

Using SDI and LEPA Sprinkler Irrigation to Apply Swine Wastewater

A progress report

Freddie R. Lamm,
Research Irrigation Engineer
Kansas State University



Todd P. Trooien
Water Resources Engineer
South Dakota State University

The use of livestock wastewater through agricultural irrigation systems can have positive or negative impacts on the environment, depending on the method and intensity of use.

In this study we hope to answer these specific questions:

- *What are the environmental impacts of swine wastewater when applied with SDI or LEPA irrigation specifically in terms of nutrient utilization and redistribution in the soil profile?*
- *What are the crop impacts of swine wastewater application through SDI compared to LEPA irrigation?*
- *Is swine wastewater use through SDI technically feasible?*

The wastewater treatments were applied during a two week period (late June-early July) in 2000 and 2001. After the treatments were made, fresh water was used for irrigation for the remainder of the season.

The treatments were as follows:

1. SDI control treatment (No application of wastewater, but SDI fertigation of commercial fertilizer, 200 lbs N/acre inseason through dripline.)
2. Application of 1 inch of wastewater per year with SDI.
3. Application of 2 inches of wastewater per year with SDI.
4. Application of 0.6 inch of wastewater per year with simulated LEPA.
5. Application of 1 inch of wastewater per year with simulated LEPA.
6. Application of 2 inches of wastewater per year with simulated LEPA.

Preliminary Results

Water use tended higher for the LEPA sprinkler irrigation plots as compared to the SDI plots averaging approximately 1-3 additional inches of use. Since irrigation was only 0.2 additional inches for the LEPA sprinkler irrigation plots, this extra water use came by decreasing soil water storage. It is not clear why the LEPA sprinkler irrigation treatments had higher total water use, but a partial reason may be increased water losses from evaporation from the soil surface or deep drainage. Drier soil surfaces with SDI can reduce soil evaporation while smaller SDI applications can also decrease deep drainage.

Wastewater Treatment	Total applied nutrients ¹			Grain yield bu/a	Irrigation inches	Water use ² inches
	N	P ₂ O ₅ Lb/a	K ₂ O			
SDI - No wastewater	245	45	0	258	18.8	29.3
SDI - 1 inch	219	82	142	261	18.8	28.9
SDI - 2 inches	383	124	279	263	18.8	28.8
LEPA - 0.6 inch	149	60	85	225	19.0	30.7
LEPA - 1 inch	219	82	142	251	19.0	30.8
LEPA - 2 inches	383	124	279	242	19.0	31.8

¹ Total applied N-P-K from the three sources: starter treatment at planting (30 lbs N/acre + 45 lbs/a P₂O₅), wastewater application, and the amount naturally occurring in the irrigation water (0.75 lbs/acre-inch).

² Total of seasonal change of soil water storage in the 8 ft profile plus irrigation and precipitation.

Both SDI and LEPA sprinkler irrigation appear to be acceptable methods in terms of obtaining high crop yields and good nutrient uptake when applying swine wastewater.

This should be considered as a progress report, because a large portion of the experimental results remains to be analyzed. Soil nutrient data related to the nutrient utilization and soil profile redistribution will be crucial information in evaluating these two irrigation methods for application of swine wastewater.