

**“Understanding aflatoxin accumulation in maize and evaluating strategies to reduce human exposure in East Africa” – Funding from the Cornell Center for a Sustainable Future**

Cornell	Univ. of
- Chuck Nicholson	Maryland
- Beth Medvecky	- Vivian
- Steve DeGloria	Hoffmann
- Michael Milgroom	
- Rebecca Nelson	
- Samuel Mutiga	

**Genetics of resistance to *Aspergillus flavus* and aflatoxin accumulation; breeding for resistance**

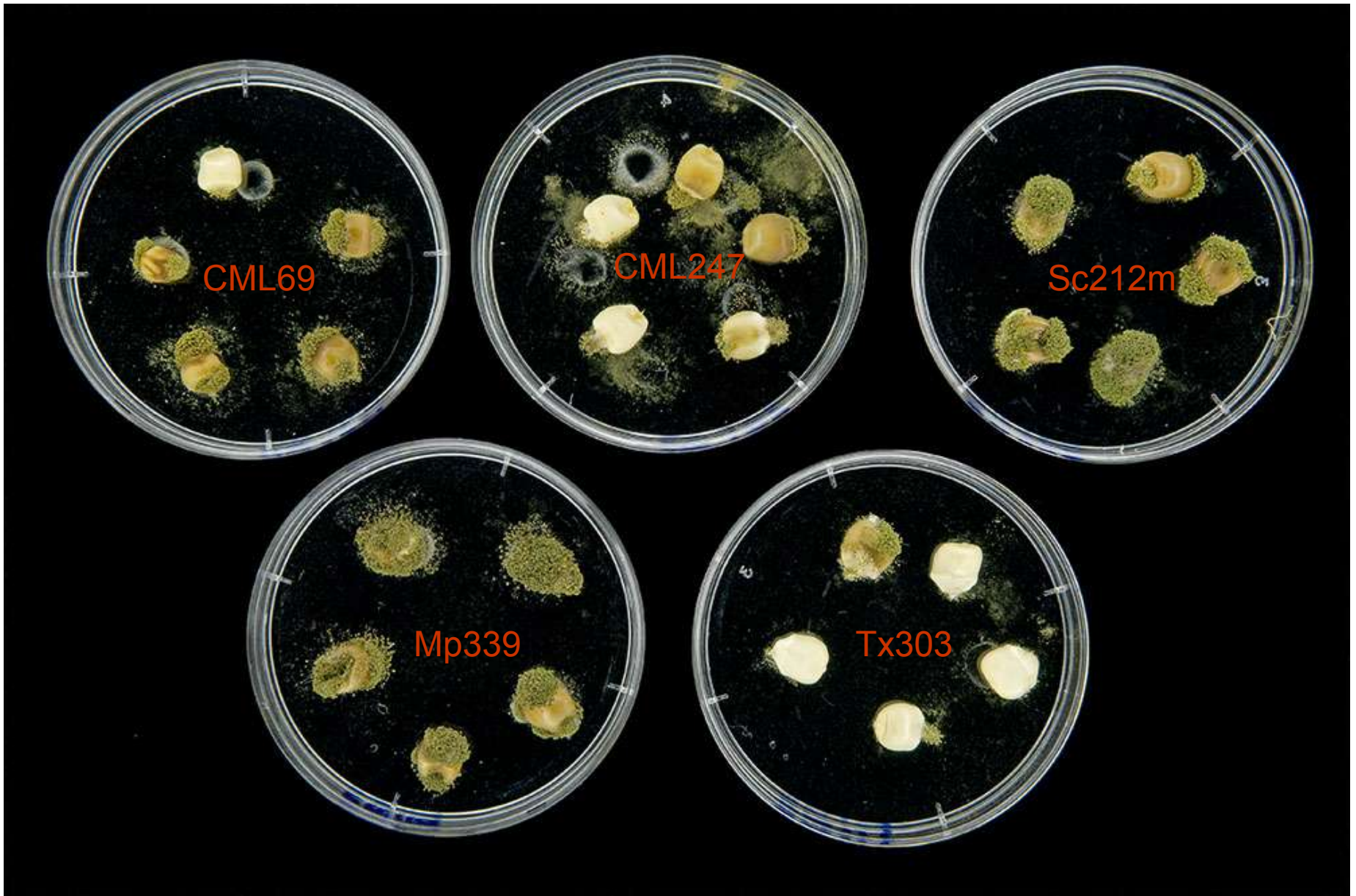
**The McKnight Foundation Collaborative Crop Research Program**

Groundnut breeding, southern Africa  
 Maize breeding, Kenya  
 Aflatoxin survey, Malawi

KARI	Mississippi State / USDA-ARS
- James Gethi	- Paul Williams
BecA	- Gary Windham
- Segenet Kelemu	- Marilyn Warburton
Univ. of Nairobi	NCSU
- Sheila Okoth	Texas A&M
CIMMYT	Nelson lab
- Geo. Mahuku	- Santiago Mideros
- Dan Makumbi	- Samuel Mutiga
- Marianne Banziger	

# Maize lines inoculated with *Aspergillus flavus* in Mississippi, 2008

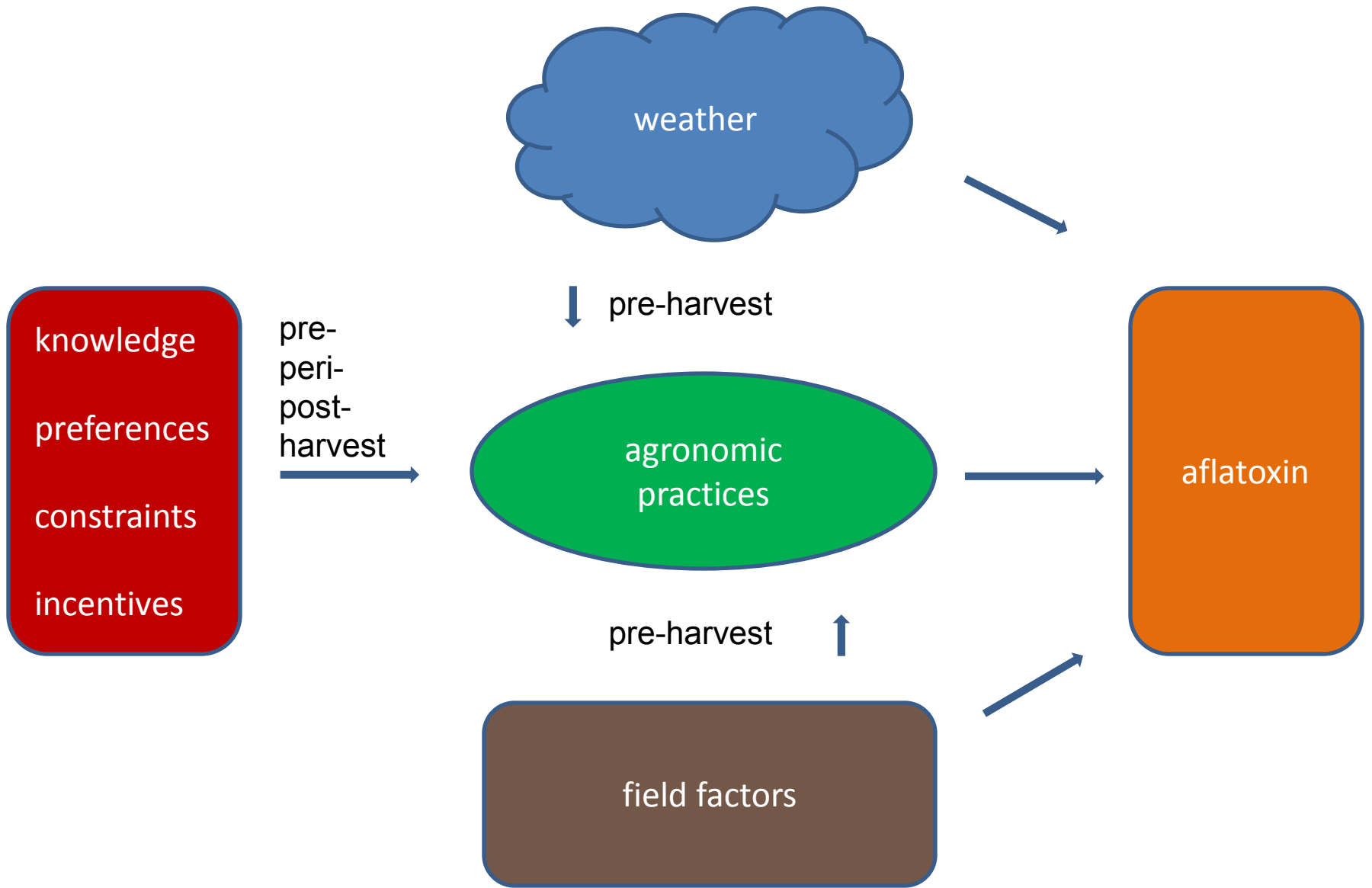
Level	aflatoxin ng/g	Least Sq Mean	
CML103	22735	10.03	a
B73	13917	9.54	ab
Mo17	11982	9.39	ab
B97	10118	9.22	abc
IBM262	6283	8.75	abcd
MS71	3689	8.21	abcde
Oh7B	3483	8.16	abcde
IBM54	2790	7.93	bcde
Oh43	2542	7.84	bcde
Ki3	1739	7.46	bcde
Tx303	1333	7.20	cdef
Ky21	1056	6.96	defg
Mp339	886	6.79	defg
NC358	854	6.75	defg
M37W	622	6.43	efgh
CML247	172	5.15	fgh
Mp313E	126	4.84	gh
CML52	94	4.55	h



S. Mideros and R. Nelson, Cornell

**Table 2.** Markers associated with resistance to *A. flavus* colonization in the B73xCML322 population (Significance threshold by permutaions  $\alpha: 0.05= *$  and  $\alpha: 0.01= **$ )

Trait	Year	Marker	Position	P	source
DvK Sporulation	2007	m798	7.02	2.1E-04	B73
DvK Sporulation	2007	<b>m758</b>	6.07	1.8E-03	B73
DvK Sporulation	2008	<b>m758</b>	6.07	3.7E-05 *	B73
DvK Sporulation	2008	m838	7.06	7.8E-05 *	B73
DvK Sporulation	2008	m209	2.03	1.0E-04 *	CML322
Aflatoxin (field)	2008	<b>m500</b>	<b>4.08</b>	<b>4.4E-06 **</b>	CML322
Aflatoxin (field)	2008	m746	6.06	7.0E-05 *	CML322
Aflatoxin (field)	2008	m35	1.03	2.2E-04 *	CML322



# Key Questions:

## Field factors → aflatoxin

- For given weather conditions, how much does aflatoxin accumulation vary across plots?
- What environmental factors (e.g. soil quality, pests, weather) are the most important correlates of aflatoxin accumulation?
- What stages of crop cycle are most critical?

# Key Questions:

## Farm Practices → aflatoxin

- What is the relative importance of exogenous conditions vs. farm management practices?
- Which practices are most influential?
- To what degree are yield-increasing practices also aflatoxin-reducing?

# Key Questions:

Economic factors → farm practices

- Are farmers willing to pay more for low aflatoxin maize? aflatoxin resistant seed?
- How is more contaminated vs. less contaminated grain used?
- How does knowledge affect farm practices and marketing behavior?

# Approach

- Intensive data collection on ~200 small-holder farms
- Integrate agronomic and economic data:
  - on-farm observation
  - analysis of maize samples
  - farmer surveys
  - economic experiments

Thank you