

Smoke'n Tile Lines

A Demonstration of Soil Structure

Soil Quality

- Soil Structure
 - Conservation tillage
 - No-till
 - Crop rotation



Soil Quality

- Increase infiltration
 - Earthworm burrows
 - Root holes
 - Cracks
 - Structural porosity



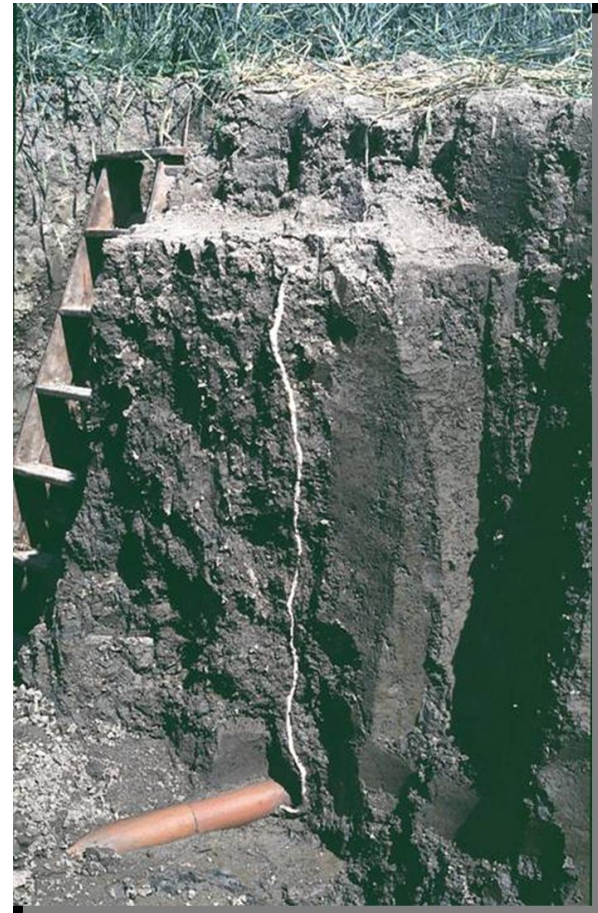
Liquid Manure and Tile Lines

- Liquid manure
- Odor and runoff
 - Subsurface injection
- Conservation tillage



Manure Movement to Tile Lines

- Earthworm burrows
 - Up to 10% of total rainfall
 - Proximity to tile lines
 - Within a few cm
 - Connections to subsoil fractures



Ohio Study

- Frank Gibbs, NRCS
Martin Shipitalo,
USDA, ARS
 - Tile line smoking
 - Determine effect
of earthworm
burrows
 - Dyed water
 - 12m downstream
 - 14 minutes
 - 9.3 L of water



WI Tile Line Smoking Demo

- UW-Extension Grains Team and Nutrient Management Team
- Soil Quality Field Days
 - Fond du Lac
 - Chippewa
 - Adams
 - Columbia



WI Tile Line Smoking Demo

- Frank Gibbs
 - Ohio NRCS



WI Tile Line Smoking Demo

- Expose tile line
- 300' line hooked up
- Gas powered turbine blower
- Smoke cartridges
 - 1100 m³ in 3 minutes





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WI Tile Line Smoking Demo

- Tile line flagged
- Earthworm burrows with middens emitting smoke were identified
- Moisture effect



Burrows and Middens







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Control Measures

- Tilling high above tile line
- Precision farming
- Plugs or shut offs
- Manure >5% solids
 - Agitation
 - Bedding



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