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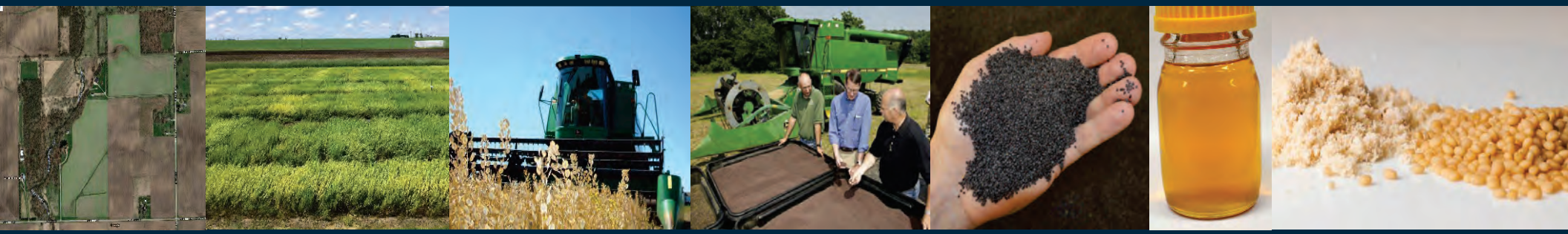
Integrated Pennycress Research Enabling Farm & Energy Resilience

Winthrop B. Phippen, Project Director



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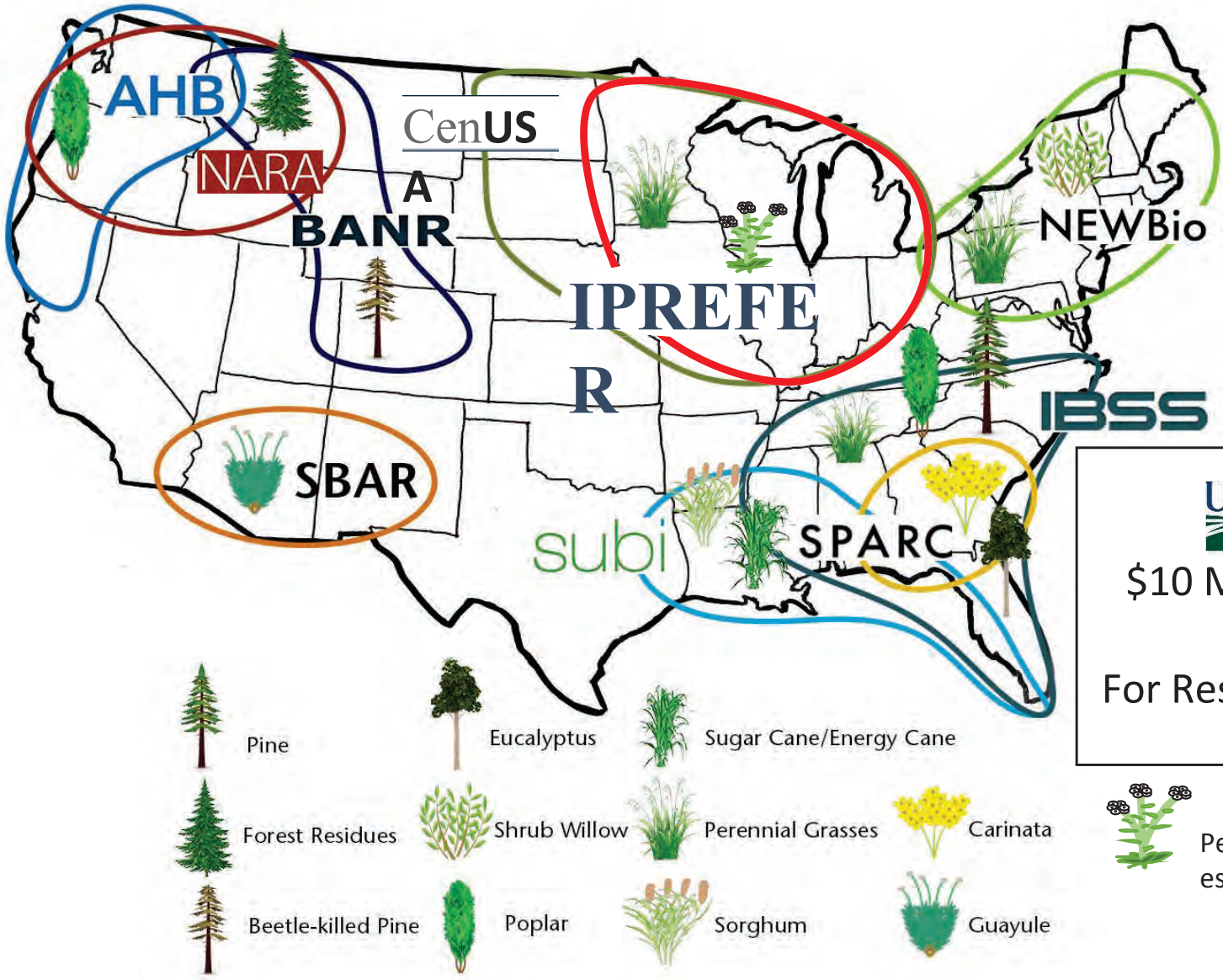

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$10 Million SAS CAP Grant
2019-2024
For Research, Education and Outreach

Pennycress

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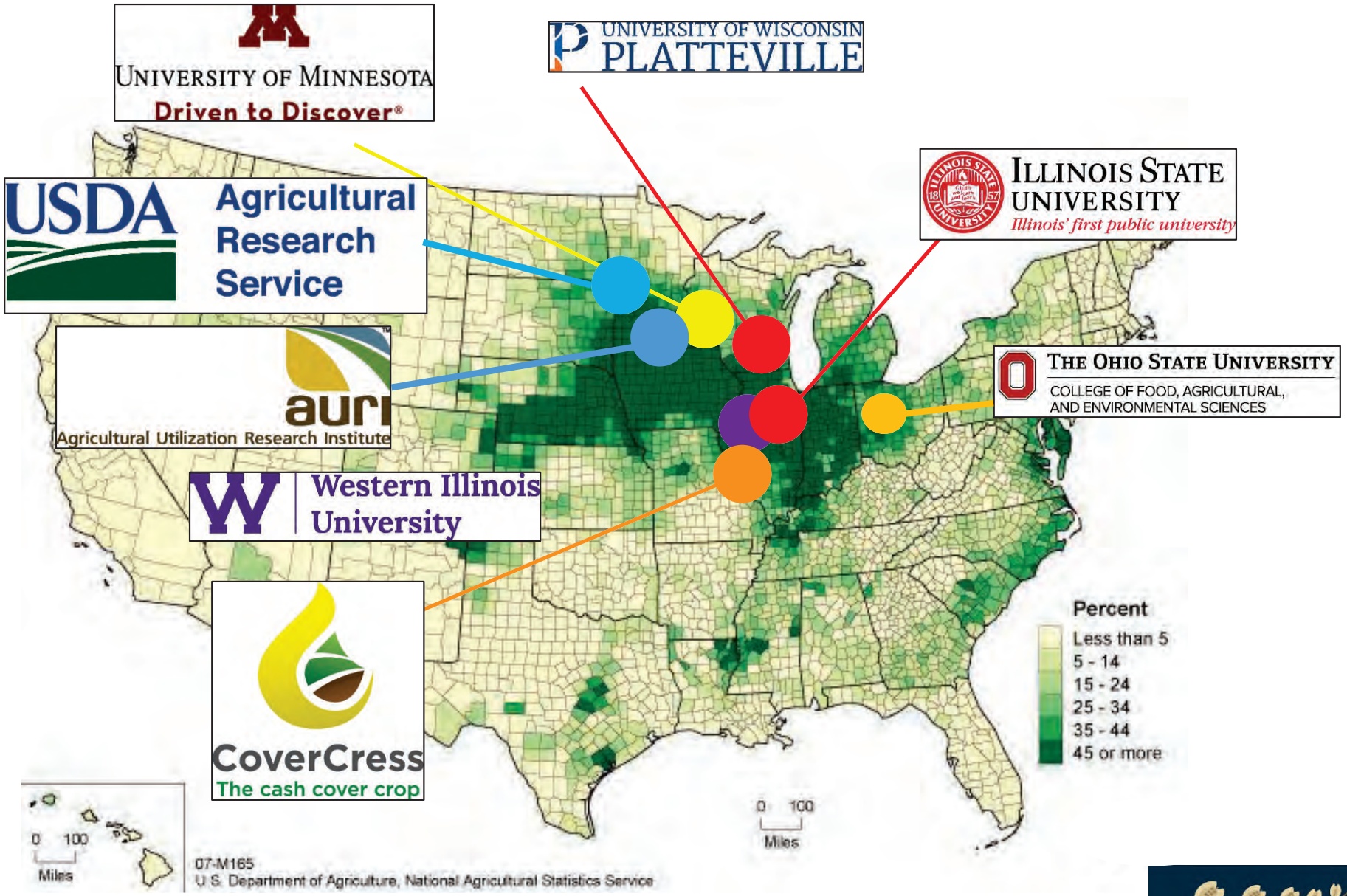
Pennycress commercialization



Mission:

Optimize off-season pennycress oilseed production by overcoming production and supply chain bottlenecks.

Goal:

Commercially launching pennycress as a cash cover crop in 2021.

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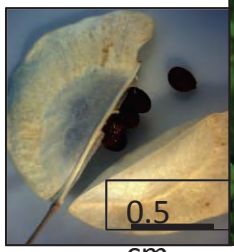
Pennycress (*Thlaspi arvense*) as a potential new cash cover crop

- Related to canola, found on all continents except Antarctica
- Naturally high yields of seeds rich in oil (~30%) and protein (~18%)
- Extreme cold tolerance
- Relatively short life cycle
- Not invasive, is easily controlled



Naturally-occurring stand near Bloomington, IL

Planted field near Galesburg, IL

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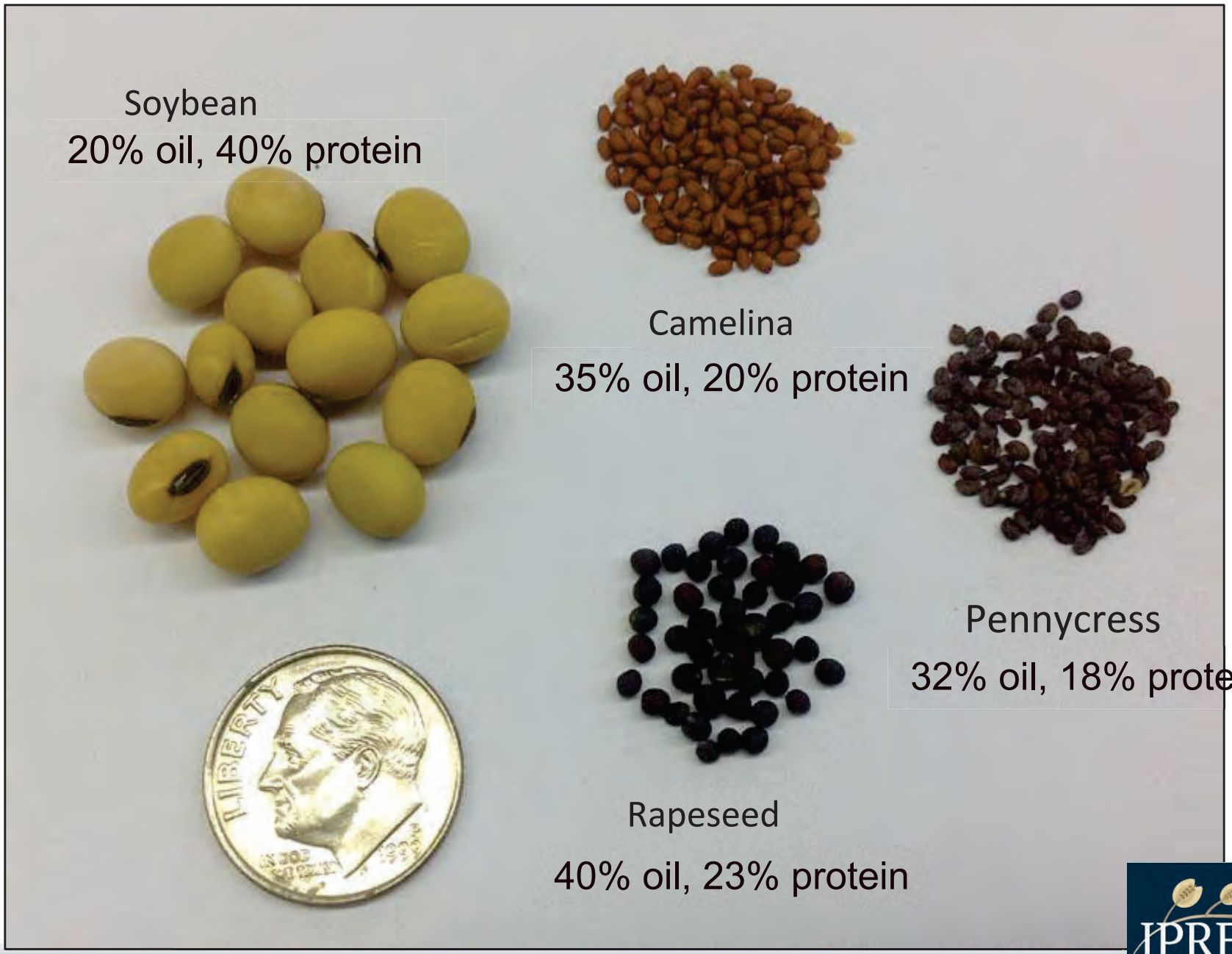
Field Pennycress (*Thlaspi arvense L.*)



From: Sedbrook et al. (2014) Plant Science **227**: 122-132

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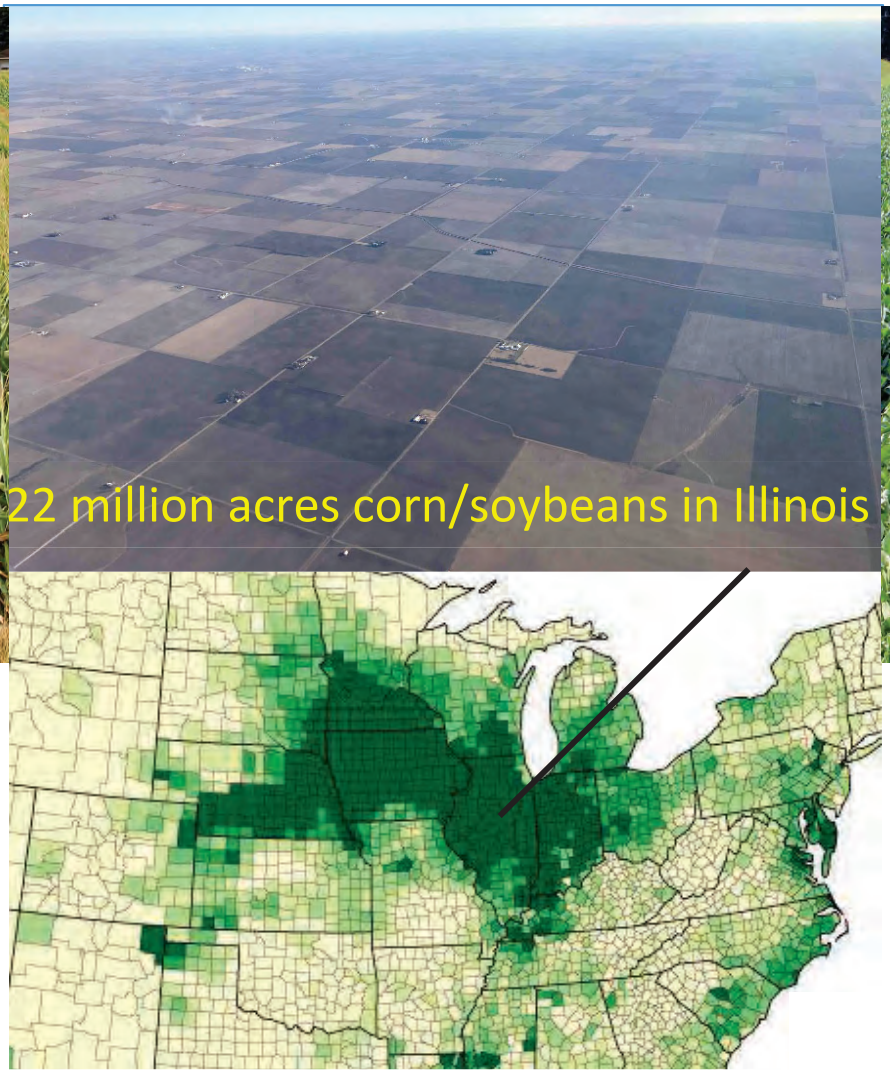
80 million acres of Midwest farmland lay empty October to May

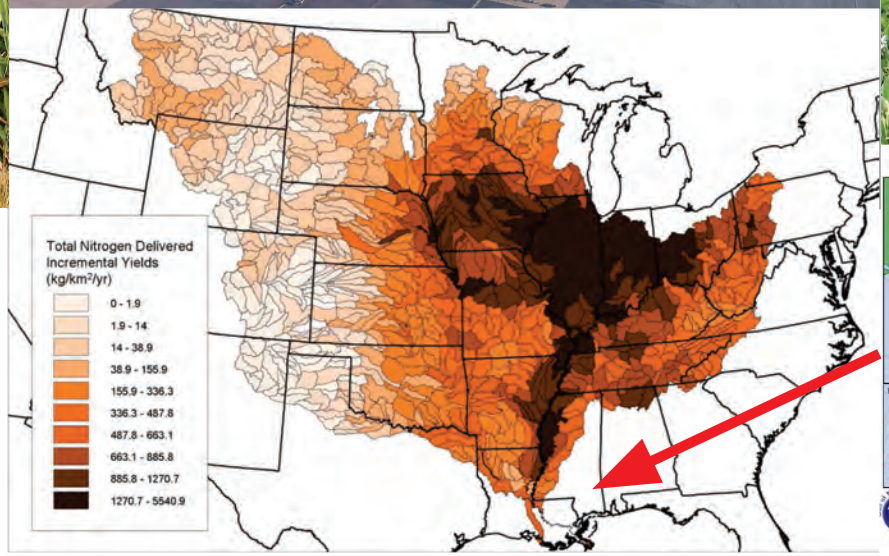
Corn



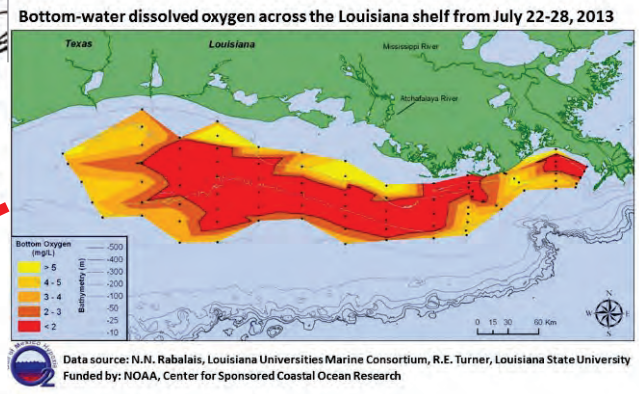
Soybean

Pennycress could reduce water pollution by soaking up nitrogen in otherwise barren farm fields

Corn



Soybean



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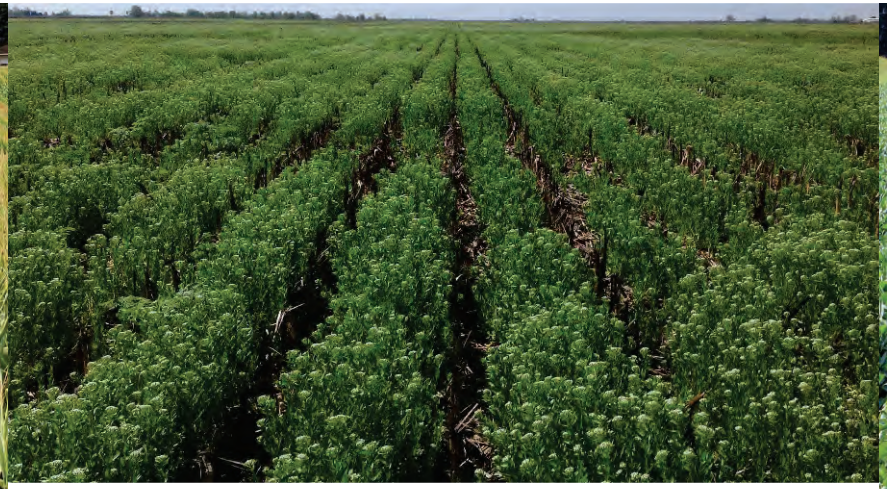
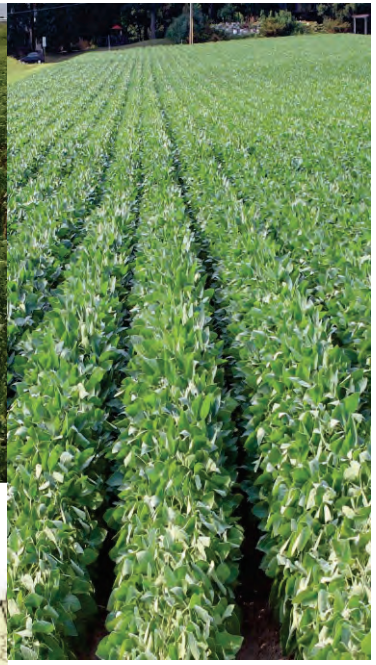
Pennycress could be grown throughout the Midwest

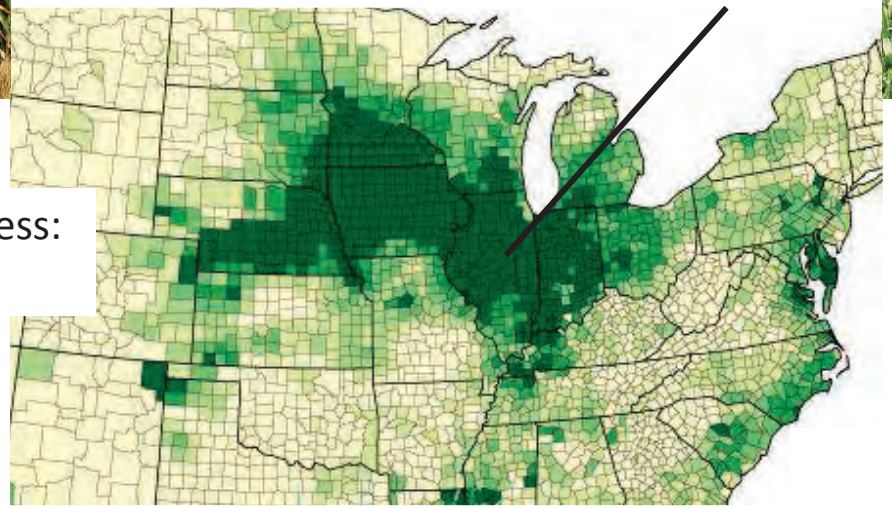
Corn





Soybean

11 million Illinois acres each year



Sweet spot to grow pennycress:
South of I80, north of I64

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Pennycress could add both economic and ecological value without disrupting corn, soybeans, or ecosystems

Corn

Soybean

1,500 lbs seed/acre = $218/acre seed value

Goal: 3 million acres by 2030 = $0.5 billion/year crop

Harvest with same equipment as used for soybeans

Integrated Project

- **Research**

Breeding/Genetics- Advance breeding lines, identify and integrate new traits

Agronomy/Crop Management – Crop establishment, rotations, SCN, seed treatments

Ecosystems Services – Impact of pennycress as a cover crop, pollinator health

Supply Chain – Processing, stability, conversion, seed handling tools for producers


Pennycress plots- October 20, 2019

Spring – End of March

Early April– first flowers

Full Bloom – End of April

Full Pods – Middle of May

Dry down– End of May

Mature Pennycress– Aerial Seeding

Minimal weed control

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Harvest

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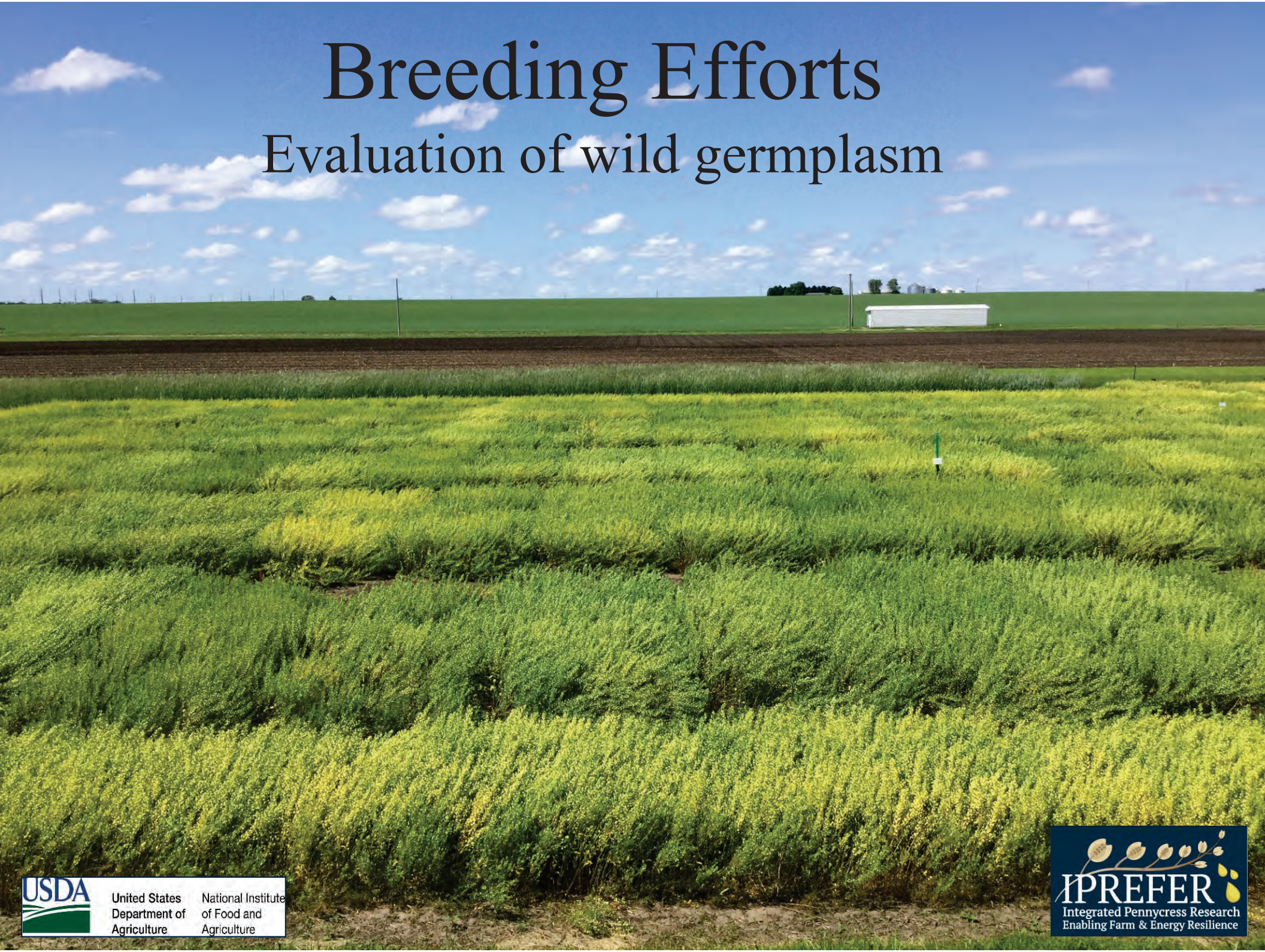
Breeding Efforts

Evaluation of wild germplasm



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Seeding rates and planting methods

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Early maturity

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Aerial seeding inconsistency

Herbicides and residue management

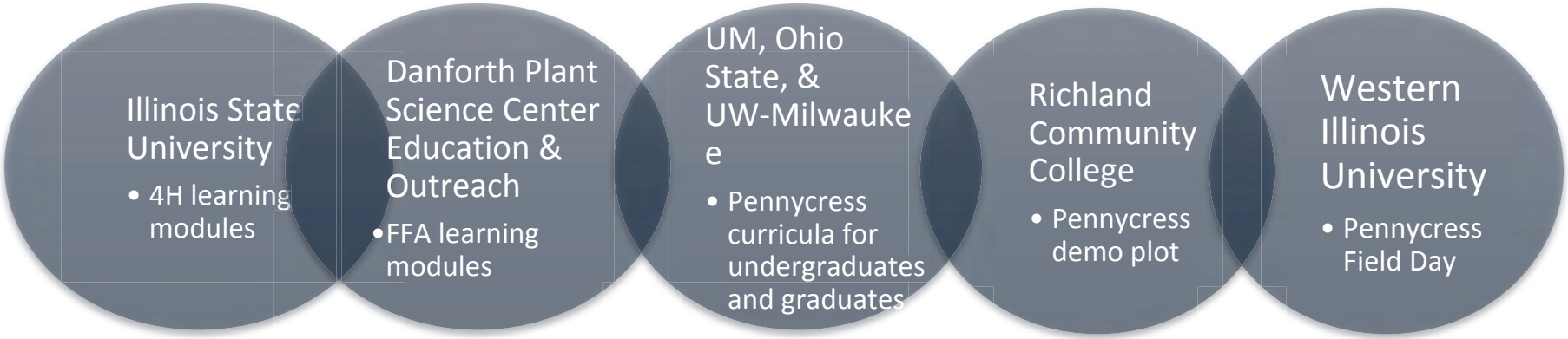
Inter seeding into standing corn

Replicated tiled plots are being installed at the ISU Lexington farm for nutrients runoff studies

ISU students taking soil samples for nutrients, carbon, and soybean cyst nematodes (SCN) analyses.

water quality and flow monitoring using ISCO drains

Pennycress Education & Outreach



Educational Outcomes:

1. Generate awareness of pennycress as a potential cash cover crop
   - Demos
   - Field days
   - Printed informational material
   - Research publications
2. Workforce development
   - Prepare the next generation of farmers and scientists
   - Bioenergy curricular modules
   - Interdisciplinary research experiences for college students

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