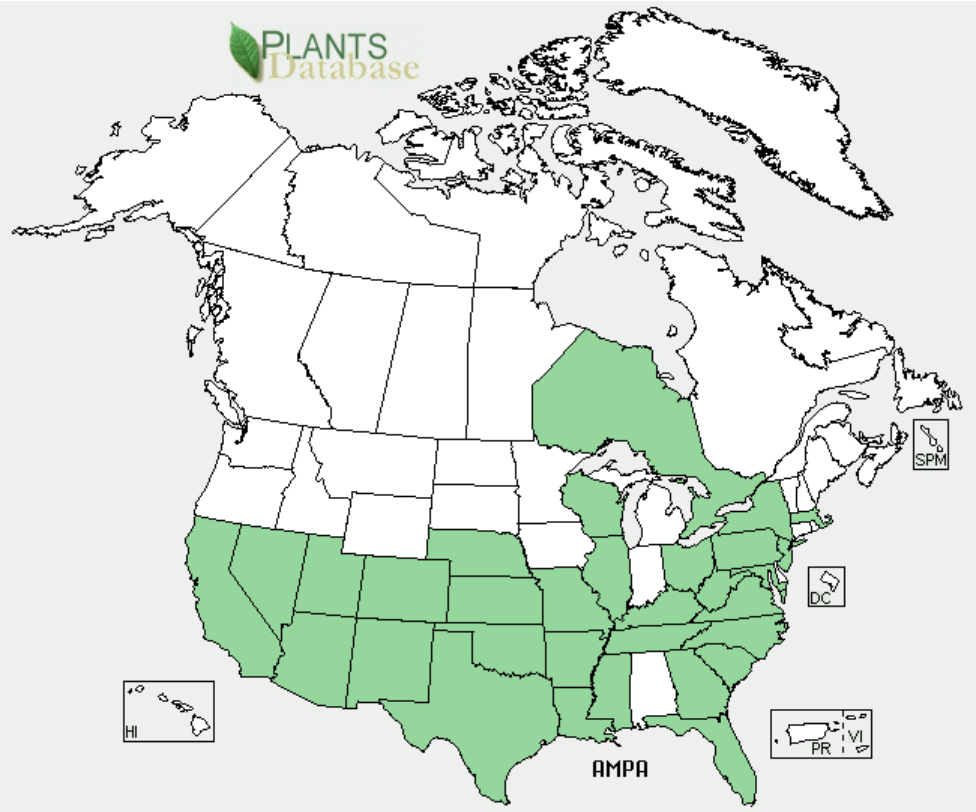
Palmer amaranth:

A looming threat to soybean production in Illinois?



Dr. Adam Davis[1]
Dr. Aaron Hager[2]
Dr. Bryan Young[3]

1 USDA ARS, Illinois Soybean Association

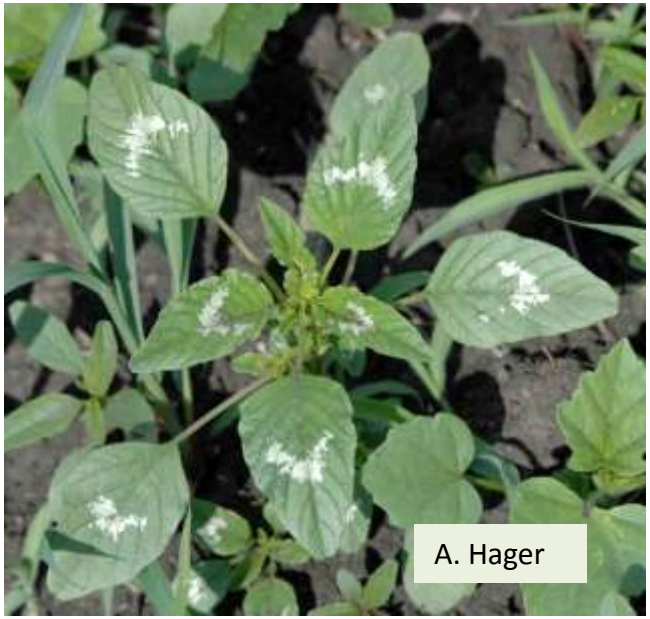
2 Illinois

3 SIU Southern Illinois University Carbondale, Purdue

male female

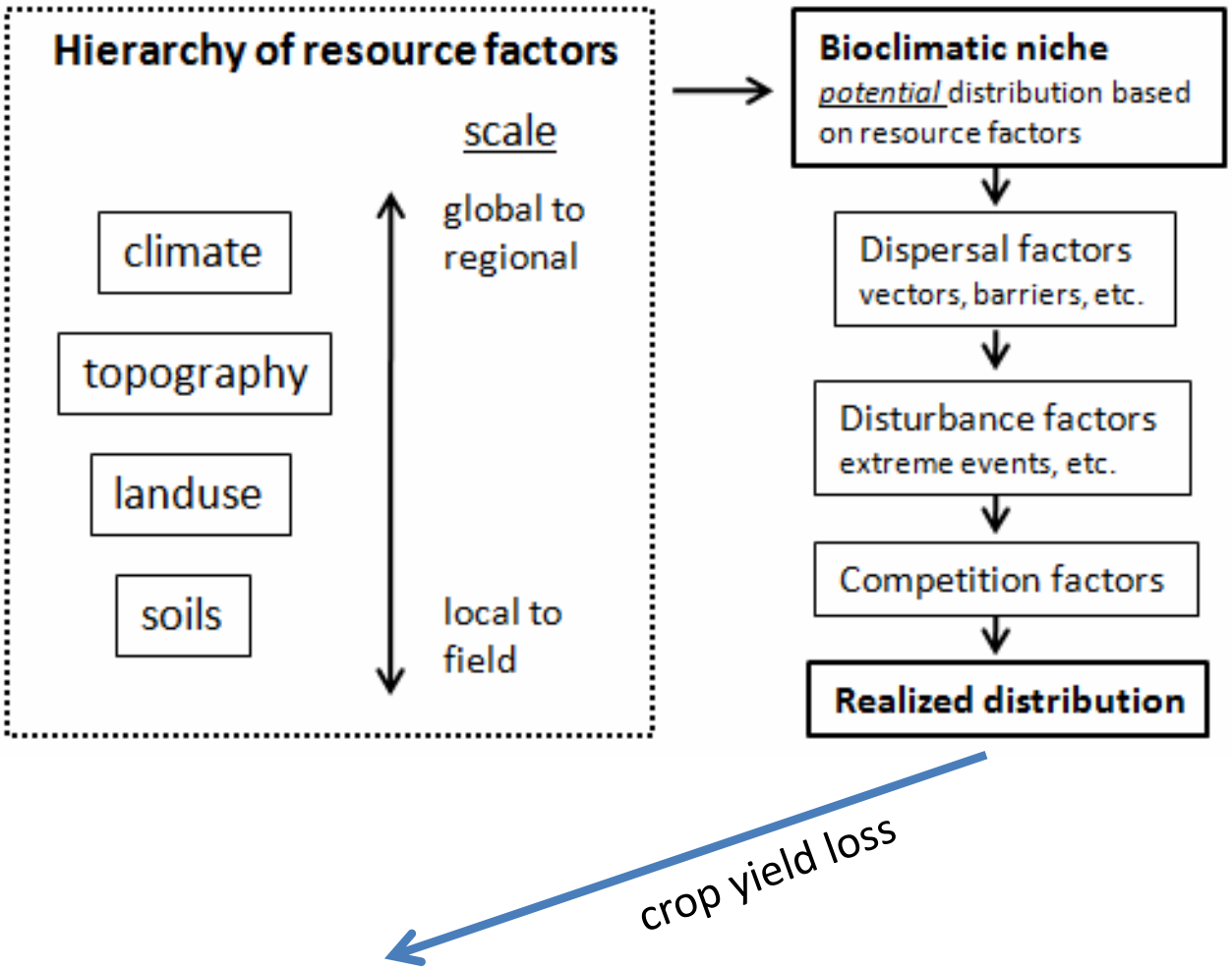
Palmer amaranth (*Amaranthus palmeri*)

dioecious forb
summer annual
extended germination
rapid life cycle
many seeds
very competitive



Bioclimatic Niche

environmental influences on potential geographic distribution of a species



Damage niche

McDonald et al. 2009

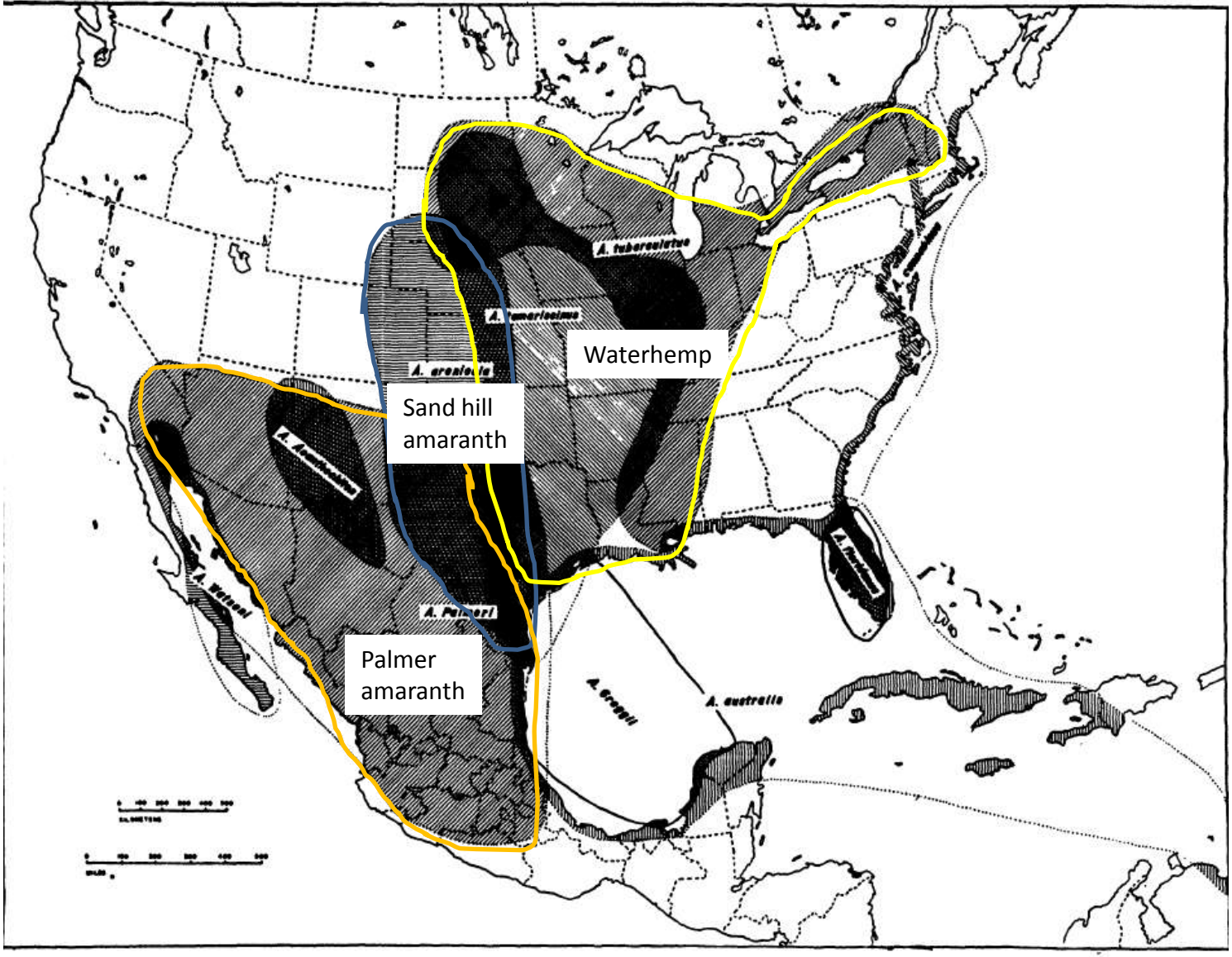


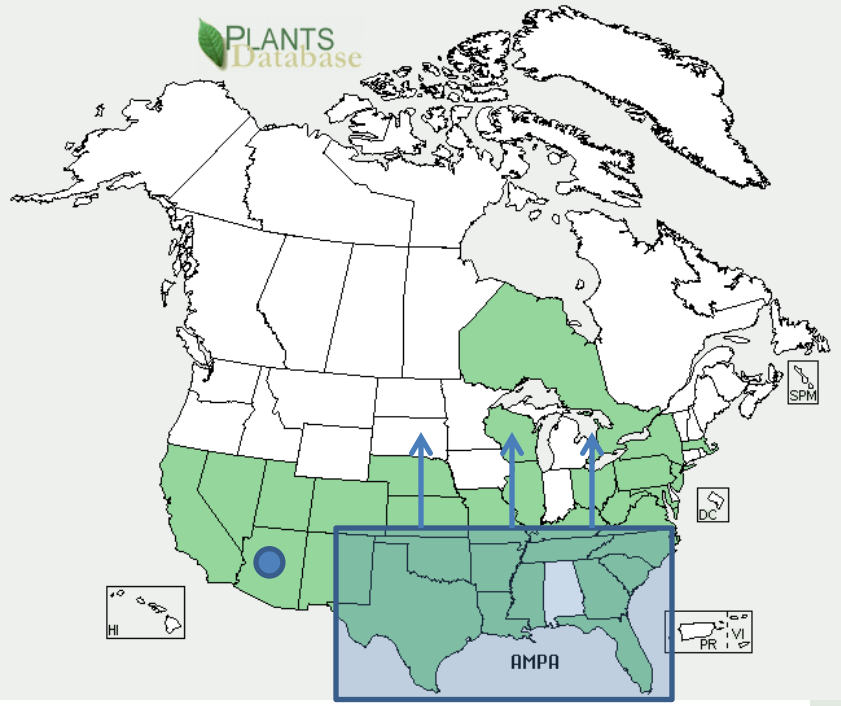
FIG. 1. Present gross ranges of the dioecious amaranth species, as indicated by aggregate of herbarium collections.

"The ten dioecious species of Amaranthus, all originally pioneer plants of naturally disturbed habitats, have behaved quite differently during increasing human disturbance of their native continent, North America. Those at home in coastal marshes, beaches, and dunes have remained static while those from **river floodplains and desert washes** have been expanding and diversifying as weeds in artificially opened habitats..." Sauer, **1957**

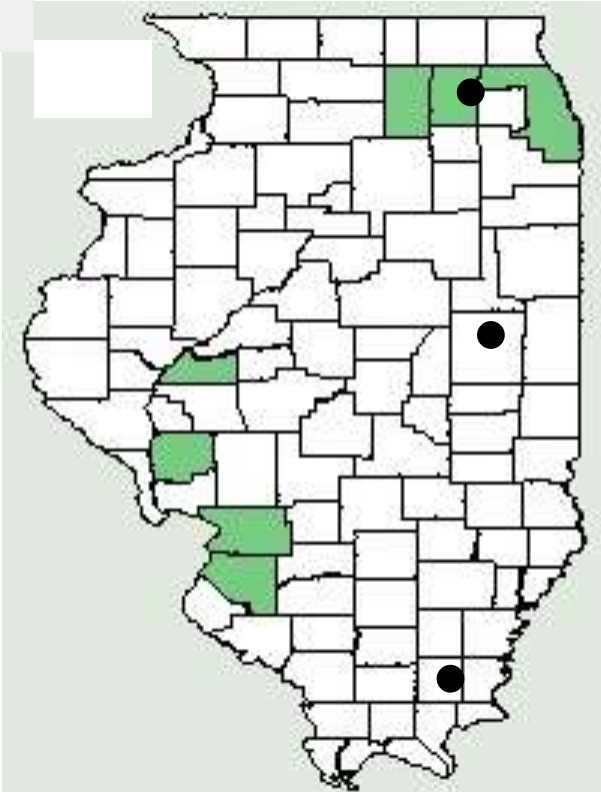
L. Steckel

Abandoning the Crop

J. Norsworthy



What is the **damage niche** of Palmer amaranth in soybeans in Illinois?



DeKalb

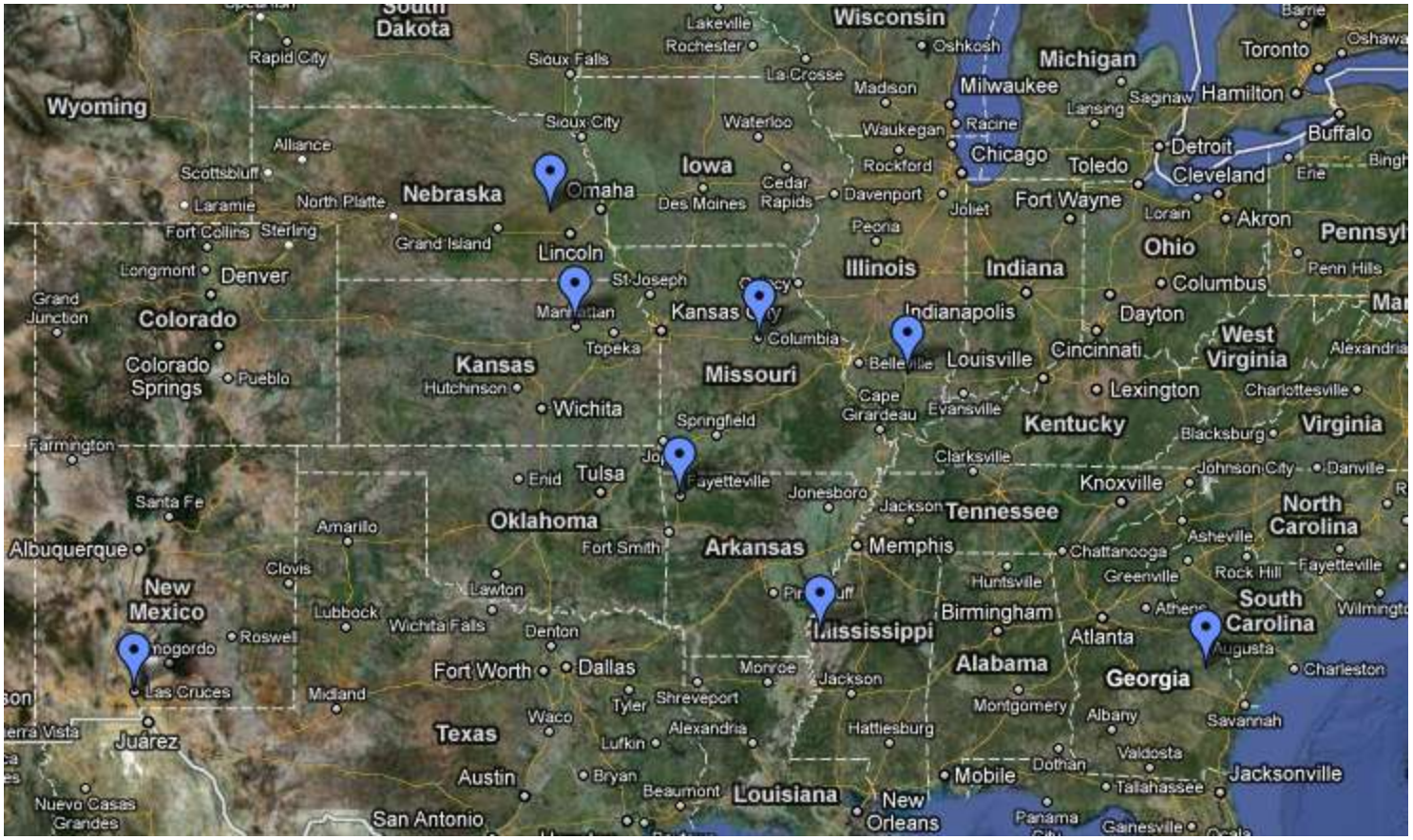
Urbana

Dixon Springs

Common garden study
3 locations
2 years
8 populations of AMAPA

sb +/- weed
RCBD, 4 reps/loc
rand ~ siteyr/rep

Palmer amaranth seed accessions



Thanks to:

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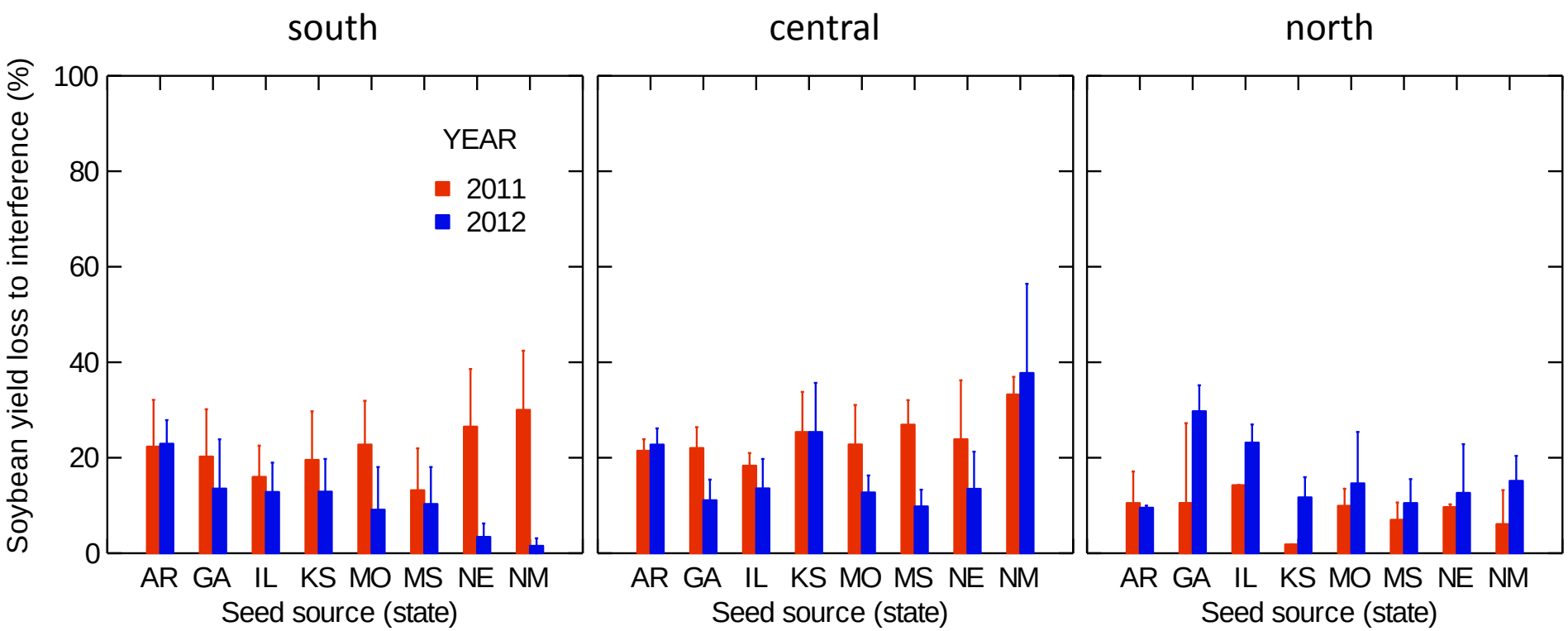
Dr. Anita DIlle, KSU
Dr. Reid Smeda, UMo
Dr. John Lindquist, UNL
Dr. Jason Norsworthy, UArk
Dr. William Molin, ARS Stoneville
Dr. Stanley Culpepper, UGA
Dr. Loyd Wax, ARS Urbana

Research questions

- Where will AMAPA cause sb yield loss in IL?
- Are some genotypes better suited to invade northward (e.g. ones that are already growing in more northerly locations?)
- Is AMAPA climate or dispersal-limited in the upper midwest?



What mattered?

Seed source? No

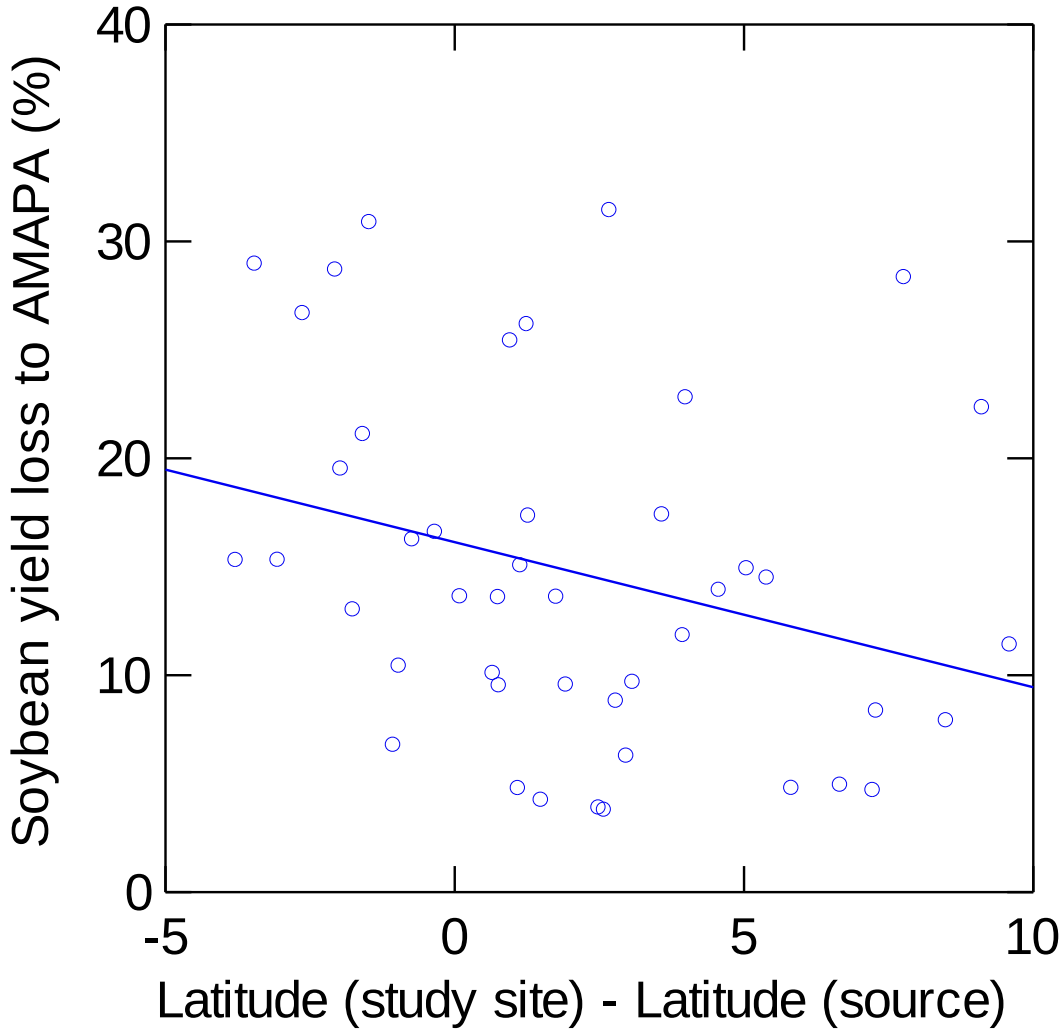
Location? **Yes** ***

Seed x location? No

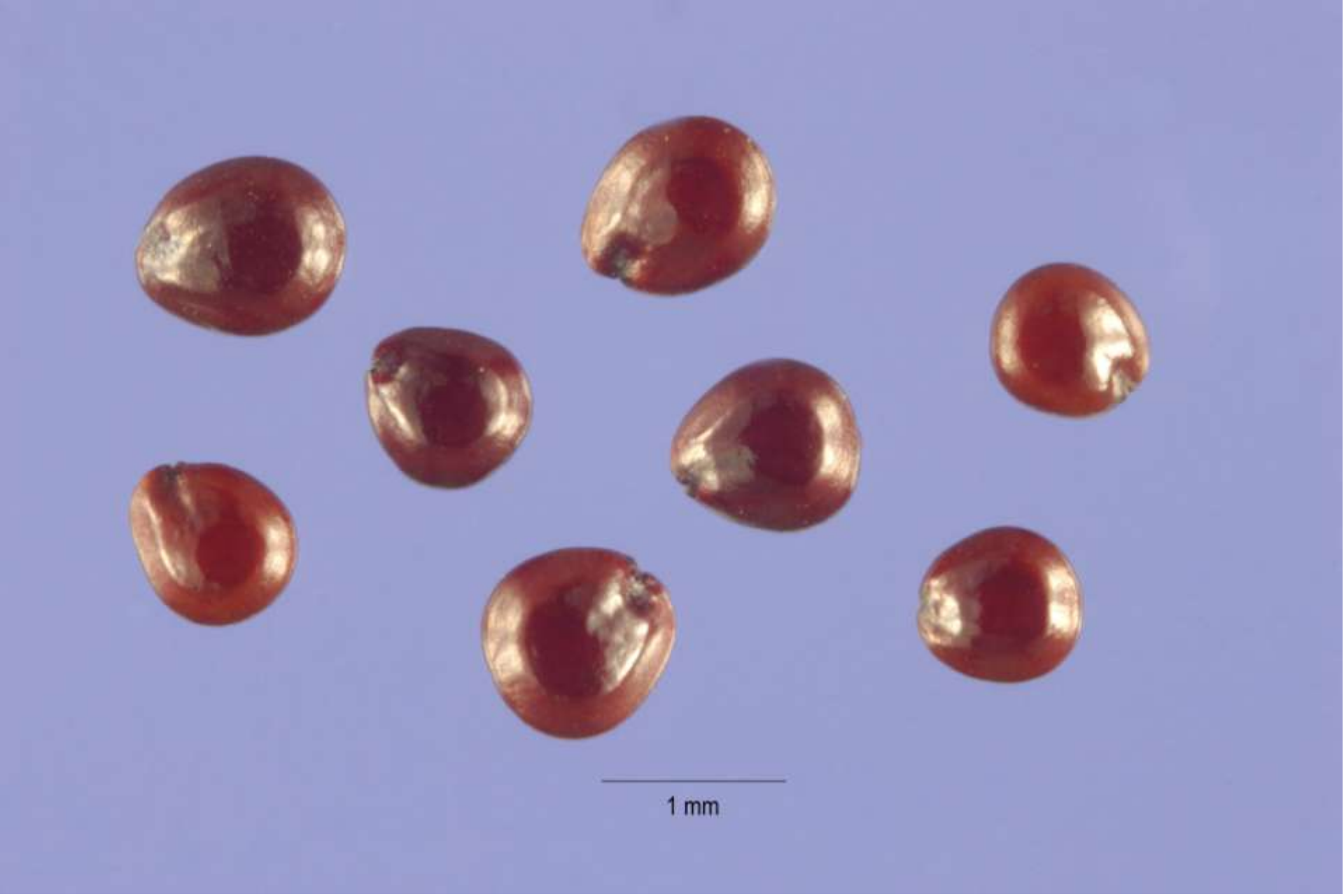
Year? No

Year x location? **Yes** *

Did northward adaptation by Palmer amaranth influence competitive ability?



r = -0.29
p < 0.05*

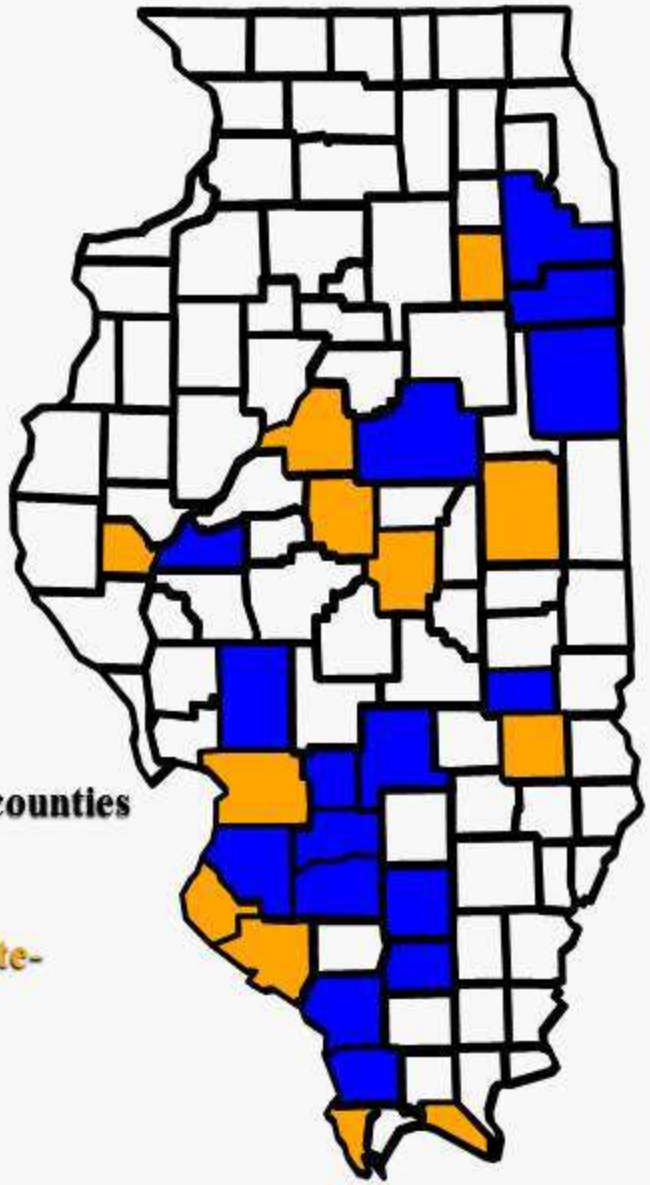


Steve Hurst @ USDA-NRCS PLANTS Database

Photo: R. Bellm

Hager

Palmer amaranth Distribution in Illinois 2012–2013 sampling



Palmer amaranth confirmed in counties colored orange or blue

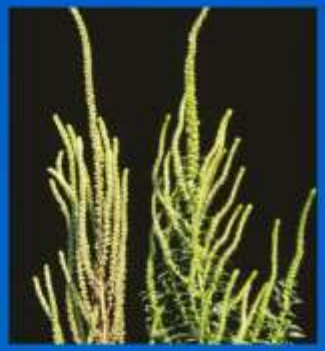
Orange – counties with glyphosate-resistant Palmer amaranth

Hager, Riggins & Tranel, unpubl.

It's here: now what?

- **P**revention: clean equipment, seed, feed, manure
- **R**econnaissance: learn to identify, monitor fields regularly throughout season
- **E**radicate: flag suspected populations, destroy; manage to limit spread
  - harvest around patches
  - limit tillage
  - limit emergence (overlapping residuals)

http://bulletin.ipm.illinois.edu/wp-content/uploads/2013/09/Guidelines-for-the-Identification-and-Management-of-Palmer-amaranth2.pdf

Is it Palmer amaranth or Waterhemp?

Characteristic	Palmer	Waterhemp
Young leaves:		
Notched	Yes	Yes
Shape	Rounded	Lanceolate
Older leaves:		
Petiole	Longer than blade	Shorter than blade
Markings	"V" variegation	None
Pubescence:	No	No
Inflorescence:	Feet	Inches