Soil Management Practices for Reducing Risk: *Can Anything be Done?*

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What is Risk?

- Definition: expose someone or something of value to danger, harm, or loss. (source: Oxford Dictionary)

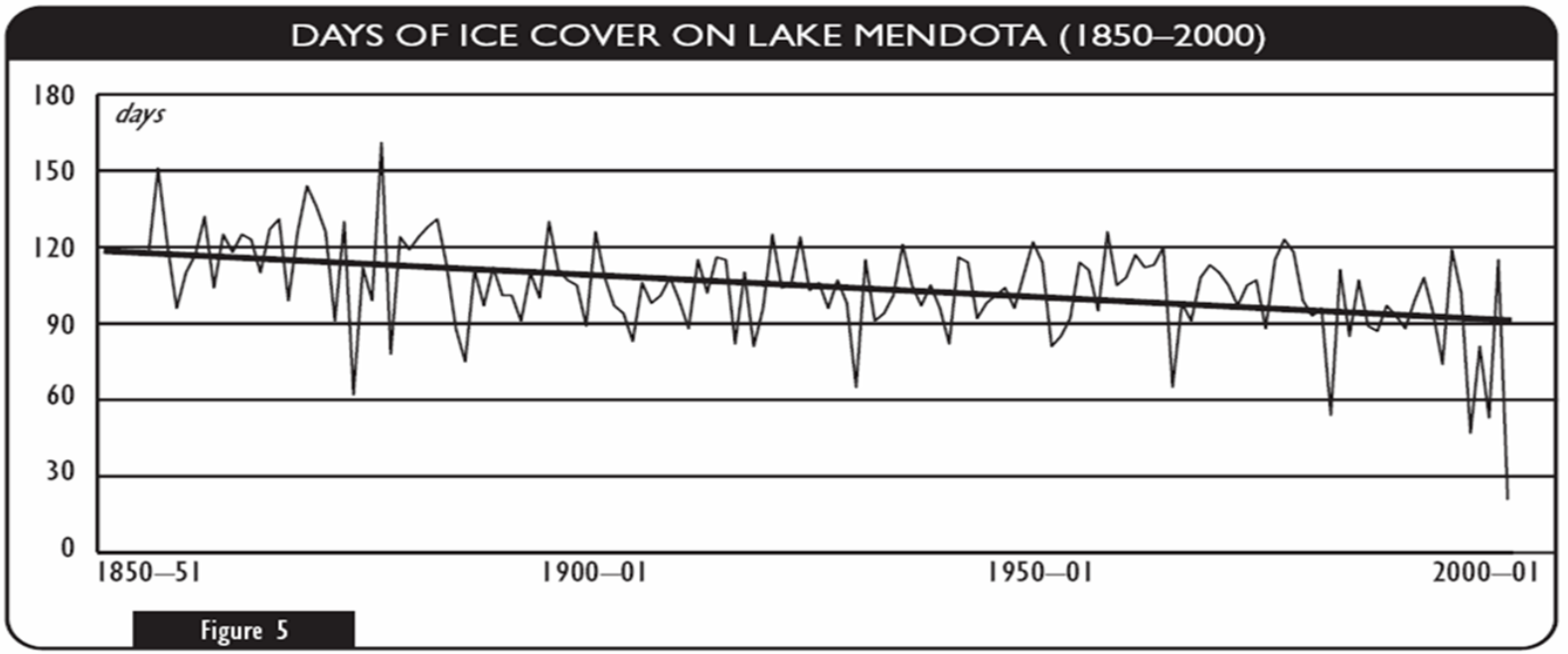
- Farmers deal with uncertainty on a daily basis; weather, animal/insect damage, weeds, pathogens, etc.

- "Risk can be defined as the possibility of adverse outcomes due to uncertainty and imperfect knowledge in decision making." (source: S.A. Drollette, 2009)

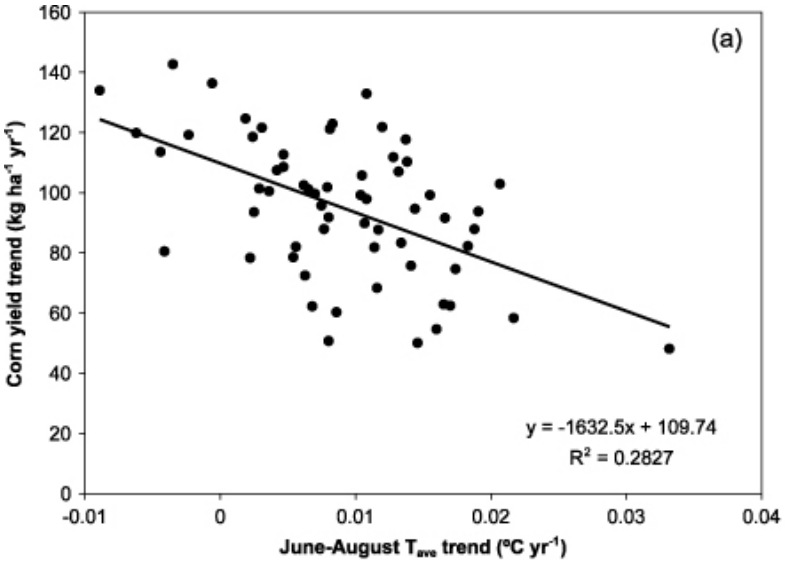
Sources of Risk from a Soils Point of View

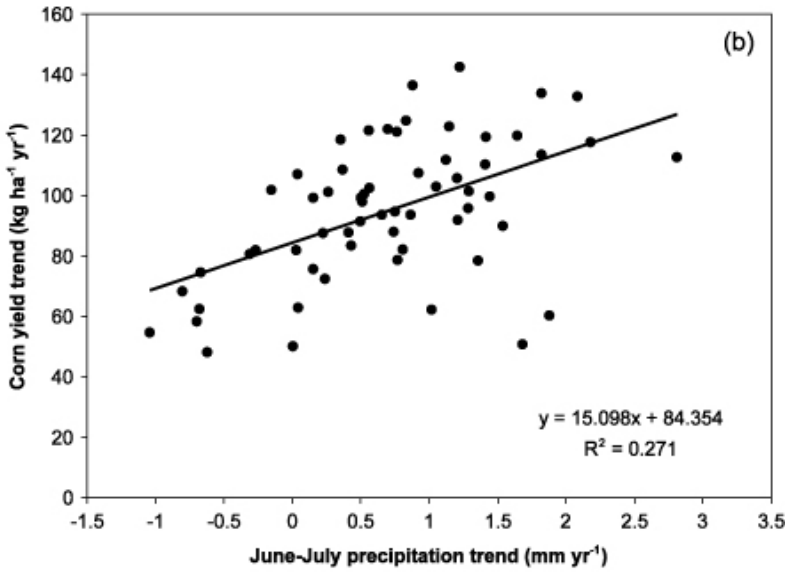
Risk Source	Impact	Potential Cause
Inadequate fertilization	- Poor yields - Susceptibility to pests	- Management
Lack of soil moisture	- Poor emergence - Reduced yields	- Weather - Management
Soil erosion/runoff	- Reduced soil profile depth - Nutrient losses - Reduced yields	- Management - Weather
Excess water	- Poor crop performance - Nutrient losses - Increased erosion risk	- Soil type - Weather - Management

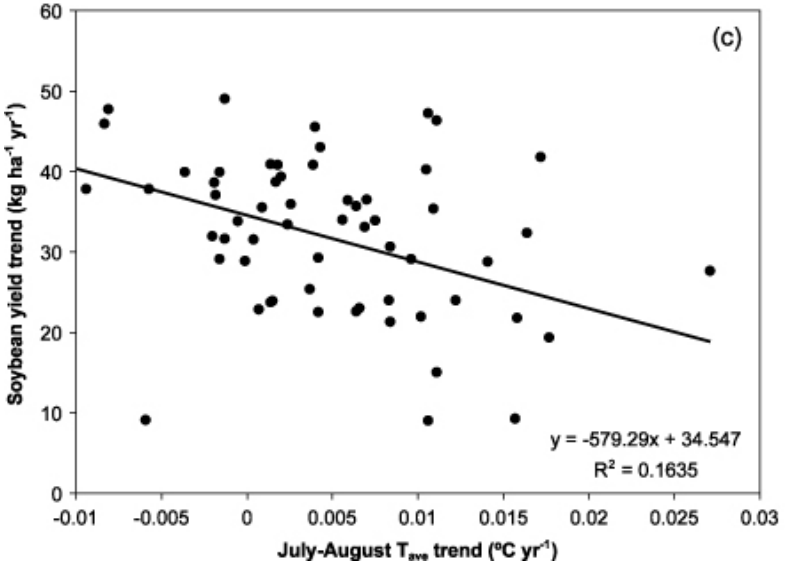
Weather is a MAJOR factor, but management is too…

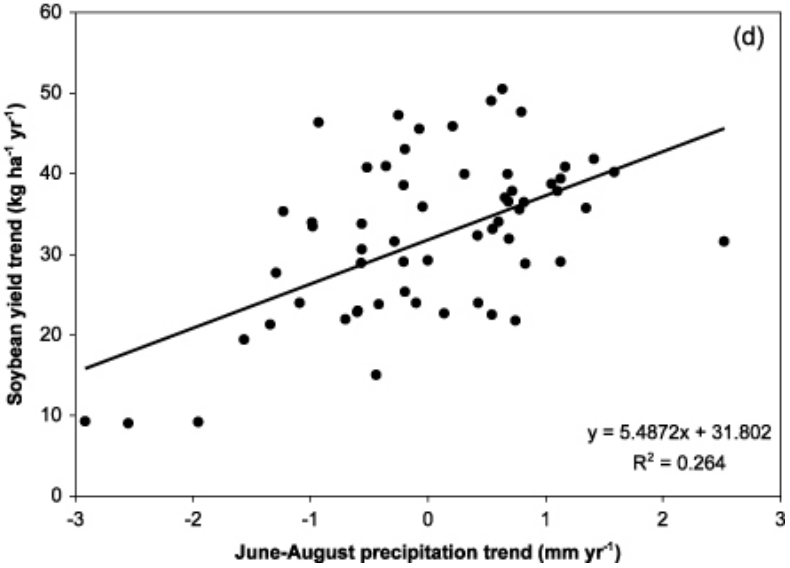


Source: WDNR, Waters of Wisconsin Report





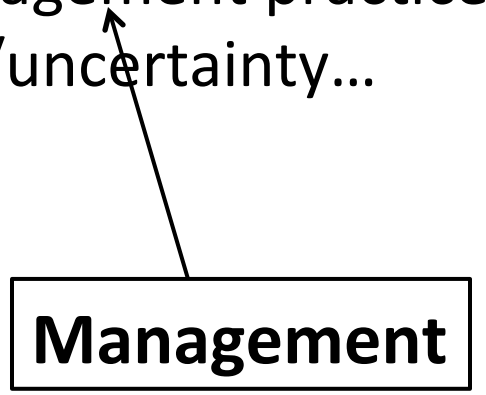




Source: Kucharik & Serbin, 2008

Can We do Anything About the Weather?

- Yes and No.
- NO : can't control weather patterns
- YES: certain management practices can help reduce some of the risk/uncertainty…



Soil Management Strategies

- Maintain adequate soil fertility
- Increase water retention by soil
- Prevent and reduce soil erosion/runoff potential
- Control of excess water (flooding) in poorly drained soils

Management Strategies Soil Fertility

Nitrogen

Zinc

Phosphorus

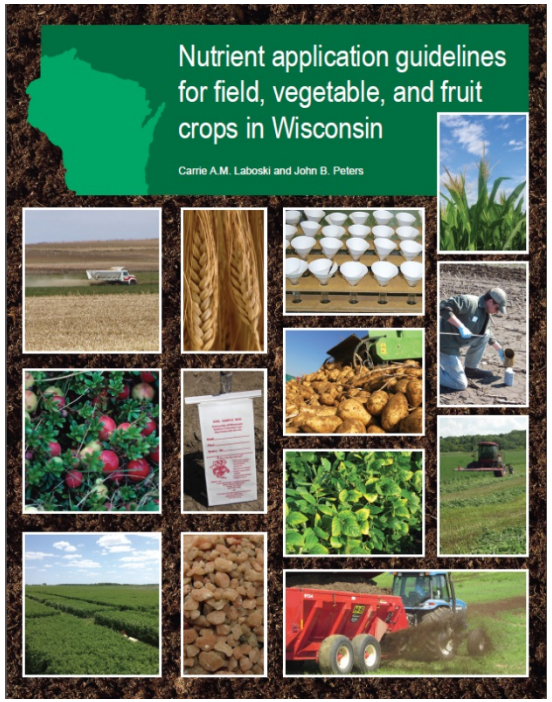
Manganese

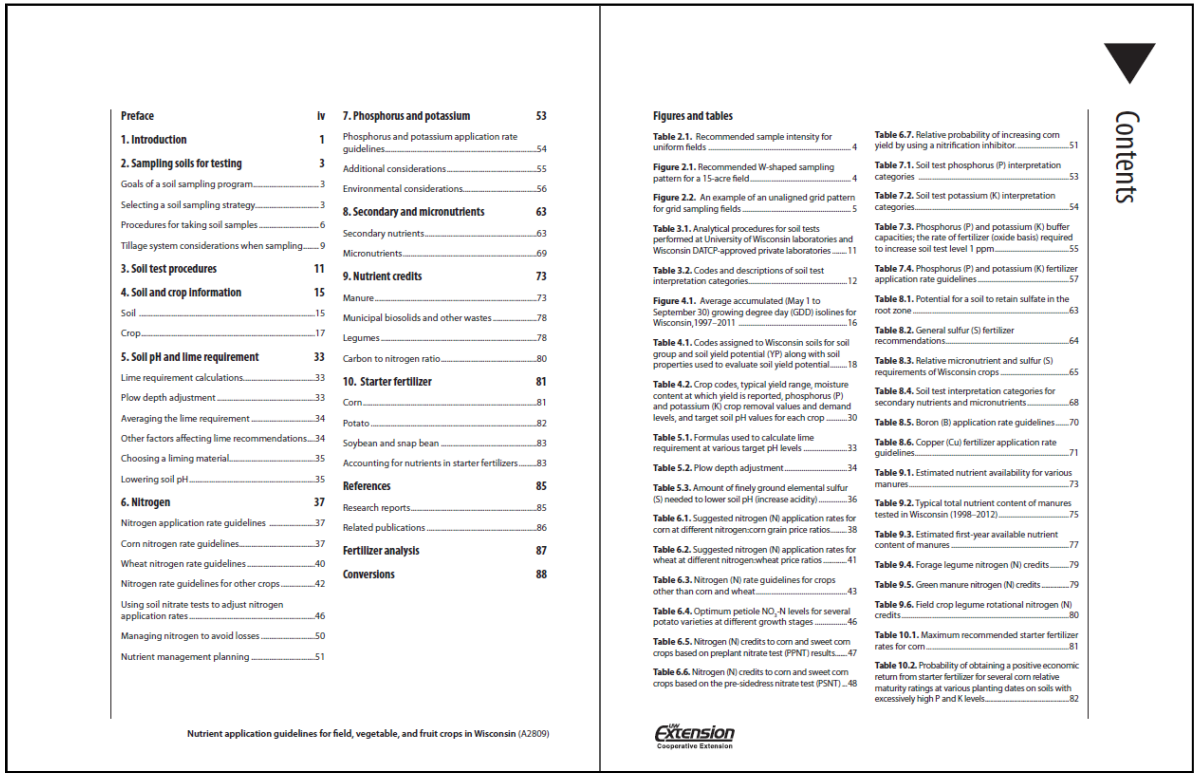
Management Strategies Soil Fertility

	sandy loam			silty clay		
	2009	**2010**	**Mean**	**2009**	**2010**	**Mean**
Corn stover, ton/ac	2.28	1.57	1.93	2.45	2.13	2.29
P, lb/ton	1.7	1.5	1.6	1.4	2.6	2.0
P, lb P_2O_5/ac	9.0	5.5	7.3	7.8	12.5	10.2
K, lb/ton	14.5	14.6	14.5	12.5	23.0	17.8
K, lb K_2O/ac	39.9	27.6	33.8	36.8	59.0	47.9
Ca, lb/ton	3.2	3.2	3.2	2.90	4.4	3.6
Ca, lb/ac	7.3	5.0	6.2	7.1	9.3	8.2

Management Strategies Soil Fertility

- Soil test on a regular basis and follow nutrient management recommendations (A2809)





Contents

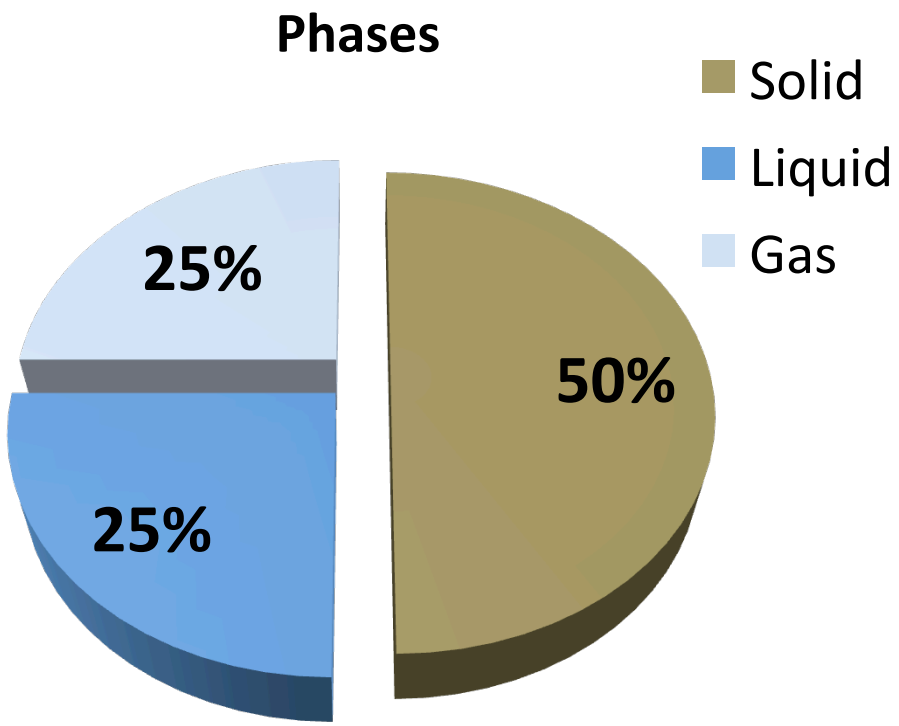
Nutrient application guidelines for field, vegetable, and fruit crops in Wisconsin (A2809)

Figures and tables

UW Extension Cooperative Extension

Management Strategies Soil Moisture

Soil as Three-Phase System



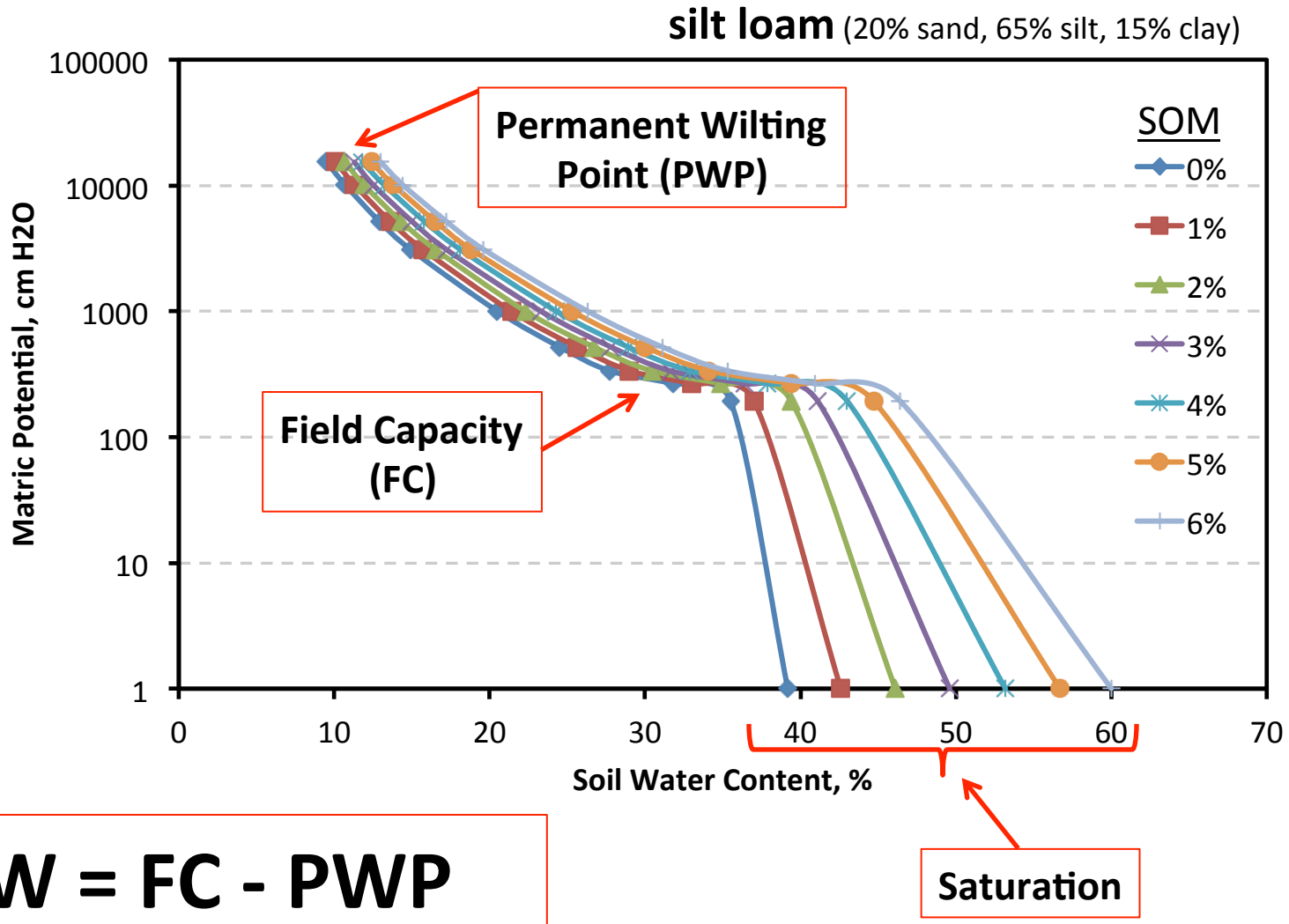
PHASES

Solid:
- ✓ Mineral
- ✓ Organic

Liquid:
- ✓ Water & solutes

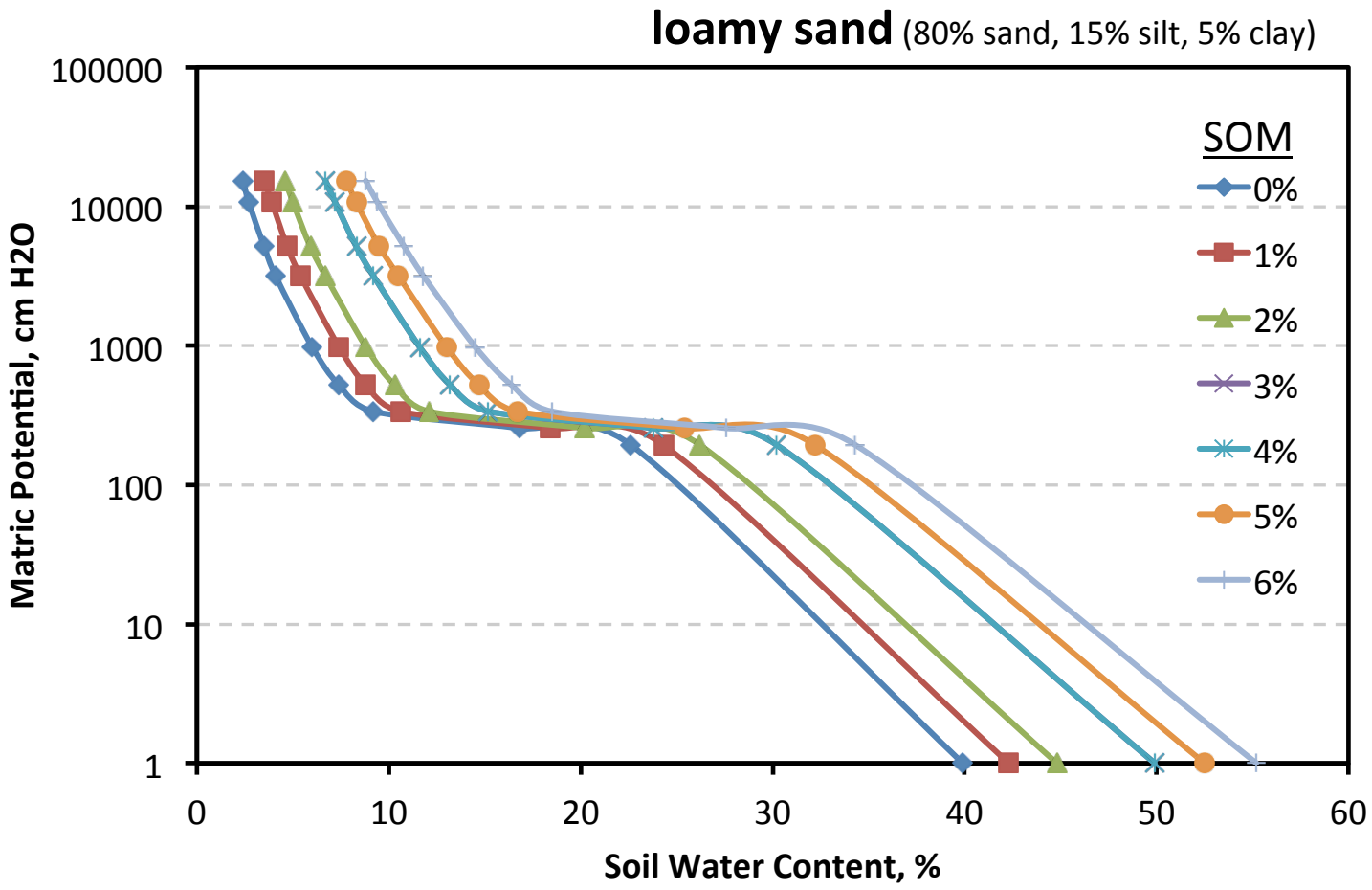
Gas:
- ✓ N_2, O_2, CO_2 & others

Management Strategies Soil Moisture



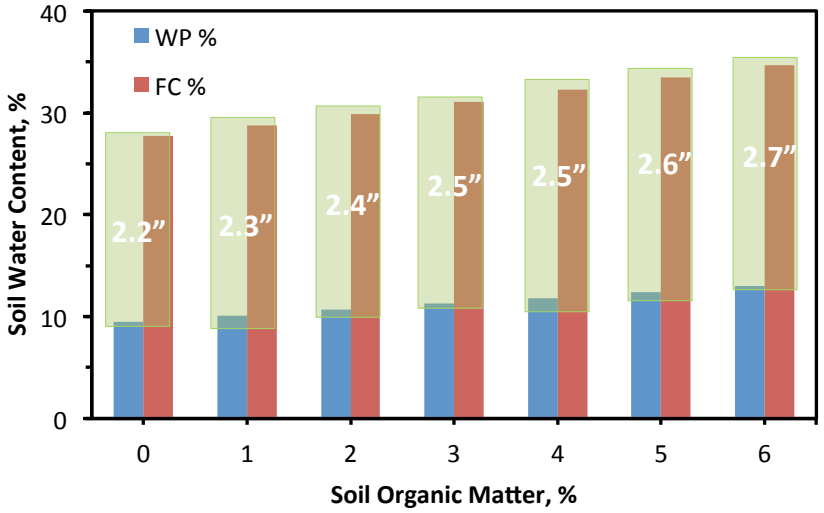
PAW = FC - PWP

Management Strategies Soil Moisture



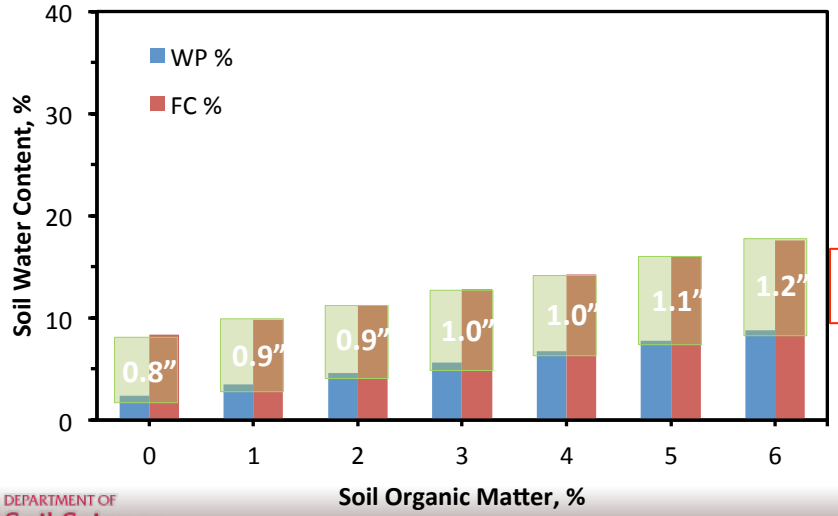
Management Strategies Soil Moisture

Plant Available Water (PAW = FC – PWP)



silt loam

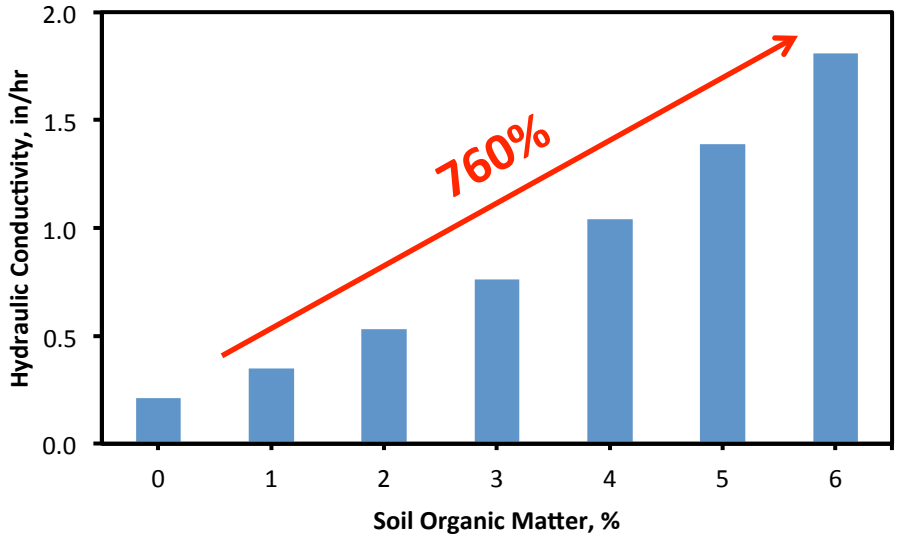
Difference in Plant Available Water = 0.5 inches/ft



loamy sand

Difference in Plant Available Water = 0.3 inches/ft

Management Strategies Soil Moisture



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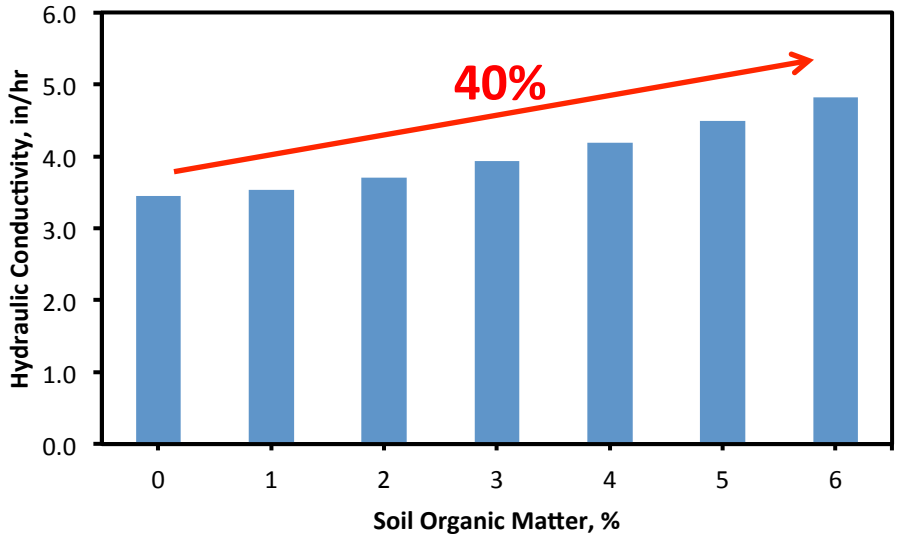

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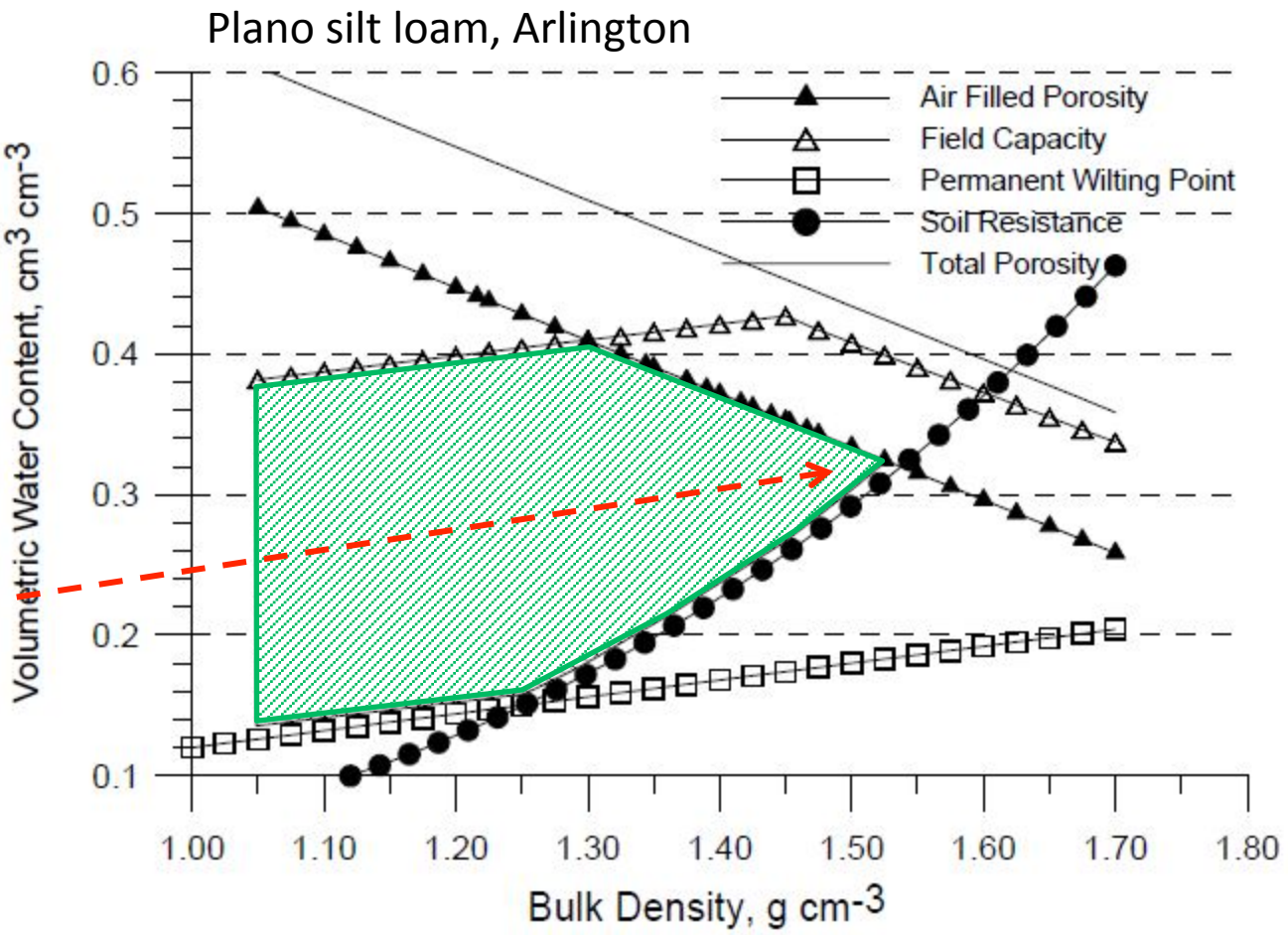
Management Strategies Soil Moisture

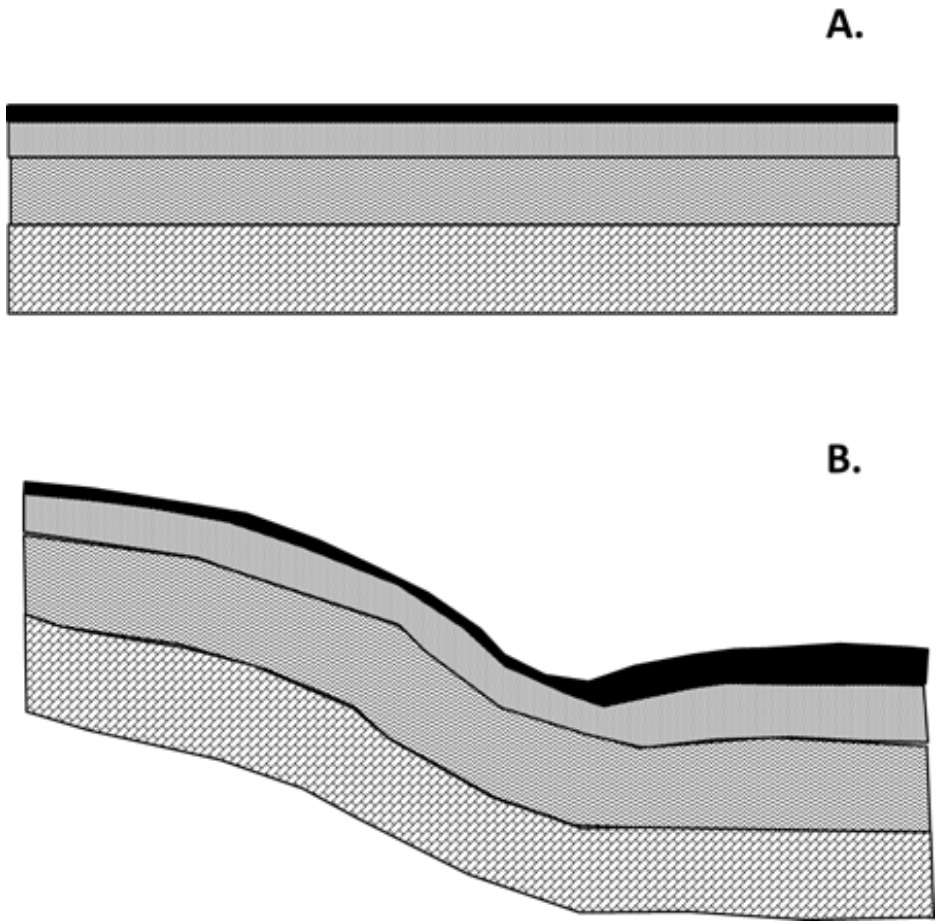
Plant Available Water (PAW = FC – PWP)



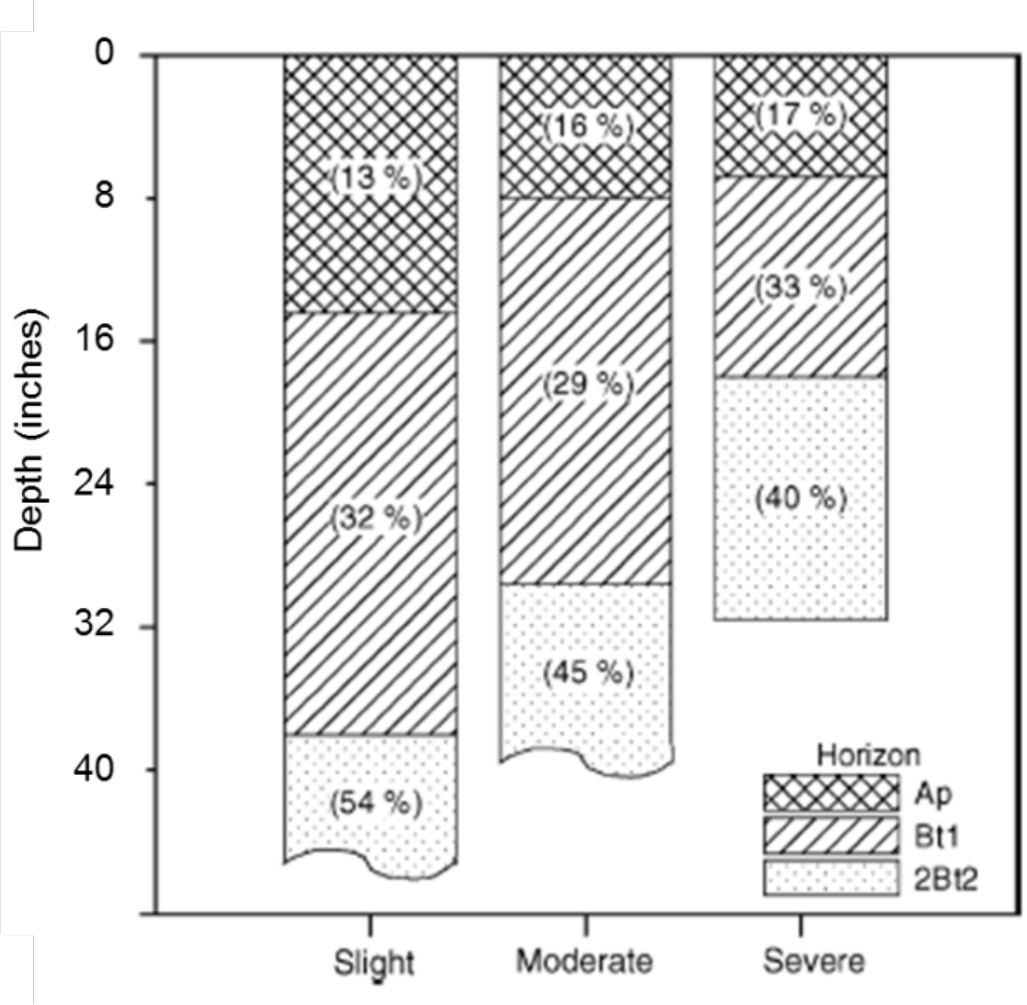
As D_b increases, plant available water is reduced dramatically

(Reinert et al., 2002)

Management Strategies Soil Erosion

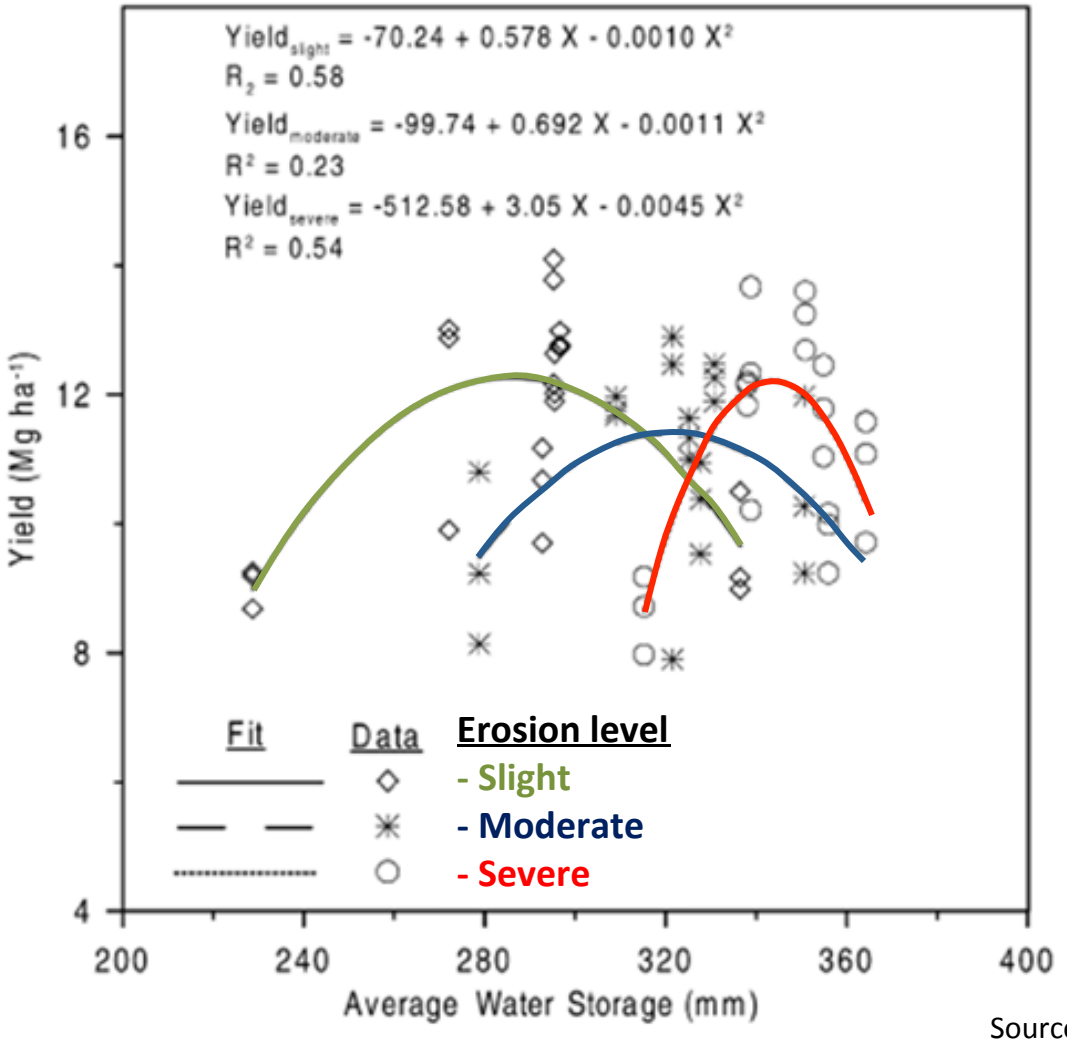


Management Strategies Soil Erosion



Source: Arriaga and Lowery, 2005

Management Strategies Soil Erosion

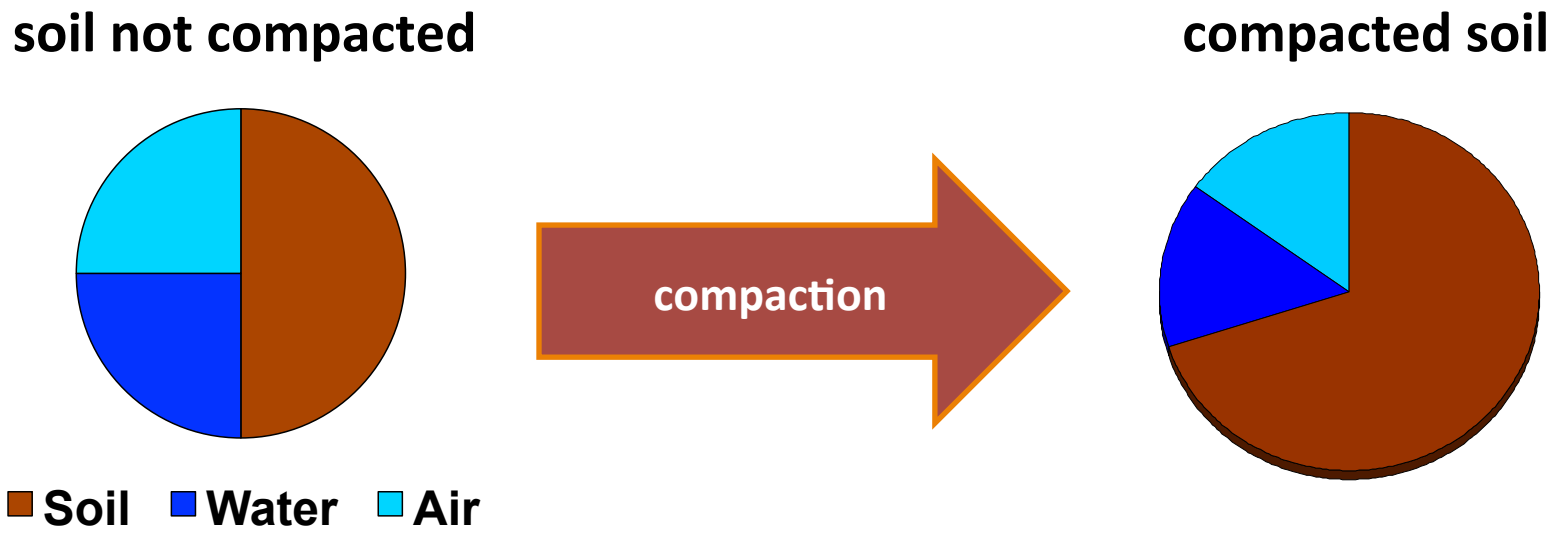


Source: Arriaga and Lowery, 2003a

Management Strategies Soil Erosion

Management Strategies Soil Erosion

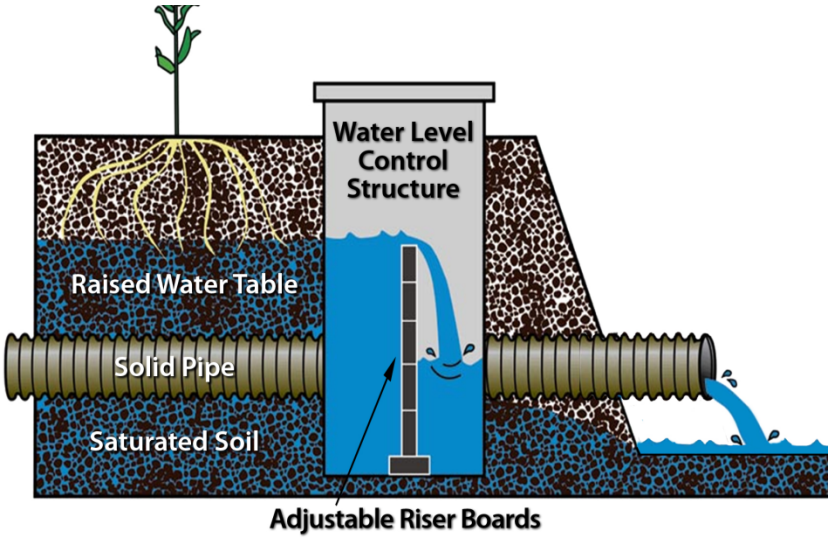
Soil Compaction



Compaction reduces the amount of pore spaces in the soil, which in turns reduces aeration, water retention, and water movement in the soil.

Management Strategies Excess Water/Flooding

source: mchenrycountyblog.com



source: NRCS

Management Strategies Excess Water/Flooding

Final Thoughts

- Uncertainty and risk are inherent factors in any farming operation.

- Management can help reduce some of the risk associated with crop production and soil in an operation;
  - Maintain fertility
  - Improve soil aggregation (improves water relations)
  - Reduce erosion potential
  - Manage frequent excess water

"Take care of the land, and the land will take care of you."

Hugh Hammond Bennett

Thank You!
Any Questions?