

# Farming after the Flood

**JOHN WILSON**

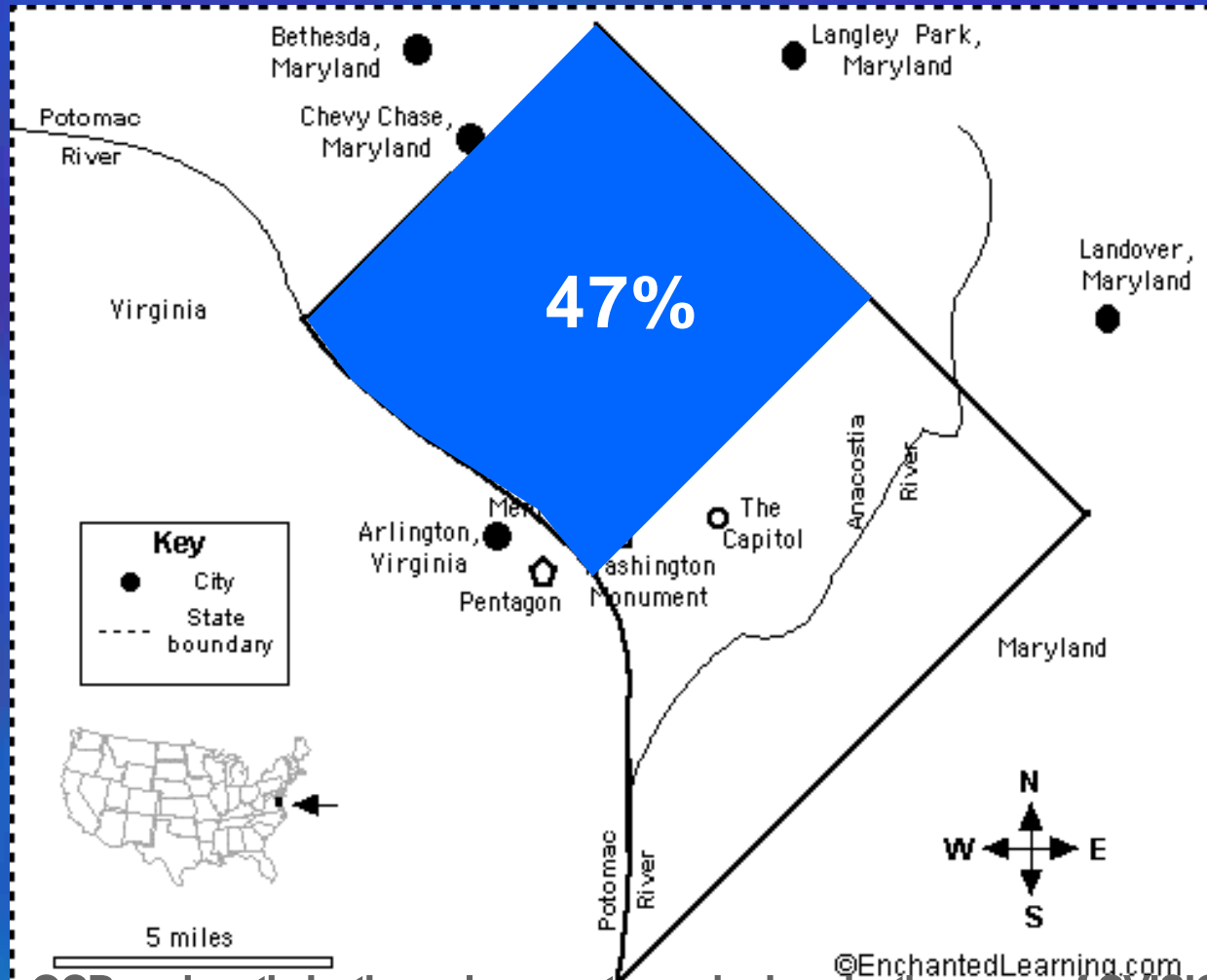
**Extension Educator**

**University of Nebraska-Lincoln Extension**

**Burt County -- Tekamah, Nebraska**



## Economic Impact



# Economic Impact

## STUDY DONE FOR NEBRASKA FARM BUREAU

**CROP LOSSES** after crop insurance & disaster payments

Burt County - \$8.0 million      Nebraska - \$41.1 million

**TOTAL LOSSES \***

Burt County - \$28.7 million      Nebraska - \$188.8 million

*\* - Does not include losses associated with levee damage, reduced soil productivity, disaster cleanup, buildings, roads and other infrastructure and property. Nor do they account for the losses from non-agriculturally related manufacturing and services that were affected by the flooding.*

# Successful Farming After The Flood Management

- I. **Problem: Sediment and Debris**  
**Recovery Goal: Remove barriers to crop production**
- II. **Problem: Erosion**  
**Recovery Goal: Repair physical damage to the soil**
- III. **Problem: Flooded Soil Syndrome**  
**Recovery Goal: Stimulate soil microbial activity**
- IV. **Problem: Other Considerations – Crusting, Soil Sampling, Seeding Method, Wind Erosion**  
**Recovery Goal: Select best management practices for your situation**

# I. Sediment and Debris

- **Flooded fields may contain the following debris**
  - **Building debris**
  - **Fuel tanks**
  - **Household refuse**
  - **Unmarked containers**
  - **Driftwood**
  - **Plant residue**
  - **Sand and sediment**



# I. Sediment and Debris



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# I. Sediment and Debris

■ **Recovery Goal: Remove barriers to crop production including:**

- **Miscellaneous debris**
- **Plant residues**
- **Sand and sediment**





# IA. Miscellaneous Debris

- **Recovery Goal: Remove barriers to crop production**
  - **Remove material according to state regulations (will vary from state to state)**
  - **Inspections/permits may be required**
  - **Burn and/or bury debris when appropriate**



## IB. Plant Debris

- **Recovery Goal: Remove barriers to crop production**
  - **Residue less than 4 inches deep can be buried with tillage**
  - **Increases nitrogen demand**
  - **Spread, remove, or burn deeper deposits**



# IC. Sediment (sand) Management

- **Recovery Goal: Remove barriers to crop production**
  - **Less than 2”:** incorporate with normal tillage operations
  - **2-8”:** incorporate with chisel or moldboard plow
  - **8-24+”:** spread or remove to a depth of 8” or less and incorporate as listed above



# IC. Sediment (sand) Management

- **Recovery Goal: Remove barriers to crop production**
  - **Removal**

# IC. Sediment (sand) Management

- **Recovery Goal: Remove barriers to crop production**
  - **Compaction from traffic will be a concern.**
  - **Use lanes for multiple trips.**
  - **Compaction is usually not caused by flood water and sediment.**
  - **5 feet of water = 2.2 psi.**



## II. Erosion



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## II. Erosion



## II. Erosion

- **Recovery Goal: Repair physical damage to the soil**
  - **Tillage - soil can be smoothed and farmed following a normal tillage operation**



## II. Erosion

- **Recovery Goal: Repair physical damage to the soil**
  - **Earth Moving - erosion too deep to correct with tillage, but can be filled, then farmed**



## II. Erosion

- **Recovery Goal: Repair physical damage to the soil**
  - **Abandonment - erosion too deep to correct economically, even with earth moving**



## III. Flooded Soil Syndrome

### CAUSE:

- It is similar to Fallow Syndrome that was first observed in 1940 in wheat fields caused by decreased survival of Arbuscular Mycorrhizae (AM) fungi population.
- AM lives in association (symbiotically) with plant roots, receiving energy (carbohydrates) from the plant while assisting in nutrient (primarily phosphorus) uptake.

## III. Flooded Soil Syndrome

- **AM are multi-branched fungi living on and in the root which increases the surface area available for nutrient absorption.**
- **The flooding by itself does not reduce AM, rather the absence of living plant roots during the flooded period.**
- **AM cannot survive in soil without plant roots.**



## III. Flooded Soil Syndrome

### RESEARCH FINDINGS:

- **Corn is the most affected crop; soybean and sorghum less.**
- **Banding nitrogen (N) and phosphorus (P) fertilizer at planting helps with early season P uptake**
- **High P rates do not always offset the flooded soil syndrome's effect on yield.**

## III. Flooded Soil Syndrome



### Symptoms:

- Stunted plant growth



## III. Flooded Soil Syndrome



- **Purple discoloration of leaves due to phosphorus (P) deficiency**

## III. Flooded Soil Syndrome

### RESEARCH FINDINGS:

Flooding effect on AM colonization of corn and soybean in Iowa in 1994

Flooding	Crop	AM (%)*
No-Flooding	Corn	25
Flooding	Corn	4
No-Flooding	Soybean	27
Flooding	Soybean	7

\* - % of root length colonized by AM

*(Wetterauer and Killorn, 1996, J. Prod. Agric.)*

## III. Flooded Soil Syndrome

### COVER CROPS:

- Any growing plants - crops, cover crops, and weeds - will increase AM re-colonization due to actively growing plant roots.
- AM recovery will increase during the growing season, returning to non-flooded soils levels.
- AM recovery will increase plant P uptake and help reduce P deficiency.

## III. Flooded Soil Syndrome

### COVER CROPS:

- Cover crops will provide root material to start AM recovery in flooded soils
- Don't plant cover crops on soils requiring a lot of sediment removal
- Many choice of kinds of plants for cover crops



# III. Flooded Soil Syndrome

**COVER  
CROPS:**

[www.mandan.ars.usda.gov](http://www.mandan.ars.usda.gov)



## III. Flooded Soil Syndrome

### COVER CROPS:

- Time of year to plant and establish cover crops
- Choices limited as move later in growing season
- Consider method of planting



## III. Flooded Soil Syndrome

### ■ COVER CROPS

- Flooded soils will have little or no residue cover to protect it from water or wind erosion and crusting.
- Grasses provide the longest lasting residue cover, usually catch more snow, and improve soil stability.
- Broadleaf taproots penetrate and open up tight soils and improve water infiltration.
- Cover crops will use some water, but generally less than the evaporation from bare soil.

## IV. Other Considerations

### ■ CRUSTING

- Surface soil texture change and loss of structure can cause effects resembling compaction
- Restricted root penetration and infiltration
- Tillage should remedy shallow (< 2 inch) layer





## IV. Other Considerations

### SOIL TESTING:

- Soil testing should be done after land leveling
- Soil samples should not be collected right after soils dry
- Allow time for chemical (P) reactions after soils aerate



## IV. Other Considerations

### METHOD OF SEEDING:

- Aerial application on soil surface
- Broadcast with light incorporation
- Drill



## IV. Other Considerations

### WIND EROSION:

- Challenge to get cover crops or regular crop established in fields



# Conclusions

- **Take things in order**
  - **Remove Debris**
  - **Remove Excess Sediment**
  - **Repair Erosion**
  - **Establish Cover Crops**
  - **Select Crop to Plant in 2012 (considering fertility, inoculants, seed treatments, etc.)**
  - **Pray that this never happens again!**

# Acknowledgements



**THANK YOU!**

