Corn Management with SDI to Save Water Resources

Freddie R. Lamm, Research Irrigation Engineer

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WATER PRODUCTIVITY (WP)

Water productivity (WP) is defined as the crop yield (YIELD) divided by the amount of water used (WUSE):

WP = YIELD / WUSE

WP can be increased either by increasing YIELD relative to WUSE or by decreasing WUSE relative to YIELD. Whereas both techniques increase the beneficial use of water, only the second technique results in water conservation directly. It is important to note that manipulation of either term must be relative to the other term in the equation. Reducing water use is not beneficial if crop yield is reduced to the same extent.

In some cases, the best way to improve WP is to ensure there is sufficient water to achieve optimal productivity.

POTENTIAL OF SDI TO INCREASE WUE

SDI can affect both numerator and denominator of the equation.

Potentially, corn yield can be increased by SDI through:

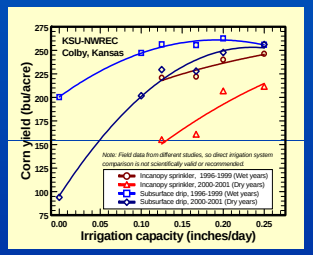
- Enhanced plant growth, crop yield and quality – A number of crops respond positively.
- Improved plant health – Less disease and fungal pressure occurs due to drier and less-humid crop canopies.
- Improved fertilizer and pesticide management – Precise and more timely application of fertilizer and pesticides through the system can result in greater efficacy and, in some cases, reduction in their use.
- Better weed control – Reductions in weed germination and weed growth often occur in drier regions.

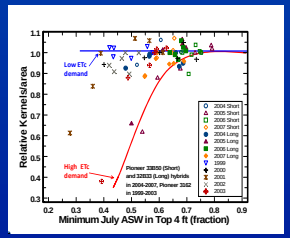
Water use of corn can be potentially decreased through:

- More efficient water use – Soil evaporation, surface runoff, and deep percolation are greatly reduced or eliminated. Infiltration and storage of seasonal precipitation can be enhanced by drier soils with less soil crusting. The inherent ability to apply small irrigation amounts can allow better water-efficient decisions about irrigation events near the end of the cropping season.
- Improved opportunities for use of degraded waters – Smaller and more frequent irrigation applications can maintain a more consistent and smaller soil matric potential that may reduce salinity hazards.
- Greater water application uniformity – Improved in-field uniformities can result in better control of the water, nutrients and salts

SDI has potential to maintain higher crop yields at lower irrigation capacities. This figure shows an SDI capacity of approximately 0.17 in/day is sufficient for corn on deep silt loam soils

A minimum capacity of 0.25 in/day is recommended for CP sprinkler irrigation.





With SDI , we have done some interesting research on delaying the first irrigation of corn. Corn yield in these studies was linearly related to the number of kernels per unit area. Kernels/area tended to be reduced when July minimum available soil water in the top 4 ft (JASW) was below 0.6.

In years of less evaporative demand, more water could be extracted from the soil profile without reducing kernels/area, but severe reductions occurred for similar soil water conditions in years with large July evaporative demands.

Irrigation systems really don't save water resources. It takes human management and actions to save water.