.

Filtration devices are another common location for pressure loss. Some pressure losses here are to be expected but pressure losses greater than 5 psi are considered excessive for most filter designs. Measure the input pressure against the output pressure (preferably with one gauge) to determine pressure loss. Most systems have such gauges in place. Regular maintenance, including backflushing and screen cleaning, should keep the losses below the 5 psi threshold. Professional service may be required if these methods are ineffective.

The third potential location for pressure problems is within the delivery system. Many systems have pressure-measuring capabilities at each manifold using permanently installed gauges or pressure taps. The original system specifications will indicate the required pressure at each of these points. For optimum uniformity, pressures should be within 2-3 psi of each other. If these pressures are unbalanced, the system can be rebalanced by adjusting the control valves at each manifold.

Plugging is an obvious problem in many systems. Visual inspection of the malfunctioning emitter is required. Emitters can be removed and examined to find the cause. Individual emitters can usually be cleaned using specialized cleaning tools or chemical methods, but replacement can be necessary for severely plugged emitters. When in doubt, it is best to replace the emitter. Regular system flushing and chemical treatments can reduce the risk of this problem occurring again.

Multiple emitter sizes can sometimes be determined by noting the color of the emitter path or overall size of the emitter. Another sign involves adjacent emitters that are discharging at highly different flow rates but which have no signs of plugging. Uneven flow rates can also be the result of excessive emitter wear. An Irrigation Review is often required to detect these problems and emitter replacement is the only solution. Growers should keep a supply of the original emitters available so that any "bad" emitters can be replaced with the same model. If these are not available, look at the design specifications and purchase emitters with similar flow characteristics.

Variable set time problems in furrow and border flood systems are most easily detected by visual observation. The presence of furrows that require very long or very short run times in relation to the rest of the field is a clear symptom of a problem. The solutions to this problem are handled in a case-by-case fashion, given the multiple causes and options available. Laser leveling, alternate tillage practices such as deep tillage for compaction reduction and changing management practices are some possible solutions.

Standing surface water, regardless of the application rate, is the primary symptom of **water penetration** problems. Water with low concentrations of dissolved salts frequently causes the finer surface particles of a soil to disperse and clog the pore spaces. Soil amendments such as gypsum that provide beneficial salts improve penetration by binding the smaller particles together. Cover crops can also improve water penetration through the creation of pores with their root structure and adding organic matter. Cover crops can also help disrupt compaction layers which impede the free movement of water within the soil.

If you have any questions regarding these topics, or any other irrigation related questions, please contact the KRCD irrigation specialist at 237-5567.

Related Irrigation News Issues

***Issues since January 1997 are available Online - Previous Issues can be picked up at the KRCD Office**

Pressure- May-June 1993 / July-August 1993 / September-October 1997 / September-October 2001
Plugging- May-June 1999 / September-October 1999
Multiple Emitter Sizing - July-August 1999 / March-April 2002
Variable Set Times- January-February 1991/ March-April 1992 / May-June 1992 / November-December 1993
Water Penetration - January-February 1996 / March-April 1996

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