

Farmers Learn About Biosolids!

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A workshop about Lincoln's Biosolids Program in February attracted about 30 area farmers and other interested people. This workshop was organized by UNL Cooperative Extension in Lancaster County and the City of Lincoln's Solid Waste Division.

The workshop began with a tour of the Theresa Street Wastewater Treatment Facility (Fig. 1) to learn about the process that makes biosolids safe for land application, followed by an educational program at the Lancaster County Extension Office.

Theresa Street Facility

The Theresa Street facility, located near 27th and Cornhusker Highway, treats about 18 million gallons of wastewater each day—about 75% of Lincoln's wastewater. Theresa Street facility tour highlights:

- Wastewater personnel Randy Wilson and Marshall Coleman explained that during the biological treatment process, oxygen-loving microorganisms

anaerobic digestion process makes biosolids safe for land application.

- One by-product of the digestion process is the production of methane gas which is burned to keep the digesters about 98° F. In addition, 900 kilowatts of electricity can also be produced which supplements the facility's electrical needs.
- After 18–20 days spent in the digesters, the treated solids are dewatered by squeezing out excess water between a series of porous belts. The consistency of the final biosolids product is typically about 20% solids.

Value of Biosolids

From 1995–1999, field research on Lincoln's Theresa Street biosolids was conducted by the UNL Department of Agronomy, headed by Darren Binder. Some of the objectives of this research were to determine optimal application rates and to establish the fertilizer and economic value of Lincoln's



(Fig. 1) Lincoln's biosolids are processed at the Theresa Street Wastewater Facility to make this fertilizer safe for land applications.

Nutrient	Biosolids lbs/yd ³	Fertilizer Cost/lb	Total
Nitrogen	13	\$0.15	\$1.95
Phosphorus	10	\$0.59	\$5.90
Potassium	1	\$0.17	\$0.17
Copper	0.25	\$4.40	\$1.10
Zinc	0.25	\$1.21	\$0.30
Iron	8	\$1.23	\$9.85
Sulfur	3	\$0.17	\$0.51
Total			\$19.78

(Table 1) Value of Nutrients in Lincoln's biosolids as determined by current fertilizer costs.

Binder calculated the value of nitrogen alone in biosolids to be \$56.50 per acre.

Many crop producers who use biosolids are using this fertilizer, not just for the nitrogen alone, but for phosphorus, zinc and other micronutrients. Using the biosolids analysis and the current cost of commercial fertilizers, Binder determined the nutritional value for seven nutrients (N, P, K, Cu, Zn, Fe, S) in each cubic yard of dewatered biosolids. According to Binder, "The fertilizer value of each cubic yard of biosolids is almost \$20 per cubic yard—which does not include the value

of organic matter." (Table 1) According to Binder, there are a number of benefits from adding organic matter to the soil. Studies have shown that organic matter increases water infiltration and water holding capacity of the soil. Adding organic matter to the soil also reduces its bulk density and reduces the likelihood of erosion.

Lincoln's Biosolids Program

The Lancaster County Extension Office coordinates the distribution and application of
see BIOSOLIDS on page 11



(Fig. 2) Marshall Coleman, Assistant Superintendent of Wastewater Operations, describes to workshop attendees the process used to thicken waste-activated sludge prior to being pumped to the egg-shaped anaerobic digesters.

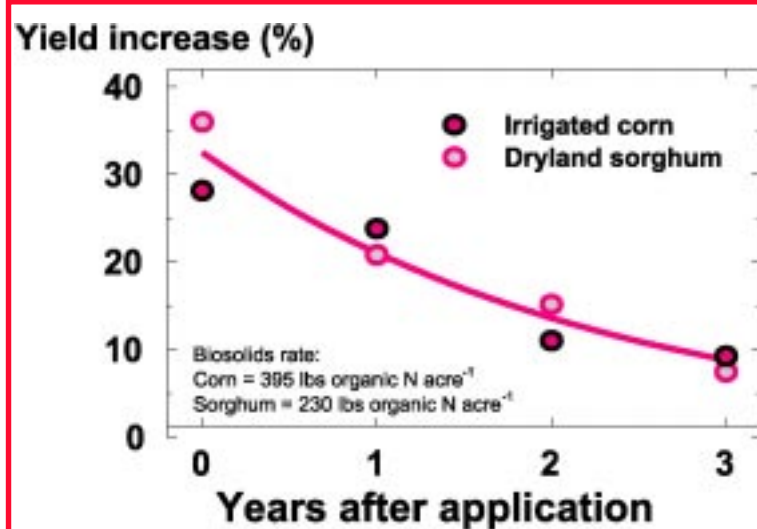
use the wastewater as their food source and release carbon dioxide and water, which results in a purified effluent. This effluent is disinfected and discharged into Salt Creek.

- Thickened solids are pumped into large egg-shaped tanks, called anaerobic digesters, where microorganisms break down the solids into a more stable form. The time and temperature spent in the

biosolids. At the February program, Binder discussed results of these studies.

In field plots where a single application of biosolids was applied at an optimal rate, corn and sorghum showed a significantly greater yield response through four consecutive crop seasons. (Figure 3)

By determining how much nitrogen was needed to produce yields for the four year study,



(Fig. 3) Yield increase with a single biosolids application over four subsequent years.

In this issue...

- Horticulture —page 2
- Environmental Focus —page 3
- Farm Views —page 4
- Urban Agriculture —page 5
- Food & Fitness —page 6
- Family Living —page 7
- 4-H & Youth —pages 8-9
- Community Focus —page 10

Visit Egg Cam!

View chicks hatching, photos of embryos as they develop, and educational resources for youth, parents and teachers on the 4-H Embryology Web site at



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