Can management impact aflatoxin production in corn?

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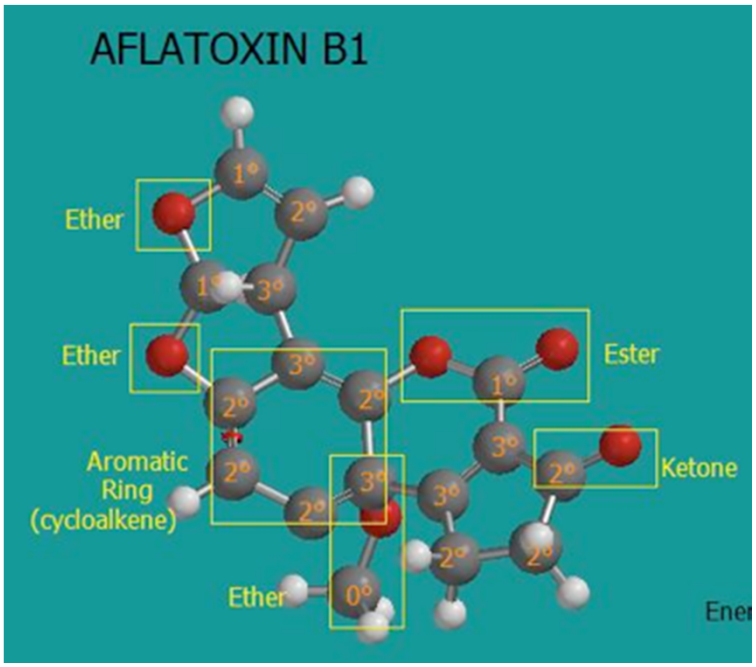
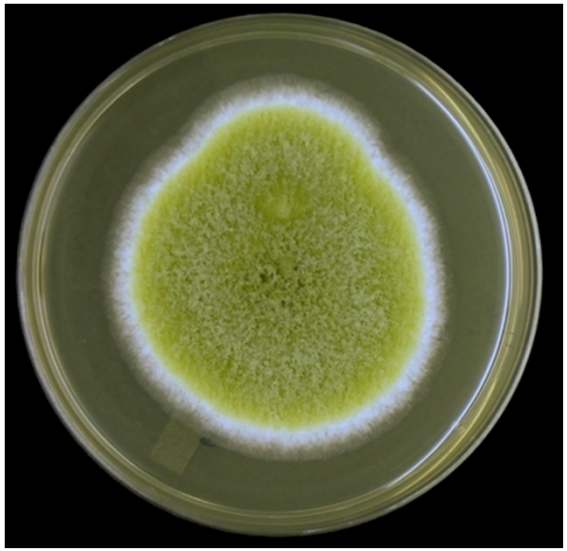
What is aflatoxin?

- Secondary metabolite produced *Aspergillus flavus*
- Associated with various diseases in livestock, domestic animals and humans



What is *Aspergillus flavus*?



- Fungus
- Causes **Aspergillus ear rot**
- Olive-green powdery ear rot
- Most prevalent in drought conditions

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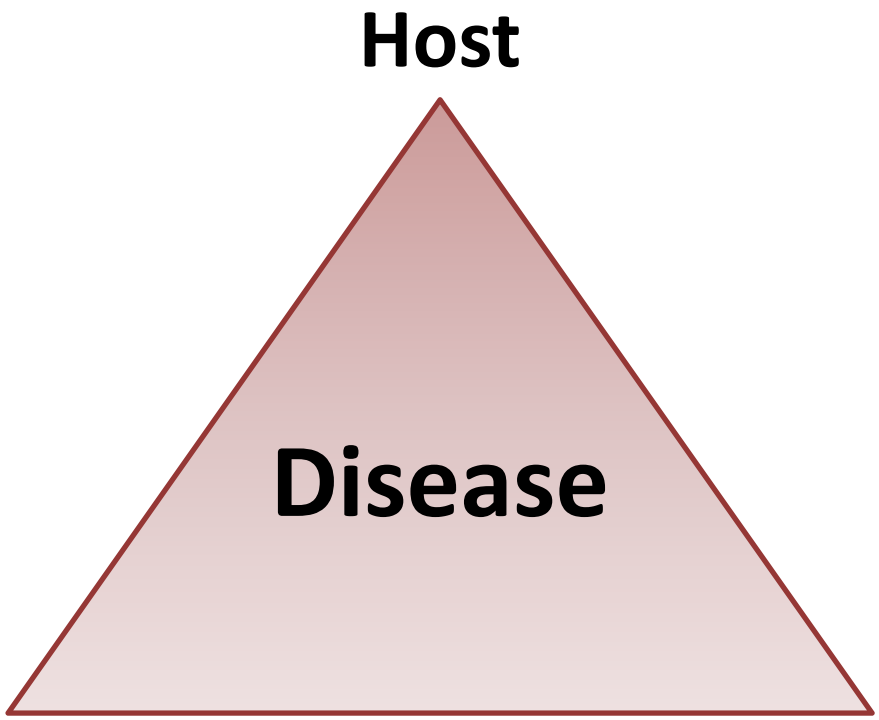
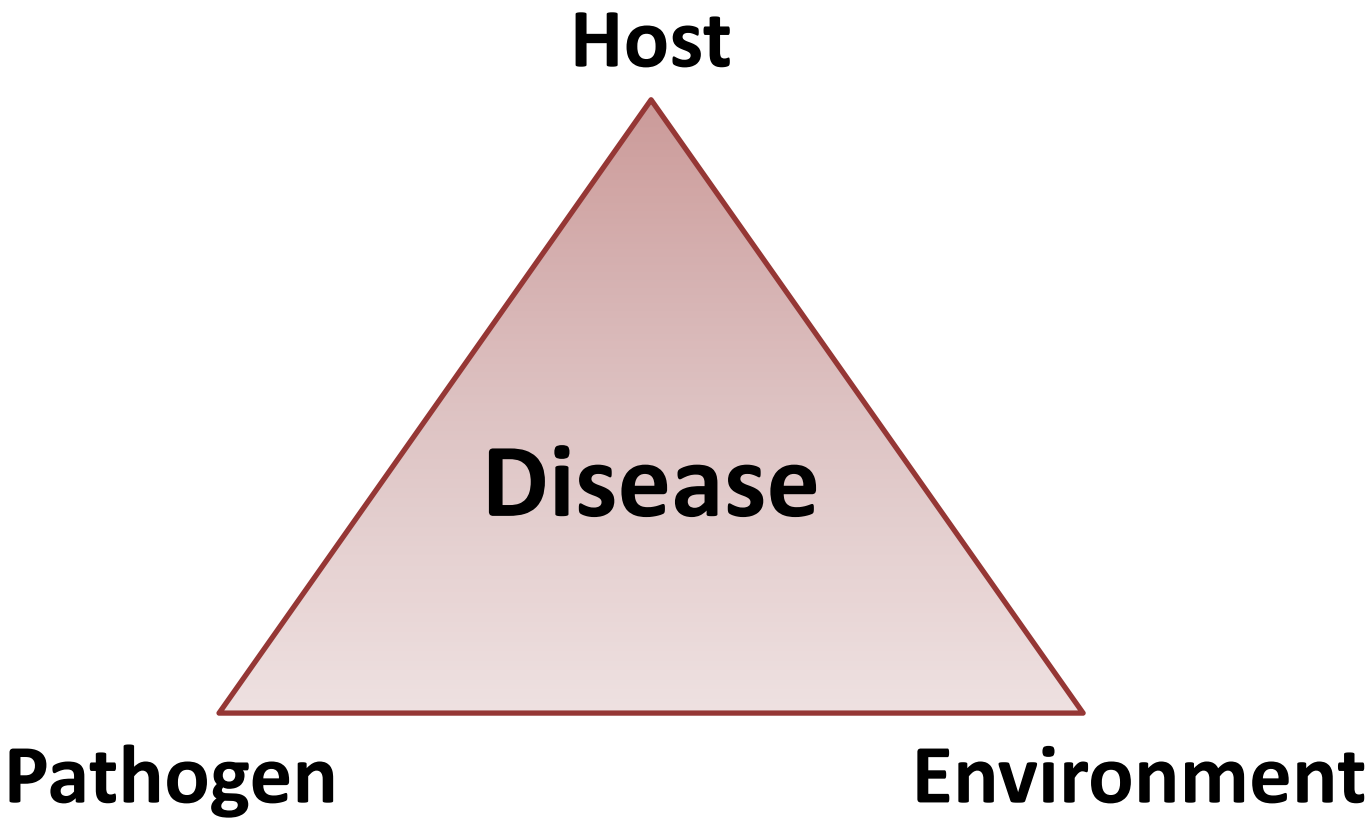
What factors play a role disease development?



Disease occurs ONLY when all 3 factors interact

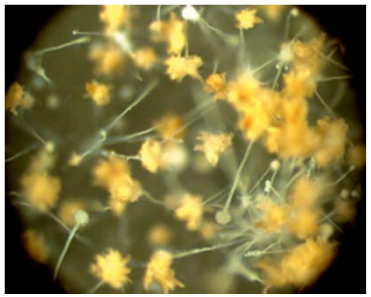
Therefore to manage disease ….



…… stop the interaction

Aspergillus ear rot disease triangle

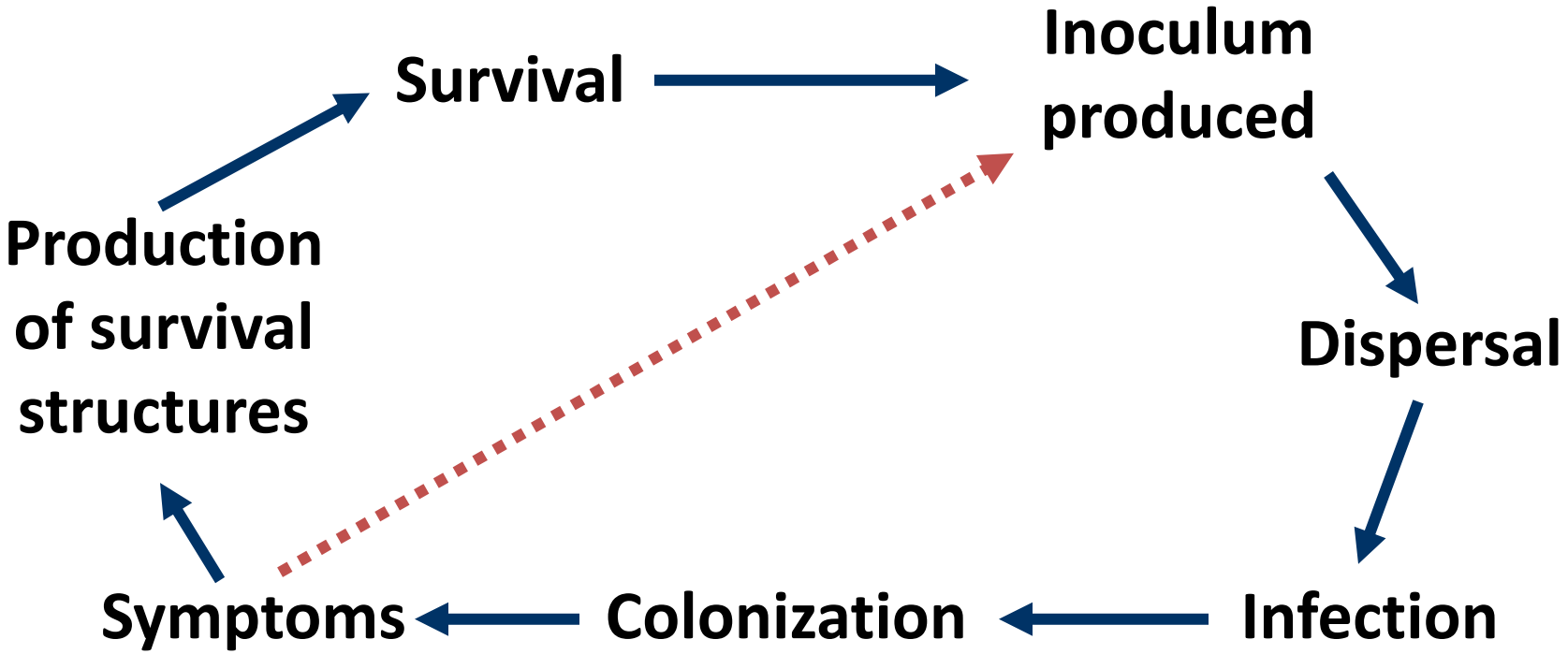
Corn



A. flavus

Hot, dry; plant stress; physical damage to kernels

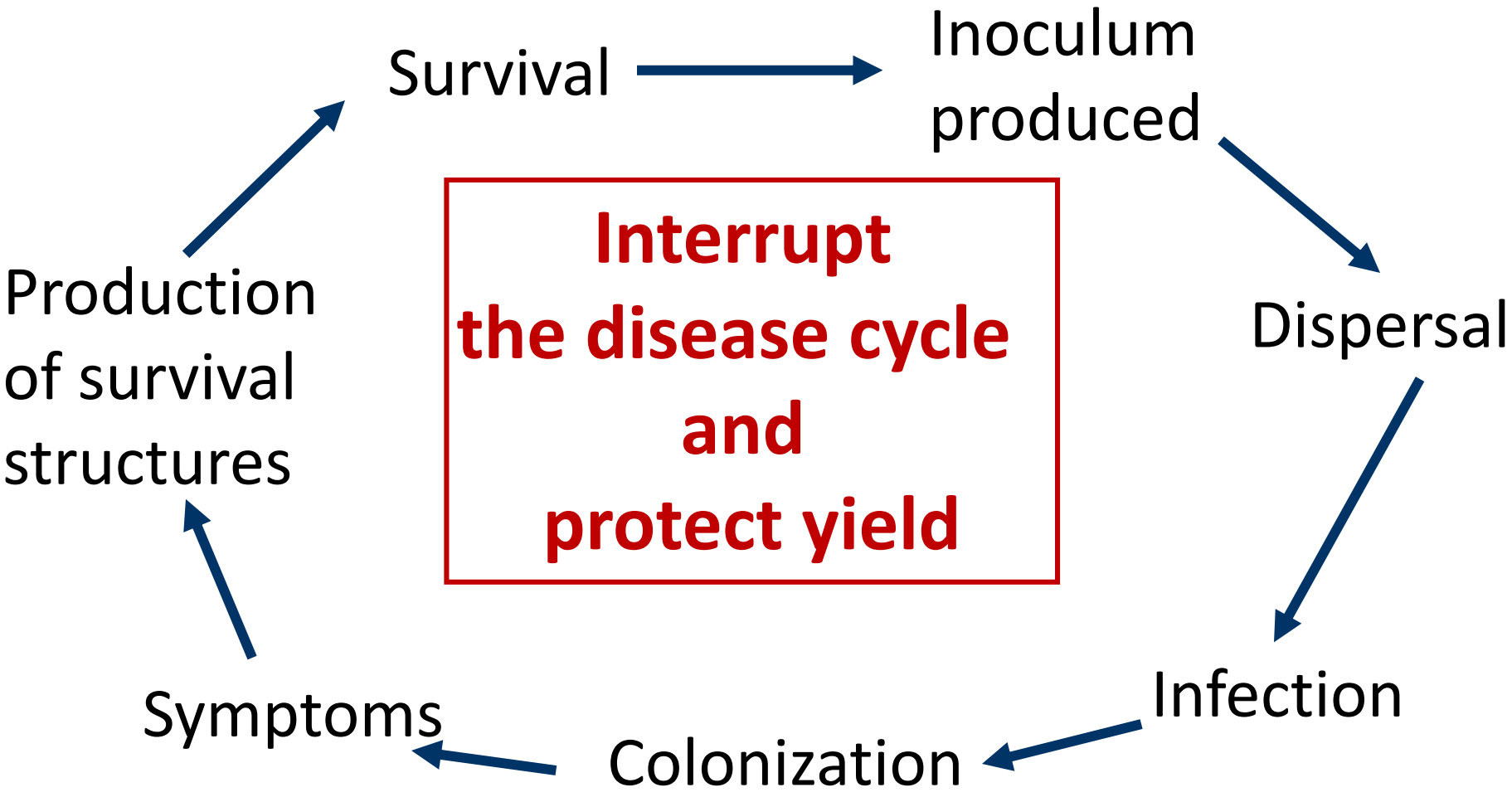
Disease Cycle



Adapted from P. Vincelli, 2005

May have 1 to several disease cycles per season

Why should we know the disease cycle?



Aspergillus ear rot disease cycle

Survives in soil & crop residue

Spores produced June through Sept.

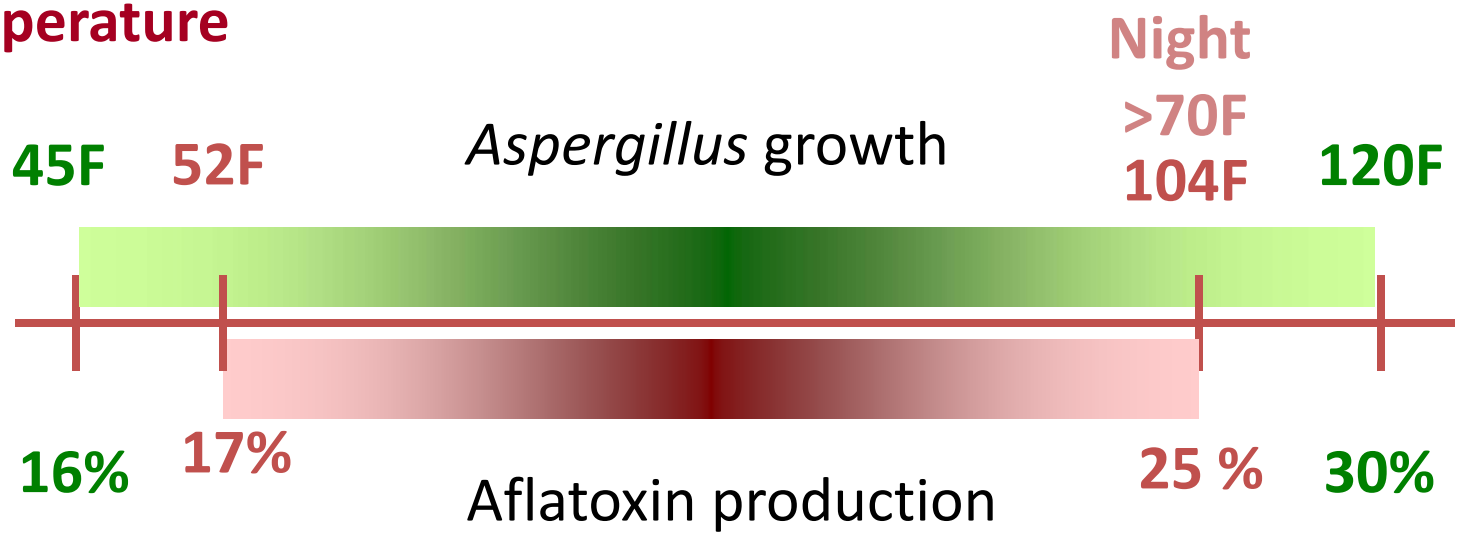
Yellow-brown silks most susceptible to infection; High temp >86F

Colonizes surface; when MC<32% =

Signs of ear rot

Favorable conditions for *A. flavus* growth and aflatoxin production

Temperature



Moisture

A. flavus can grow at higher/lower temp & moist and not produce aflatoxin

Aflatoxin in IA in 2012

Temperatures during silking

July 1 – August 5, 2012

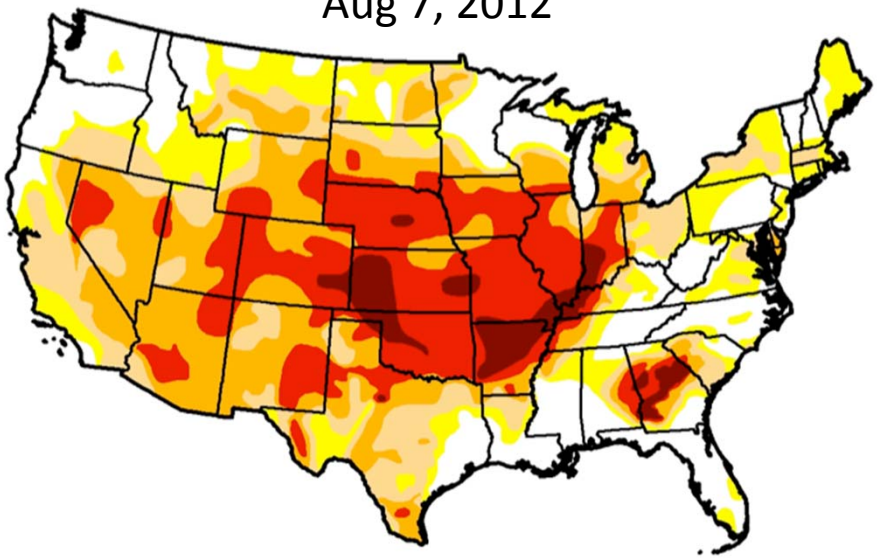
Location	High temperature		Low temperature	
	Mean	Range	Mean	Range
Ames	90.3	76.9-100.8	67.2	59.5-74.1
Crawfordsville	92.0	80.8-101.7	66.8	56.8-75.7
Kanawha	88.1	76.2-99.4	64.3	53.2-73.0
Lewis	95.4	84.7- 104.8	68.9	55.9 – 76.0
Nashua	88.9	75.4-98.4	65.3	55.5-73.0
Sutherland	88.0	77.8-96.8	64.1	54.0-71.3

ISU Mesonet

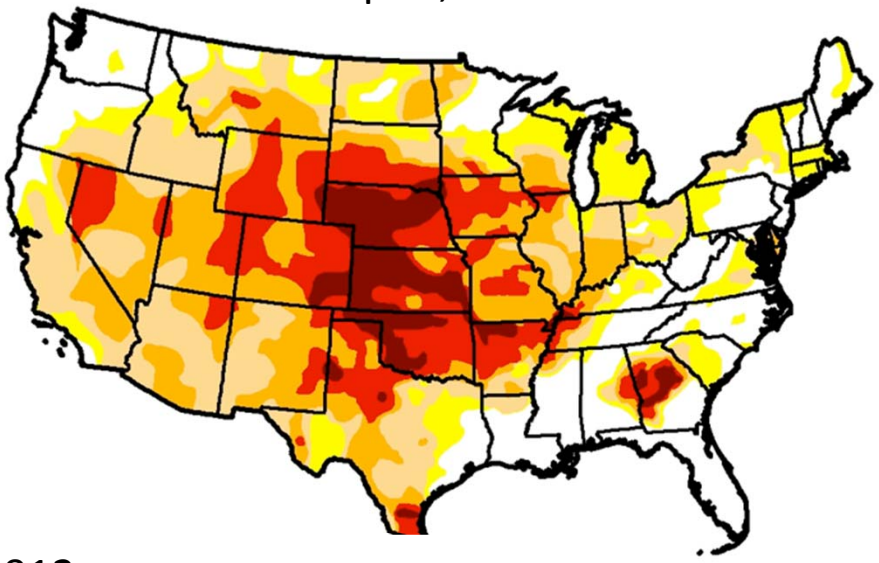
Thus conditions favorable for infection

Drought persisted through grain fill

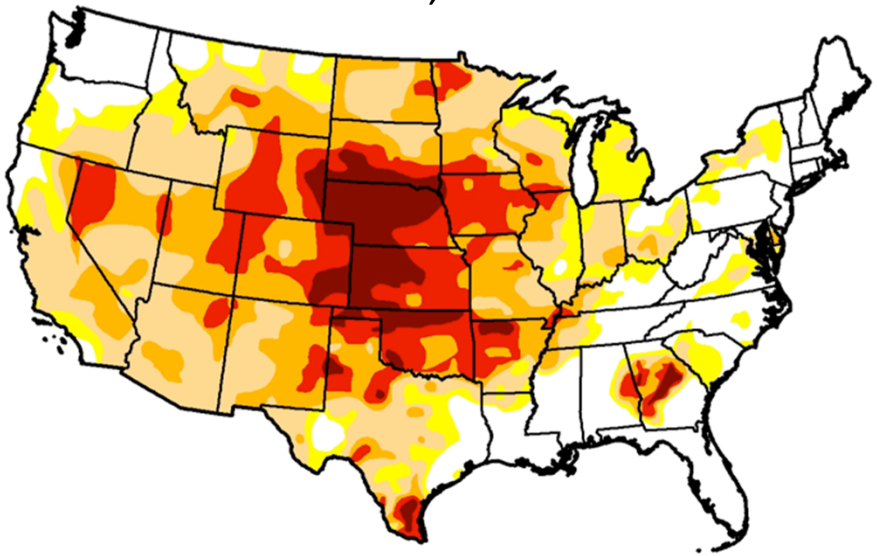
Aug 7, 2012



Sept 4, 2012



Oct 2, 2012



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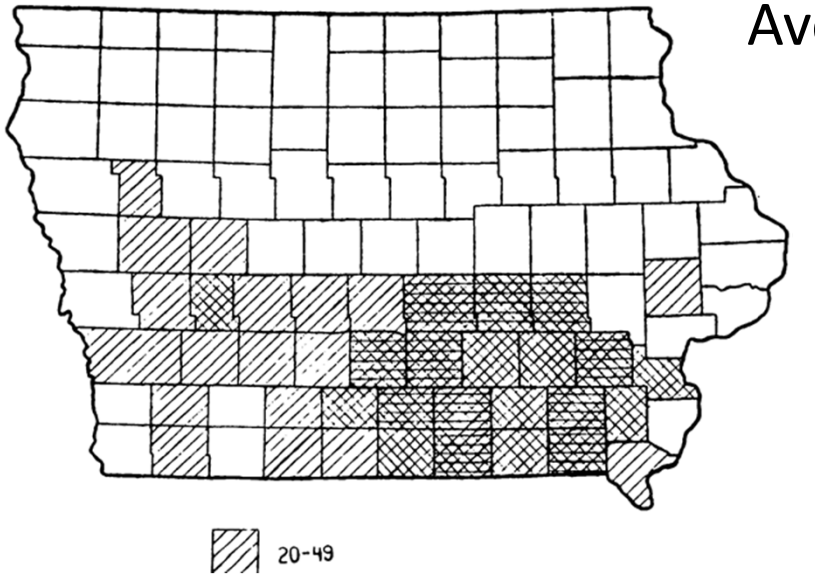
http://Droughtmonitor.unl.edu/

Aflatoxin Years in IA

- 1983

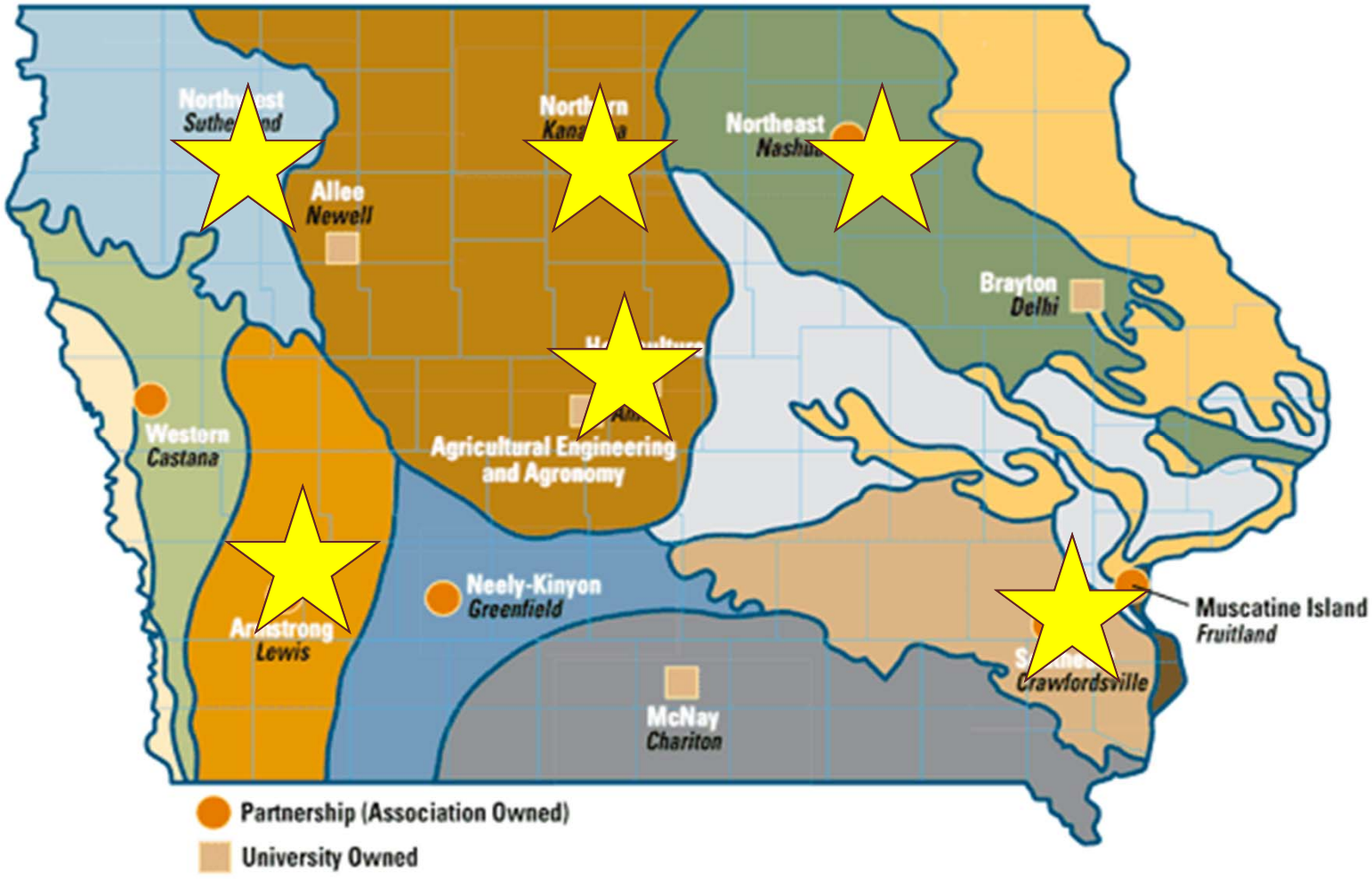


Average all Iowa samples
21 ppb

- 1988 About the same as 1983;
  - 21 ppb statewide average; 62 ppb average of counties showing positive

Courtesy C. Hurburgh, ISU

Foliar fungicide trials on corn, Iowa 2012

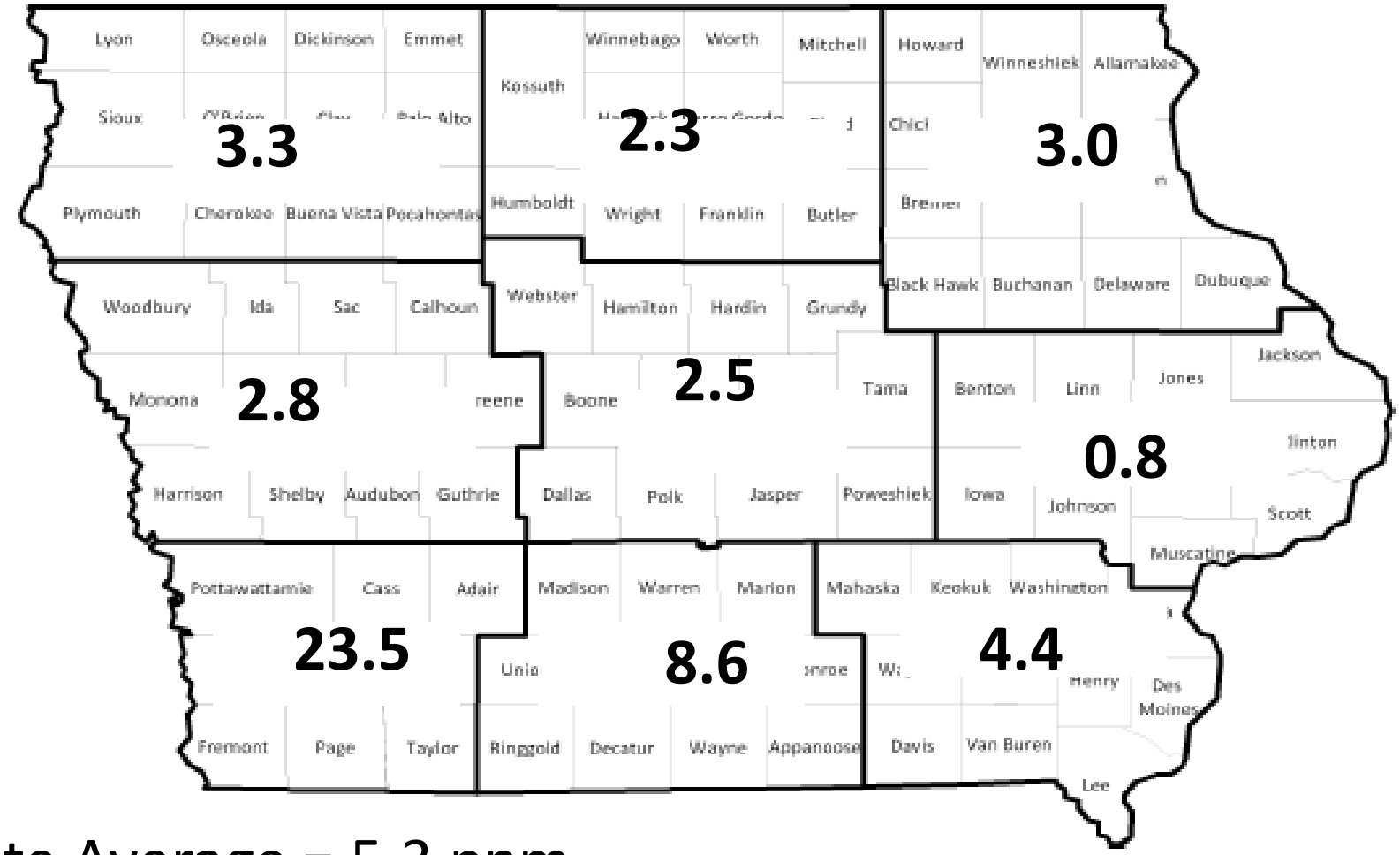


Ear rot and no. of “glowers” in fungicide trials, Iowa 2012

Location	Mean (max.) ear rot severity (%)	Mean (max.) no. “glowers” /lb
NW	0.1 (0.8)	0
NC	0.5 (11.0)	0
NE	<0.1 (3.0)	0
C	<0.1 (2.0)	0.1 (3.1)
SW 1	0.2 (1.2)	1.1 (4.7)
SW 2	0.4 (2.0)	2.3 (6.1)
SE	0.1 (2.0)	0

1 “glowers” per lb (whole grain) = greater risk of >20 ppb aflatoxin

2012 Aflatoxin Survey – IDALS
Mean aflatoxin (ppb)



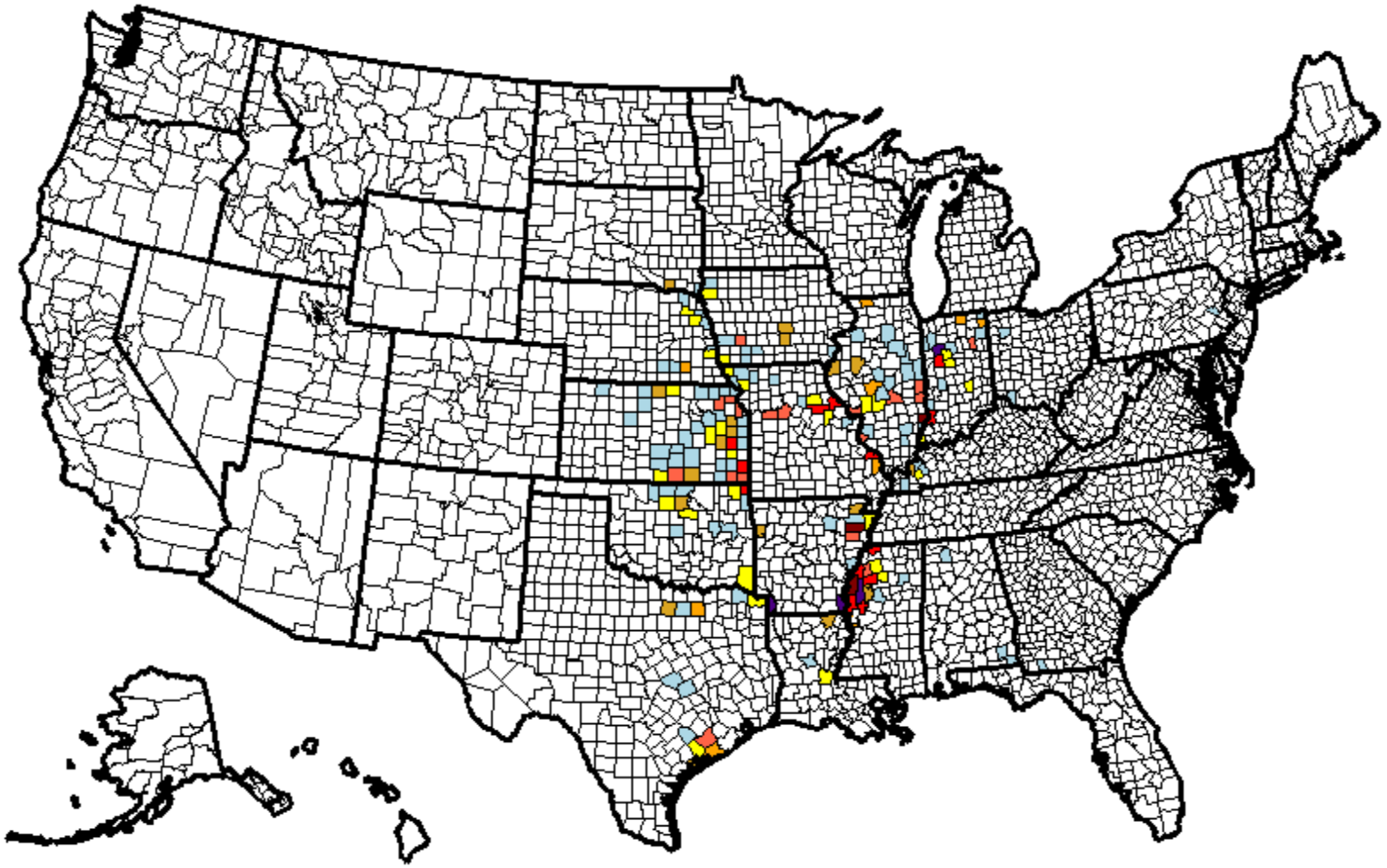
State Average = 5.3 ppm

IDALS Aflatoxin Survey - Iowa

	2011	2012
Average	3.2 ppb	5.3 ppb
High	14.7 ppb	180 ppb
% over 20ppb	0.0	6.1%
Samples	98	396
Counties	50	99
DDGS	10.6 ppb	

Courtesy C. Hurburgh, ISU

Mycotoxin Indemnities
Corn



Source: RMA, 01/02/2013

Courtesy C. Hurburgh, ISU

Can management impact aflatoxin production in corn?

Let's start by managing the ear rot!

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Aspergillus ear rot management

Hybrid selection

No *A. flavus*-resistant commercial hybrids

- Traited hybrids = reduced risk
  - Less insect damage to kernels
- Drought tolerant = reduced risk
  - Less plant stress

Aflatoxin Management – in season

Atoxigenic strain of *A. flavus*
Outcompetes endemic strains of *A. flavus* that produce aflatoxin

- Field trials in TX and OK
  → usually lower levels of aflatoxin
  (see Plant Disease Management Reports, Plant Management Network)
- Needs to be applied prior to/at VT
- Little testing in Midwest

Aflatoxin Management – in season

Reduce plant stress

Optimum planting population

Appropriate fertility

Determining if a field is at risk for aflatoxin

1. Scout for ear rot at black layer
   – look for characteristic signs

2. If >10% ears have ear rot, schedule early harvest
3. Notify an insurance adjuster

Aflatoxin Management – at harvest

Harvest

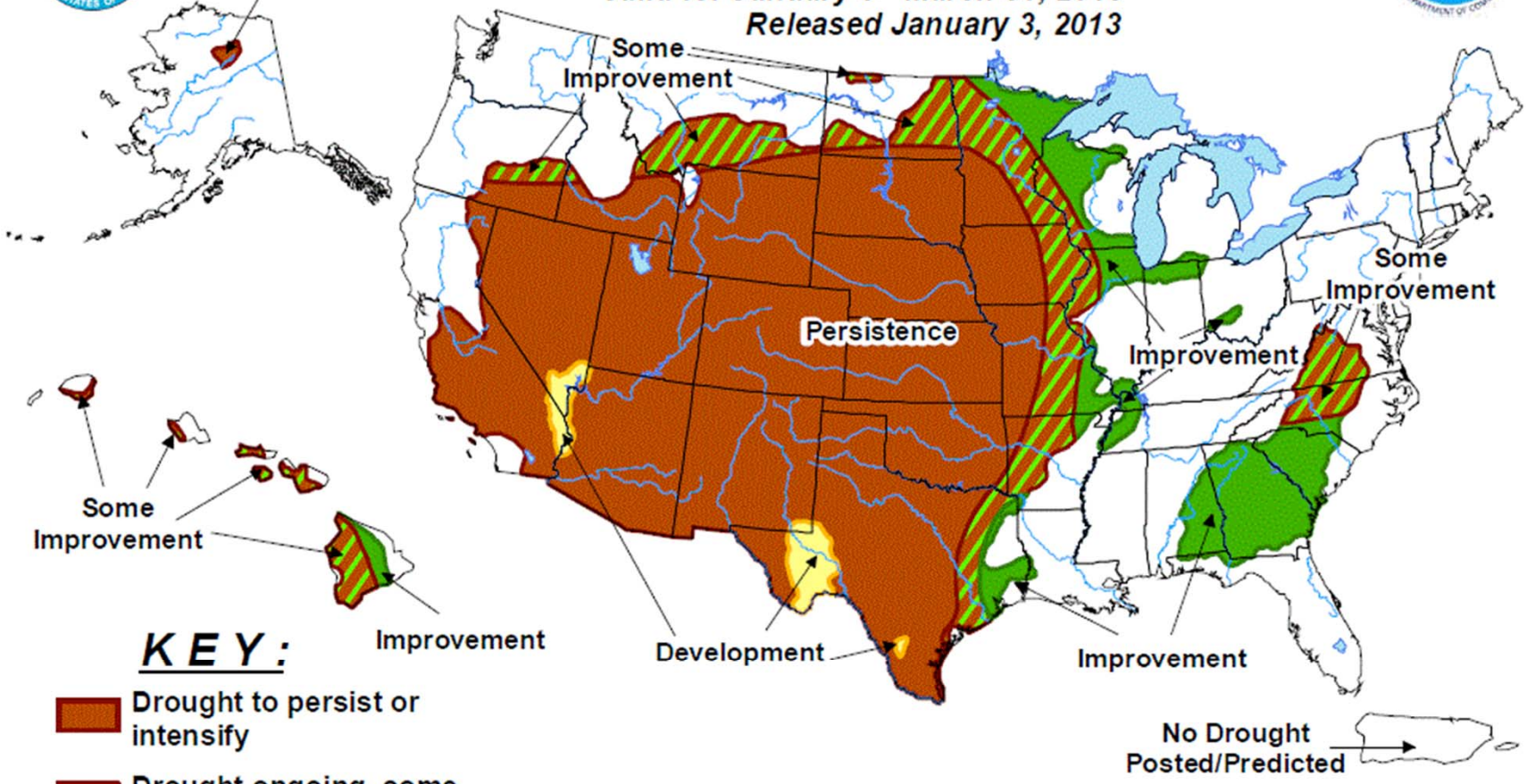
- Adjust combine settings to minimalize damage to grain
- Ensure storage bins are clean, and cool (<40F)
- Dry grain to 14 percent moisture **immediately**

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for January 3 - March 31, 2013

Released January 3, 2013



KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

Thanks for your attention

What other questions do you have?