Corn and soy profitability is down in Iowa.

Some parts of fields are less profitable than others.

Zoom in to learn more at: http://mesonet.agron.ias tate.edu/GIS/apps/profit/

Brandes E, McNunn GS, Schulte LA, Bonner IJ, Muth DJ, Babcock BA, Sharma B, Heaton EA (2016) Subfield profitability analysis reveals an economic case for cropland diversification. *Environmental Research Letters*, **11**, 014009.











Profitability [US\$ ha-1]



Nitrogen and profit loss in corn/soy fields



Subfield-scale NO₃-N leaching on corn/soy cropland. Values are annual rates averaged over the years 2012-2015. Brandes, McNunn, Schulte, Muth, VanLoocke & Heaton (*in review*)

Integrating perennials on unprofitable parts of fields can meaningfully increase profitability and retain N

Brandes, McNunn, Schulte, Muth, VanLoocke & Heaton (*in review*)



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Prairie Strips Collaborator www.prairiestrips.org

STRIPS

Slide courtesy Lisa Schulte Moore

Photo: Tama Co., Tim Youngquist

100% crops

90% crops: 10% prairie

100% prairie



Sources: Zhou et al. 2012, Helmers et al. 2012, Hernandez-Santana et al. 2013, Iqbal et al. 2014, Mitchell et al. 2014, Zhou et al. 2014 Slide courtesy Dr. Lisa Schulte Moore

Strategically adding ~10% prairie to annual row crop fields...

44% reduction in water runoff

2

- 95% reduction in soil loss through runoff
 - 90% reduction in phosphorus runoff
 - 84% reduction in nitrogen runoff and 70% reduction in subsurface nitrate loss (not tiled)
 - 2-3 times more beneficial insects and birds
 - No reduction in per acre yields

Costs less than terraces; comparable to cover crops

Source: Data collected by STRIPS team, 2007-2014 at Neal Smith National Wildlife Refuge Slide courtesy Dr. Lisa Schulte Moore

Slide courtesy Dr. Lisa Schulte Moore

Photo: Wright Co., Lynn Betts

Slide courtesy Dr. Lisa Schulte Moore

Image: Fry et al. 2011

Biomass Fuel Project

http://sustainability.uiowa.edu/biomass



Conversion

- (processing)
- combustion
- heat & power



Agricultural Services

- planting
- management
- harvest

IOWA STATE UNIVERSITY Department of Agronomy

Agronomy

- research
- extension
 - nitrogen, water, temperature

Current Biomass Fuels at U Iowa - Total fuel budget = \$14.6M - Biomass demand by 2025: 110,000 t y¹



University of Iowa Miscanthus Business Plan Review

		Manageable Risk Profile
TECH	Miscanthus Combustibility	low
	Compatible Spec	mid
	Technology to Produce Spec	high
	Technology Development	high
OPERATIONAL	Land	
	Participation in Project Area	low
	Land Suitability	low
	Crop Establishment	
	Planting Stock / Material Source	low
	Planting Schedule	mid
	Planting Method	low
	Successful Crop Establishment	mid
	Annual Yield Expectations	mid
	Winterkill / Crop Loss	mid
	Invasive potential	low
	Supply Chain	
	Harvesting	mid
	Storage	low
	Collection / Transportation	low



Research and commercial miscanthus locations

(59) Spirit Lake 📚 Add layer 💄 Share 💿 Preview a Arnolds Park ✓ University of Iowa Project Sites Rock Valley Sheldon (18) Spencer P Individual styles Sioux Center Orange City 🗳 CR Linn County Solid Waste ... 🔮 Conner, Barbara A. 34.11 acs Dahlen Properties, LLC 20.74... Le Mars Cherokee 🔮 Coder, John, etux (Prospect) ... Storm Lake Stransky, James (Jim), etal 2... 29 G Sioux City 🏅 Meade, James (Jim), etux 15... Sac City Sergeant Bluff 👶 Kemp, Jay R., etux 109 acs +... (59) Lake View 🖑 Hawkins Trust(s) 19.84 acs o Ida Grove Kemp, Blake (Prospect) Cook, Robert (Prospect) Carroll 29 Denison Kemp, Jay, etux 1.31 acs Kemp, Lucas 3.36 acs st Point Paxton, Gene, etux 14.55 acs 30 Meeker Ag, LLC (Stromberg) ... Harlan 29 Cedar Rapids Airport Commi... (71) (59) Blair 🖇 Conley, Virginia 45.5 acs 80 Avoca 680 Fremont Walnut Atlantic 🎖 Black, Dan, etal 13.1 acs University of Iowa 40.75 acs Omaha 63 6 Bellevue Papilliono ✓ LAMPS research sites Red Oak (34) 80 TINDIVIDUAL STYLES Villisca 34) (59) incoln Allee Shenandoah Clarinda Sorenson Nebraska City Southeast Research Farm



(69)

IMPACT

By burning Miscanthus instead of coal the UI will annually:

- keep \$10 million in Iowa by buying biomass instead of out-of-state coal
- Reduce nitrate leaching and soil loss by ~90%
 while building soil and providing wildlife habitat
- Provide farmers ~\$200/acre, similar to
 Conservation Reserve Program (CRP payments)
- directly displace >50,000 tons of fossil CO₂, (>20 tons of CO₂ per acre from >4 tons of coal per acre)