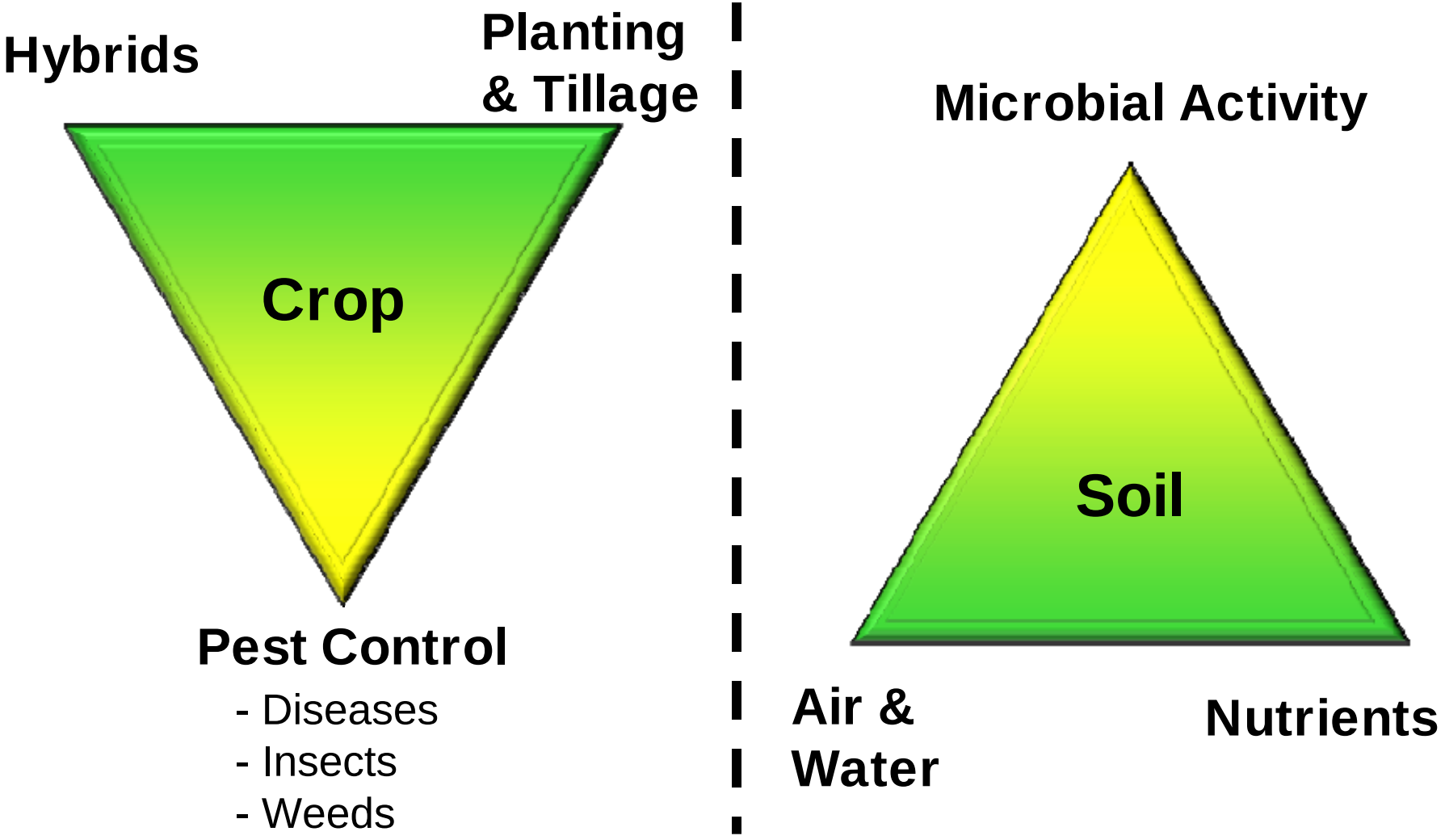
Marketing of FGD Gypsum in the Midwest U.S.

Ken Curtis

Cal-SO 100®

Key Management Factors



Solutions

- From the past.
  - Improve surface runoff.
  - Install tile.
  - Subsoil.
- The latest from the World of Science.
  - Increase soil calcium and reduce magnesium.
  - Apply gypsum on the soil surface.
  - Increase aggregate forming soil microbes.

What is Cal-SO 100®?

Calcium Sulfate Dihydrate ($CaSO_4 2H_2O$)

Sources of Gypsum:

Power Plants (Synthetic or FGD)

Recycled Dry Wall

Natural Deposits

Cal-SO 100®
100% Pure
Synthetic Gypsum

Advantages of FGD gypsum:

- **Purity**
- **Uniform particle size**
- **Low heavy metal content**
- **Inexpensive**

100% Available!

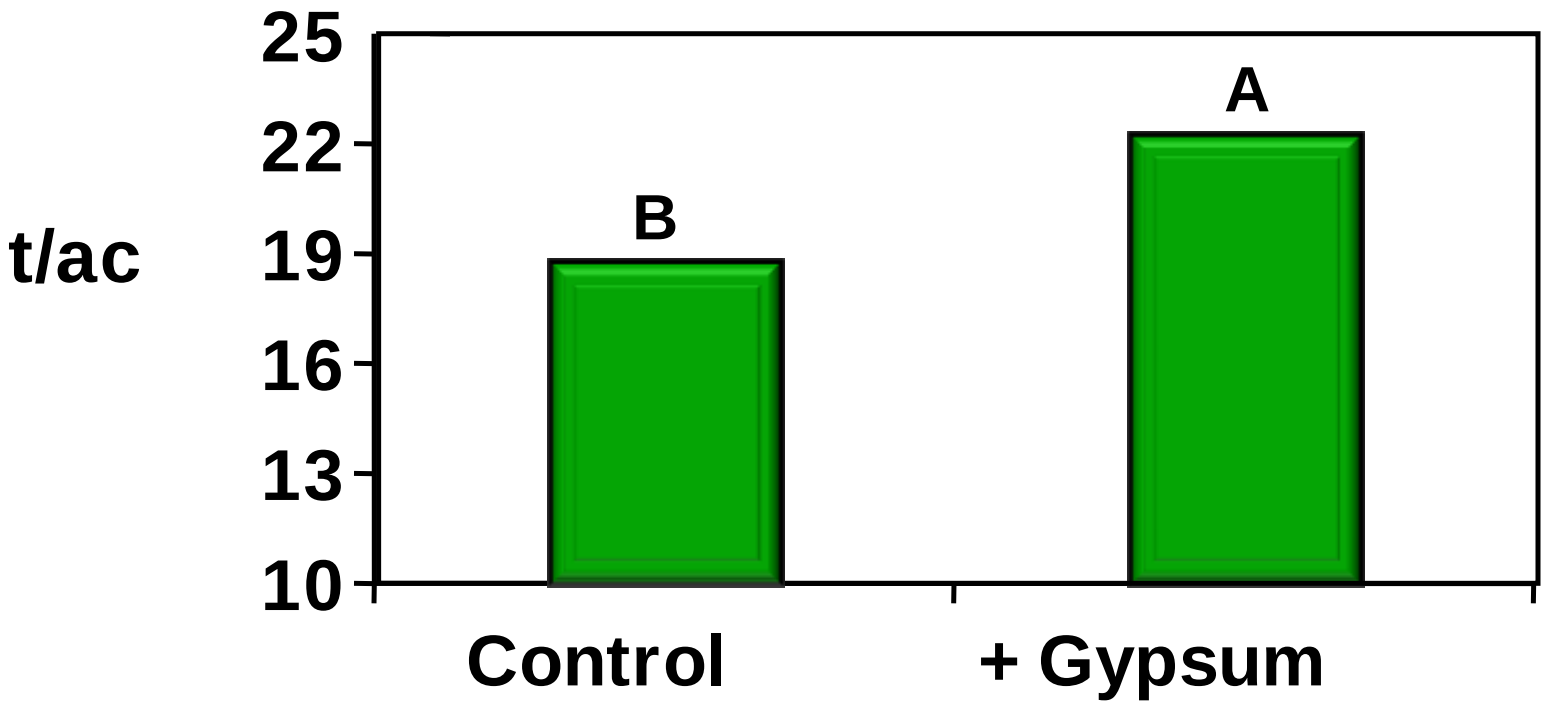
Cal-SO 100® is a Fertilizer

- Approximately 20% Calcium
- Essential for cell wall health and strength
- Approximately 15% Sulfur
- Essential for protein formation

Cal-SO 100 is not a liming agent

Cal-SO 100®

Effect of Gypsum on Cumulative Alfalfa Yields at Wooster, OH (2000 - 2002)



Different letters over each bar represent a significant difference at $p \leq 0.05$.

Cal-SO 100® is an Amendment

Alkaline Soils: Helps toxic salts leach out of the root zone.

Acidic Soils: Provides usable Calcium to soil.

Cal-SO 100 is made from a neutral salt, however it will neutralize soil acidity caused by exchangeable Al^{+}.

Cal-SO 100® is an Amendment

Sodium (Na^{+}) and Magnesium (Mg^{2+}) may accumulate in soils through:

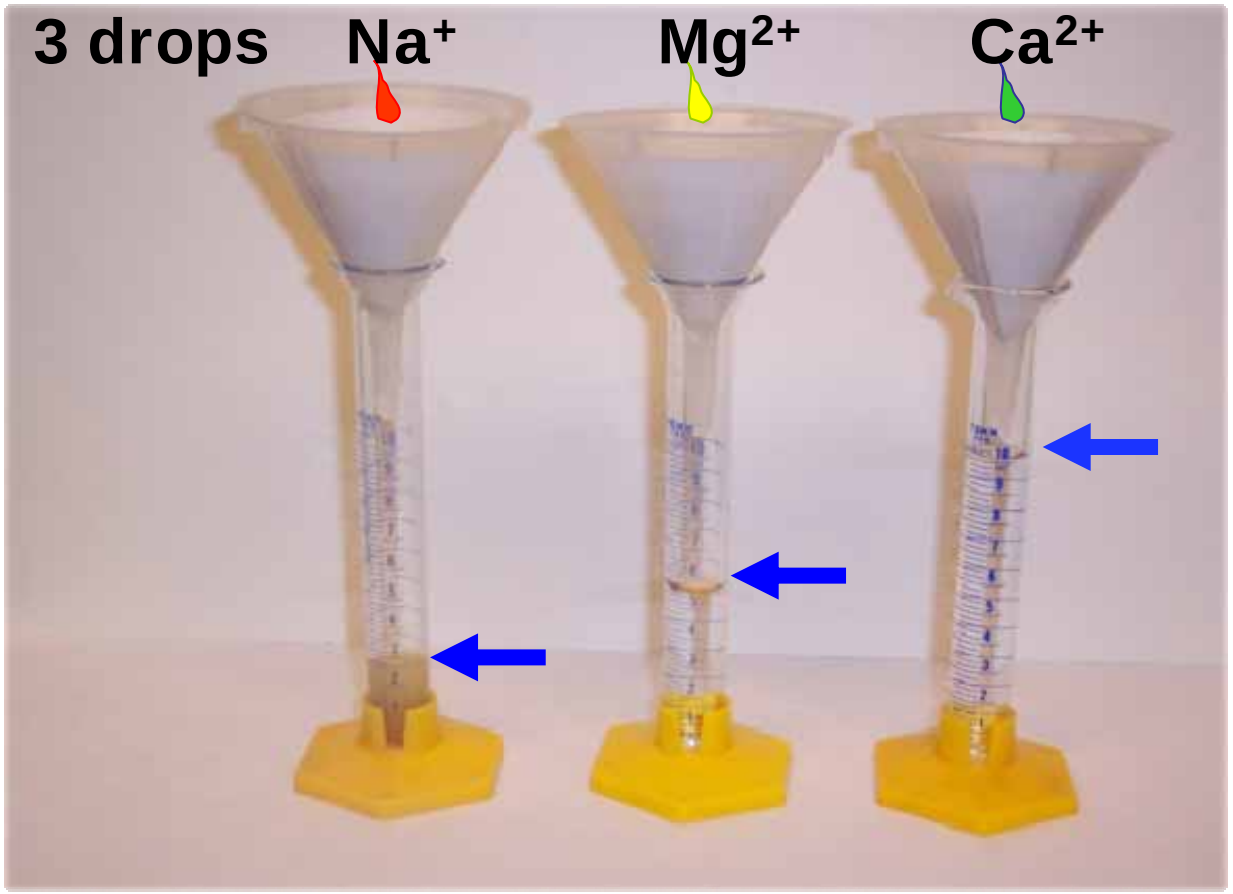
- **Natural weathering processes**
- **Use of poor quality irrigation water**
- **Long-term application of dolomitic limestone (Mg^{2+})**

Cal-SO 100®

Facilitates water movement through soils

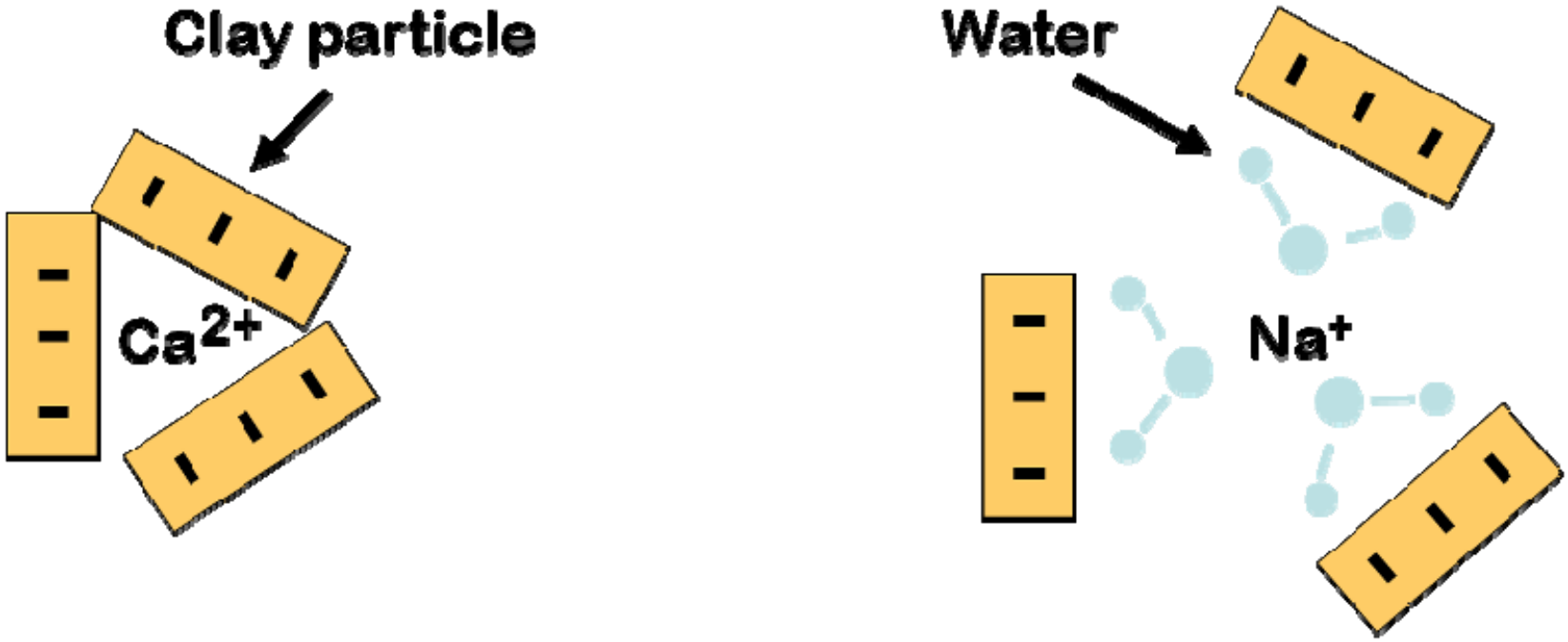
Clay suspension added to funnels.
Time = 0 minutes.

Cal-SO 100®



Filtrates after Na^+, Mg^{2+}, and Ca^{2+} added.
Time = 15 min

Cal-SO 100®



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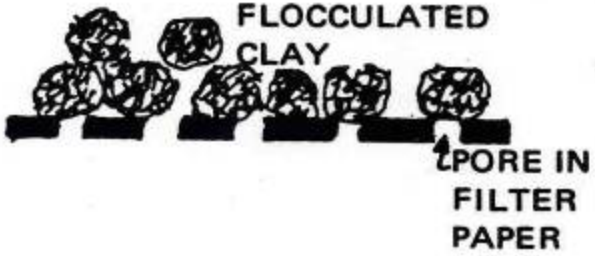
Na^{+}

Ca^{2+}



Cal-SO 100® is a Conditioner

Good soil structure (aggregation) is enhanced by:

- **Freeze-thaw**
- **Minimum tillage**
- **Crop residues**
- **Active soil biology**
- **Soluble calcium ions**

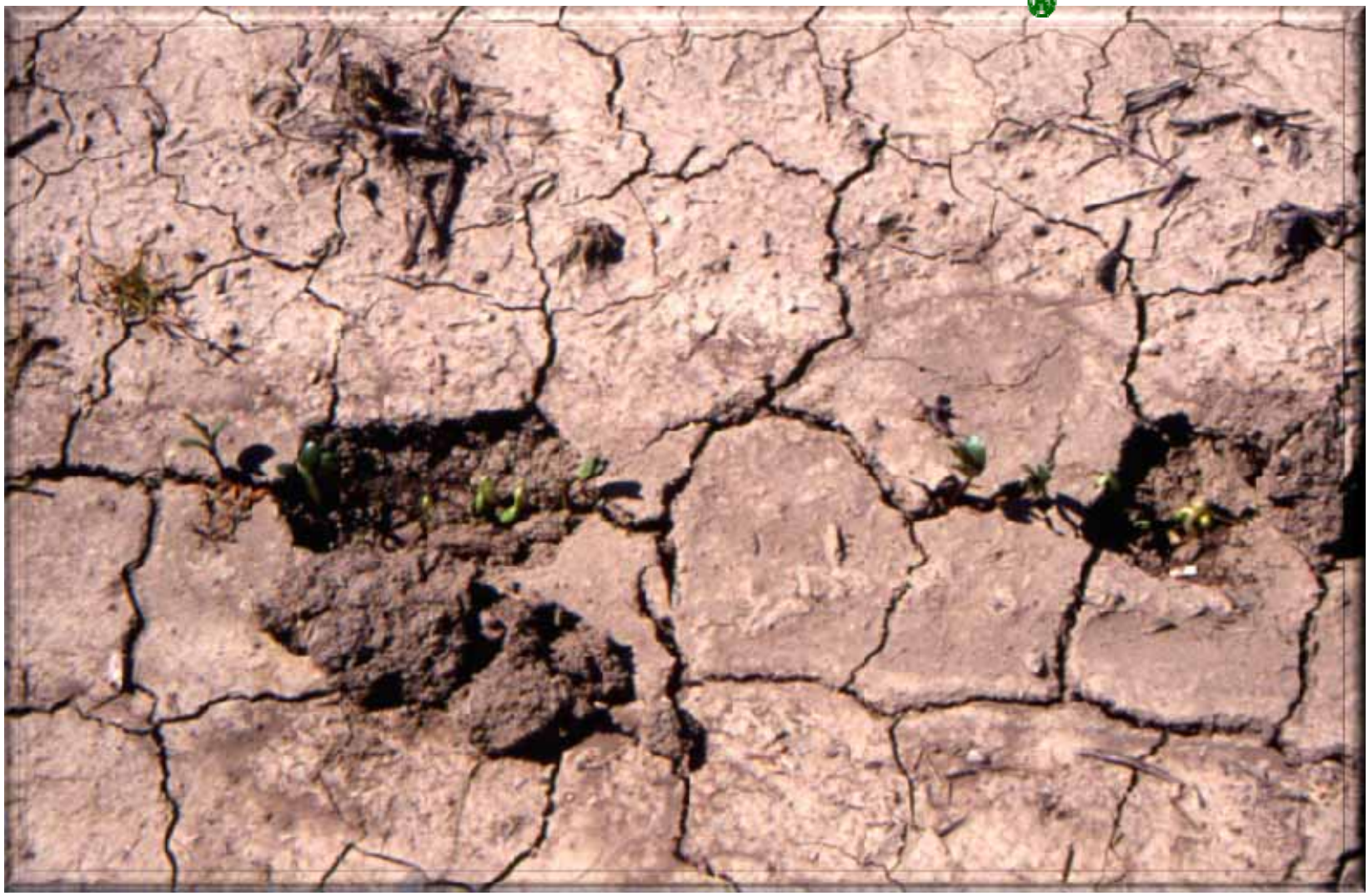
Poor Structure **Good Structure**

Cal-SO 100® is a Conditioner

Cal-SO 100 can be used to improve soil aggregation (structure) and inhibit or overcome soil dispersion. Soil dispersion contributes to:

- **Surface sealing and crusting**

Cal-SO 100®



Crusting and surface sealing due to dispersion of cultivated surface soil

Cal-SO 100® is a Conditioner

Cal-SO 100 can be used to improve soil aggregation (structure) and inhibit or overcome soil dispersion. Soil dispersion contributes to:

- **Surface sealing and crusting**
- **Problems with seedling emergence**

Cal-SO 100®

Seedling emergence in crusted soil.

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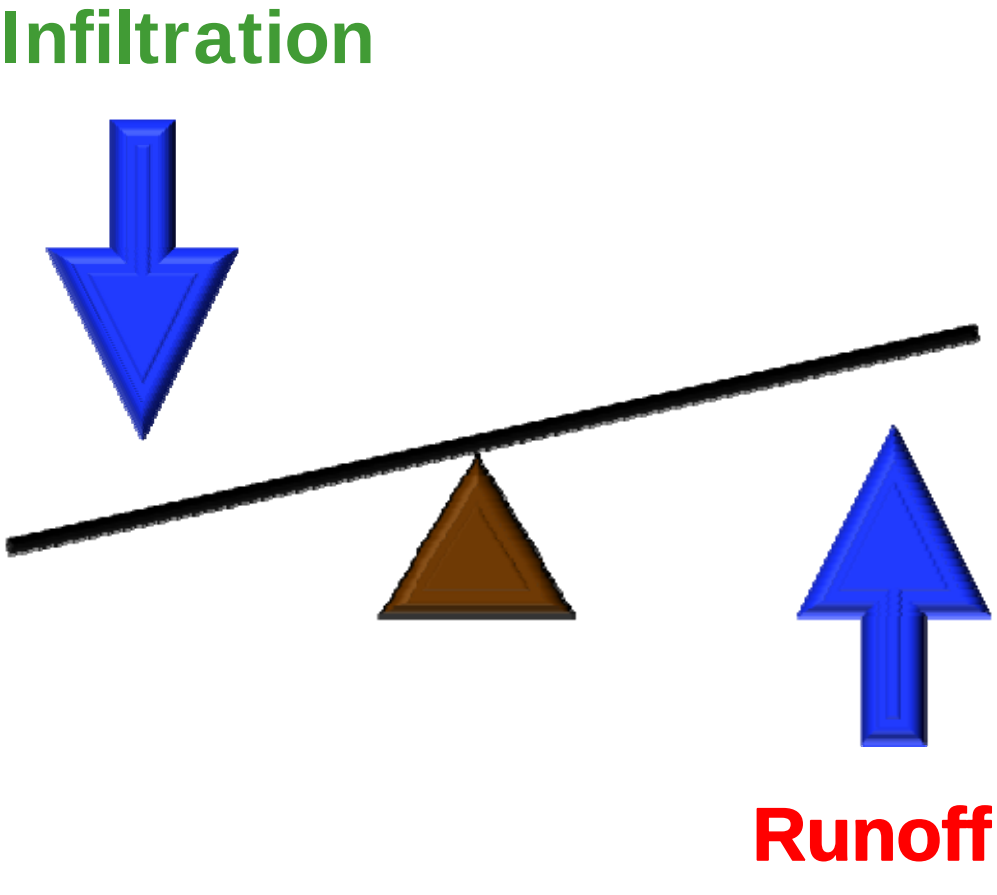
Cal-SO 100 can be used to improve soil aggregation (structure) and inhibit or overcome soil dispersion. Soil dispersion contributes to:

- **Surface sealing and crusting**
- **Problems with seedling emergence**
- **Run-off/Erosion**

Cal-SO 100®

Crusting and poor infiltration results in runoff and soil erosion



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- **Problems with seedling emergence**
- **Run-off/Erosion**
- **Subsoil swelling**

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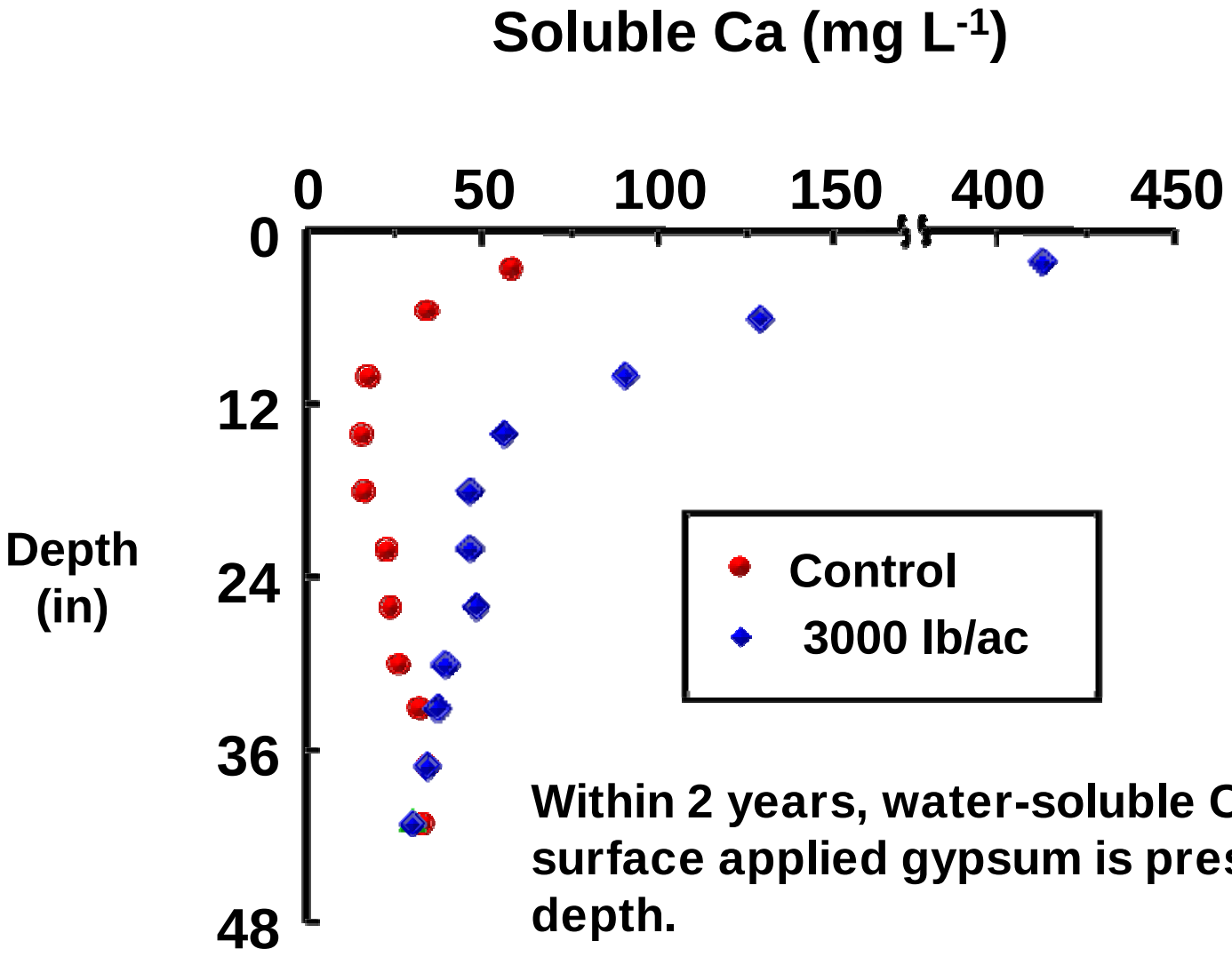
Nu-till in Ohio on the bottom and conventional on the right. Both fields have pattern drainage tiles.

Cal-SO 100®



Within 2 years, water-soluble Ca from surface applied gypsum is present at 36 in depth.

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Cal-SO 100 can be used to improve soil aggregation (structure) and inhibit or overcome soil dispersion. Soil dispersion contributes to:

- **Surface sealing and crusting**
- **Problems with seedling emergence**
- **Run-off/Erosion**
- **Subsoil swelling**
- **Poor air exchange**

Cal-SO 100®

Van Wert Co.; June, 2003; following 2.3” rain

Good Air / Water Mgt.

Poor Air / Water Mgt.

Cal-SO 100®

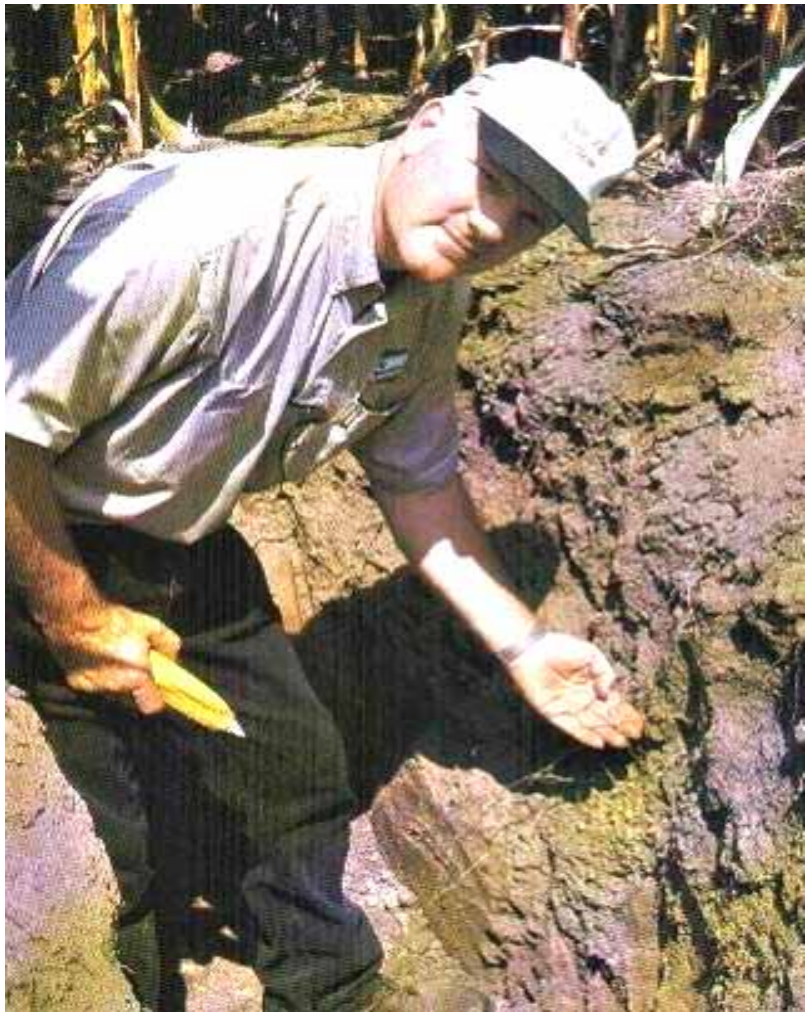
The result: Van Wert Co.; August, 2003

Good Air / Water Mgt.

Poor Air / Water Mgt.

Depth of Water Table

- **Water table is level in the soil below which water saturates all the pore volume.**
- **The root area is the area between the soil surface and the water table where plant usable (oxygenated) water is found.**



Cal-SO 100®

Before treatment with gypsum

Cal-SO 100®

After treatment with gypsum


2388
CASE

Cal-SO 100® Application

Cal-SO 100 can be applied directly to the soil using conventional dry material spreaders

Cal-SO 100 Application

- 2006 Tandem Axle Pull Spreader
- Rental Available through JLM INC

Conclusion

- **Managing Soil Air and Water:**
  - **Reduces Risks!**
  - **Increases Yields and Profits!**

- **New Science has provided more tools:**
  - **Increasing Calcium and Reducing Magnesium and Sodium.**
  - **“Salting” the Soil Surface with Gypsum Prevents Sealing.**
  - **Take Steps to Increase Stable Soil Aggregates.**

Questions ?

Cal-SO 100®

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