



Biosolids Utilization: Facts for Discussion with the Public

**E.A. Hanlon, G.A. O'Connor, and
T.A. Obreza**



Introduction

Information for this talk was summarized from the **Sustainable Land Application Conference**, Orlando, Florida, 2004

Articles were published in the **Journal of Environmental Quality**, 2005



Introduction cont'd

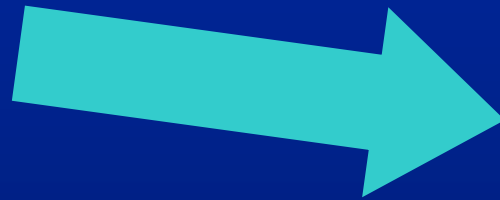
- ✧ Nutrients
 - ✧ Trace elements
 - ✧ Pathogens
 - ✧ Means of communicating this information to clients
- What works, what doesn't*



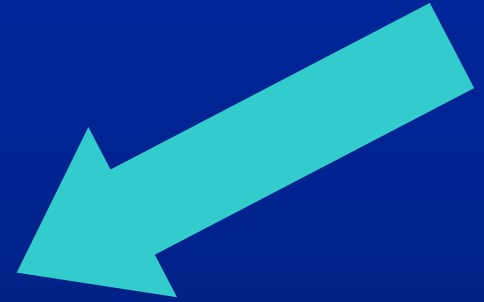
Waste Water Residuals to Usefulness

Industry screening/pretreatment

Municipalities



Sludge




Pathogen
treatment



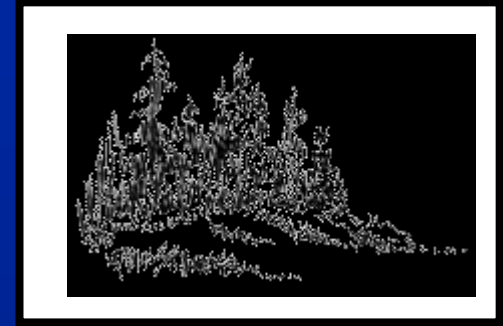
Biosolids



Nutrients

- ✧ Biosolids are a good source of both **nutrients** and **organic matter**
 - ✧ Biosolids originate from a range of sources
 - ✧ Nutrient concentrations with changing sources
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Nutrients-Nitrogen




- ✧ Nitrogen is often the primary nutrient of interest
- ✧ Carbon-to-Nitrogen ratio (C:N) of the biosolid indicates mineralization (15: to 40:1), or not

Cabrera et al., 2005



Nutrients-Nitrogen

- ✧ Nitrogen also controlled by:
 - ★ Biosolid and soil pH
 - ★ Trace elements (biosolid & soil)
 - ★ Iron, Manganese, and/or Aluminum oxides
 - ★ Wetting/drying of biosolids
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Nutrients-Phosphorus

- ✧ P-index may indicate biosolid rate should be based on P loading
- ✧ Iron and Aluminum, lime may reduce P solubility



Trace Elements

- ✧ Considerable reduction in trace element concentrations in biosolids in recent years
 - ★ Reduction in industrial sources
 - ★ Biosolids are blended sorbants (Fe and Al oxides, organic matter)

Basta et al., 2005



Pathogens

- ✧ Class A: treated to reduce pathogens below detection
 - ★ Class A biosolids must be used on plant products that are consumed raw
- ✧ Class B: treatment reduces pathogens
 - ★ Not favored in future land applications (apply only Class A biosolids)

Gerba and Smith, 2005



Risk

- ✧ Deterministic risk approach
 - ★ Used for current regulations (40 CFR 503 rule, 1993)
 - ★ Highly Exposed Individual to a Reasonably Exposed Individual
 - ★ Single pathway
 - ★ Single-point estimates
 - ★ Compounding of conservative assumptions/estimates

Beecher et al., 2005



Risk

- ❖ Probabilistic risk approach
 - ★ Controls level of conservatism and potential overestimation of exposure
 - ★ Uses and helps to identify a Reasonably Exposed Individual
 - ★ Conclusion for Dioxins in biosolids: EPA indicated no numerical limits required for biosolids in land application

Kester et al., 2005



The Dilemma

No matter how good the science is, the public must support land application of biosolids.

Otherwise, we lose this valuable resource, and the public pays a higher price for disposal.



Things to know

It turns out that real risk is only a part of the problem!

Perceived risk = risk + outrage

Science and Statistics

Feelings and level of understanding

Risk Communication

✧ Stages of communication

★ Into the 1980s: ignore the public

★ 1980s: Decide-Announce-Defend (DAD)

★ 1990s: Dialogue

★ To present: Affecting Change

One-way

Two-way

Beecher et al., 2005



Obstacles to Risk Communication

- ✧ I work with the environment and **doing good** things. Don't challenge me.
- ✧ **Experts** are logical, set boundaries, and often exhibit low level of emotion
- ✧ **Public**: emotional, irrational, diffuse and wandering topics (**outrage factor**)

Obstacles to Risk Communication

- ✧ **Power and control** (who should be at the table)
- ✧ **Comfort** level (groan zone)
- ✧ **Change** through dialogue takes commitment and time

Begin the Discussion (Dialogue)

Overall goal is to **reduce** the **number** and **intensity** of the **outrage** factors

- ✧ Make risk seem fairer and more voluntary to all
(share the perceived risk)
 - ✧ Share knowledge
 - ★ Benefits: renewable; recycling of nutrients
 - ★ Special treatment of industrial wastes
- Beecher et al., 2005

Begin the Discussion (Dialogue)

- ✧ Show that programs have **local control** vs. state or federal
- ✧ Present an **objective view**
 - ★ Include other points of view
 - ★ Share information in advance
- ✧ Avoid **experts** with a perceived **profit motive**

Begin the Discussion (Dialogue)

- ✧ Present research **credibility**
 - ★ High level of quality control
 - ★ Peer-accepted methods
 - ★ Findings flow from data
 - ★ Conclusions with described limitations

Begin the Discussion (Dialogue)

- ✧ Present research **legitimacy**
 - ★ Unbiased nature
 - ★ Fair to other views/interests
- ✧ Present **salient** research
 - ★ Useful to stakeholders
 - ★ Addresses meaningful questions/concerns

Conclusion

✧ Communication regarding biosolids will contribute to the sustainability of this resource for agriculture



Communication starts with us!



Thanks for the wide ride!

