Prairie Strips:

Strategically Integrating Prairie to Restore Ecosystem Health & Functioning within Annual Crop Fields

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& the STRIPS Team

www.prairiestrips.org

What are prairie strips?

Diverse perennial vegetation, oriented linearly within row crop fields

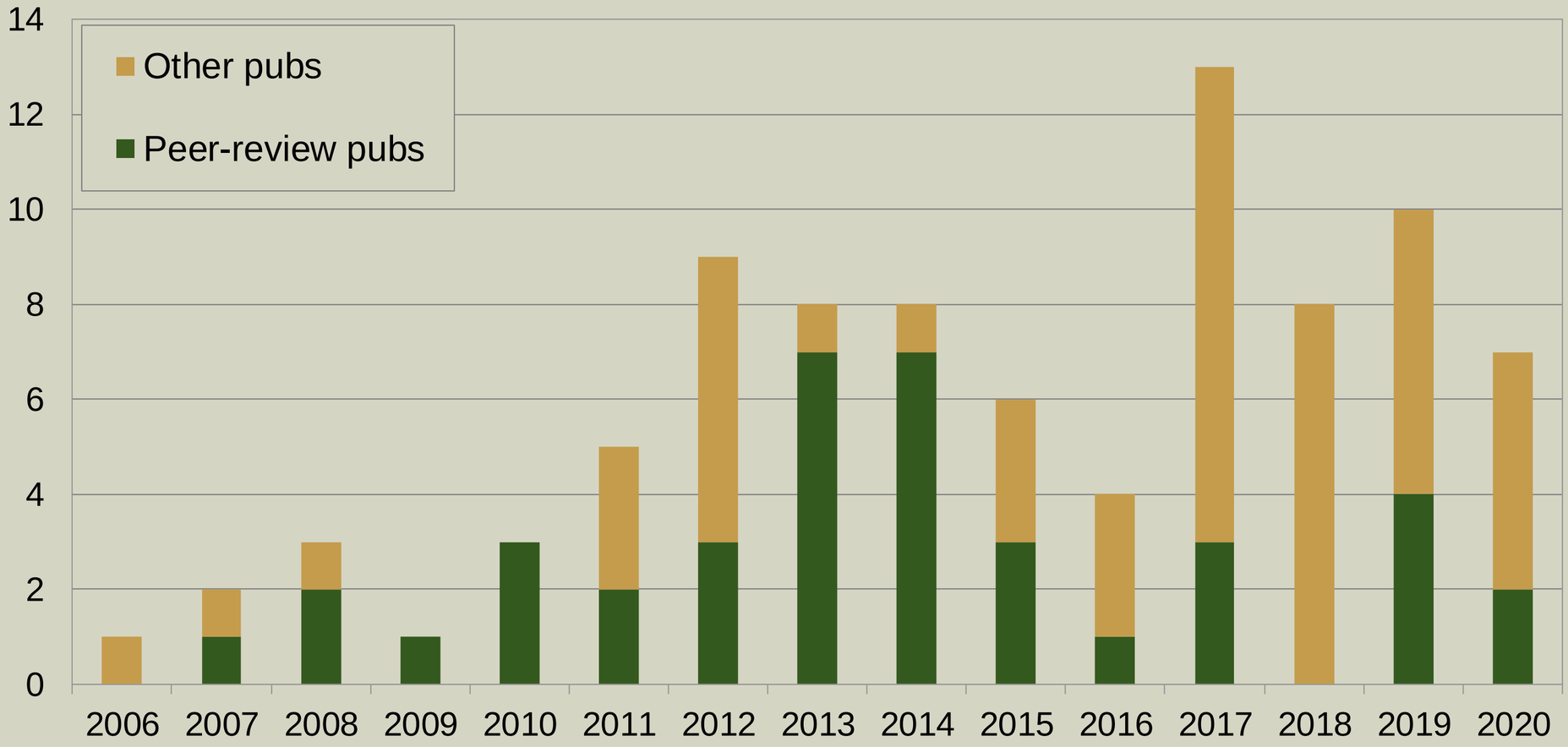
May not exceed 25% of the cropland area per tract

Range from 30-120 ft in width

Machinery traffic is allowed on locations that replace turn rows on the perimeter of the field

Source: USDA 2019 CRP Fact Sheet for CP-43

Science-based Trials of Rowcrops Integrated with Prairie Strips



Source: STRIPS; www.prairiestrips.org

Site: Interim 1
Crop: 90%
Prairie: 10% in multiple contour strips
Catchment size: 3.00 ha
Catchment slope: 7.7%

Site: Interim 2
Crop: 90%
Prairie: 10% at footslope
Catchment size: 3.19 ha
Catchment slope: 6.1%

Interim 3
Crop: 100%
Prairie: 0%
Catchment size: 0.73 ha
Catchment slope: 9.3%

STRIPS1 Study Site at Neal Smith National Wildlife Refuge; Image: Jasper Co., Iowa; Sarah Hirsch, ISU

STRIPS2 Research Site at ISU Armstrong Research & Demo Farm; Image: Cass Co., Iowa; Omar de Kok-Mercado, ISU

STRIPS2 Research Site on private farm; Image: Buchanan Co., Iowa; Omar de Kok-Mercado, ISU

STRIPS2 Research Site on private farm; Image: Wright Co., Iowa; Lynn Betts

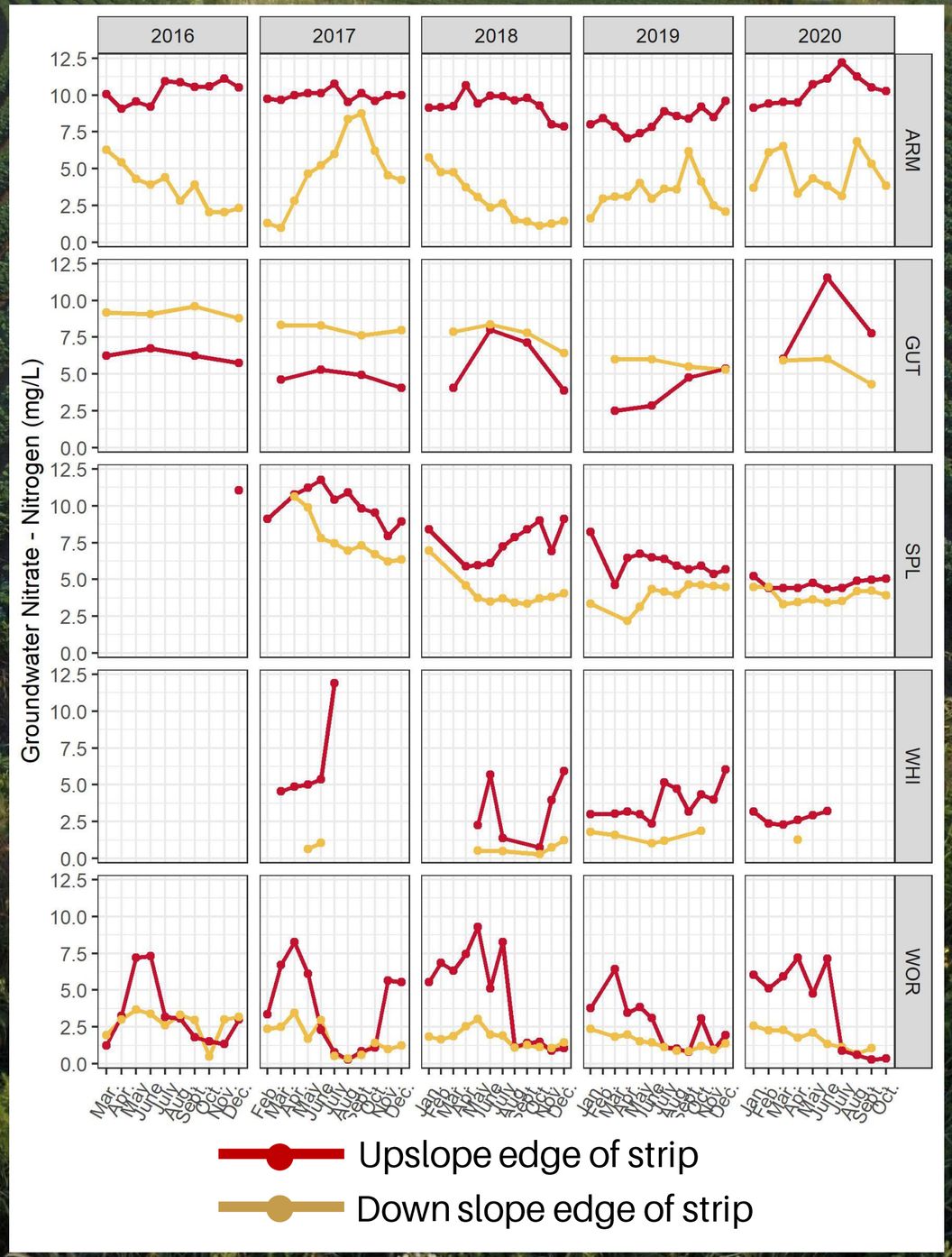
Highlights from over a Decade of Research on Prairie Strips

Strategically adding 10% prairie to untiled no-till corn-soy fields:

- 37% reduction in water runoff
- 95% reduction in sediment loss
- 77% reduction in phosphorus runoff
- **70% reduction in nitrogen runoff**
- **70% reduction in subsurface NO_3-N concentrations**
- **75% reduction in N_2O-N emissions at footslope position**
- 1% increase in soil organic matter (SOM) per year under strips
- More than triple pollinator and double bird abundance
- Influence on crop yield proportionate
- No additional weed problems
- Cheaper than installing terraces; cost comparable to cover crops

Sources: Zhou et al. 2010 JEQ, Zhou et al. 2014 JSWC, Schulte et al. 2017 PNAS, Iqbal et al. 2015 SSSAJ, Kordbacheh et al. 2020, Damiano & Niemi 2019 STRIPS, Dutter & McDaniel Unpublished data

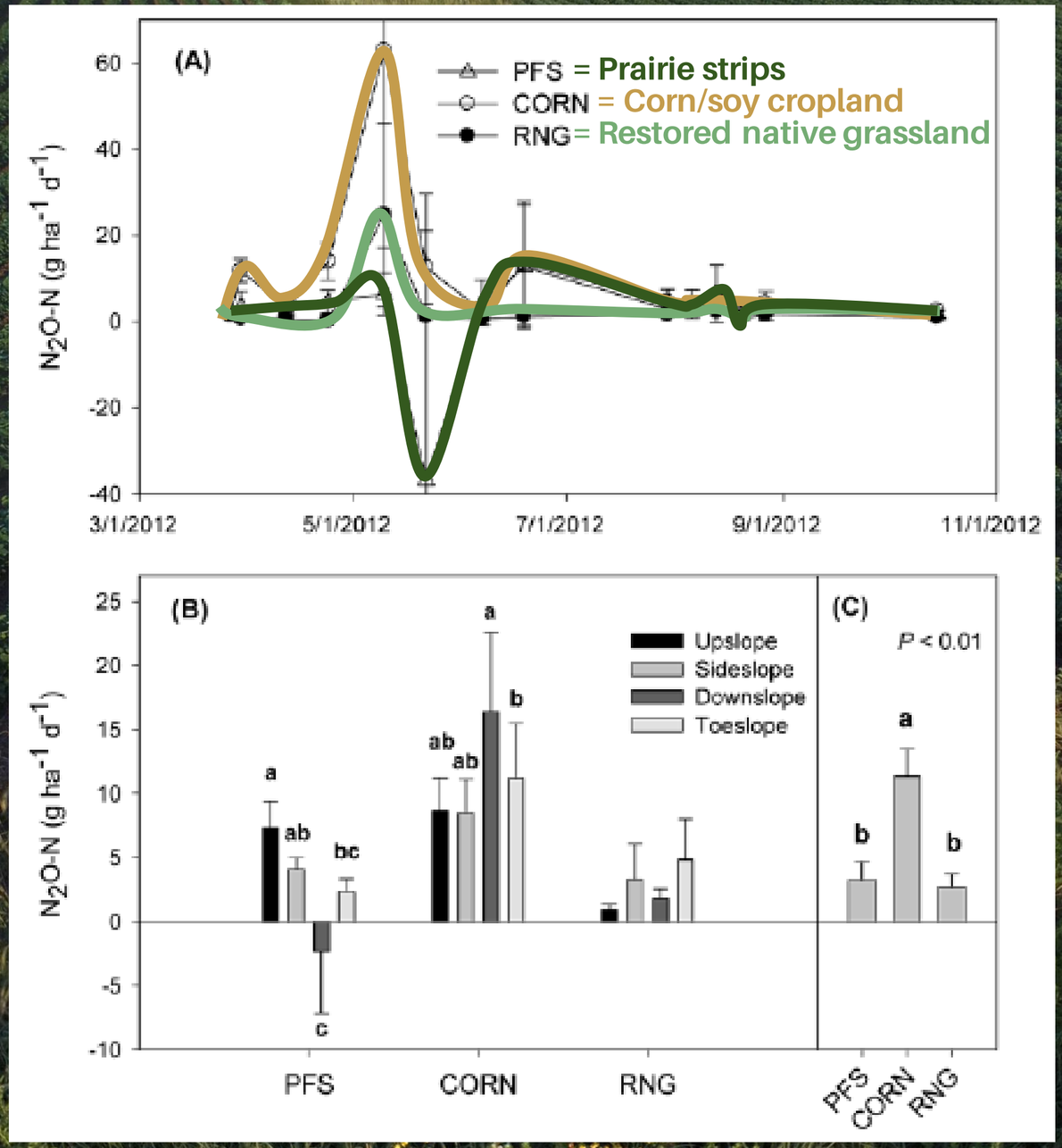
1. Prairie strips can substantially reduce nitrate loss where shallow groundwater interacts with the prairie root zone
2. Nitrate intercepted at footslopes can be fully denitrified to N_2
3. On tiled crop fields, prairie strips could be paired with a saturated buffer or other conservation practices to remove nitrate
4. Prairie strips pose substantial additional environmental benefits
5. Prairie strips are one of the cheapest cropland conservation practices
6. Farmers are aware and accepting of prairie strips; conservation payments improve adoption
7. Iowans are willing to pay for the benefits associated with prairie strips, especially nutrient removal



1

Prairie strips can substantially reduce nitrate loss from *untiled* agricultural fields in fields, where shallow groundwater interacts with the prairie root zone

Sources: Zhou et al. 2010 JEQ, Zhou et al. 2014 JSWC, Schulte et al. 2017 PNAS, Helmers et al. Unpublished data



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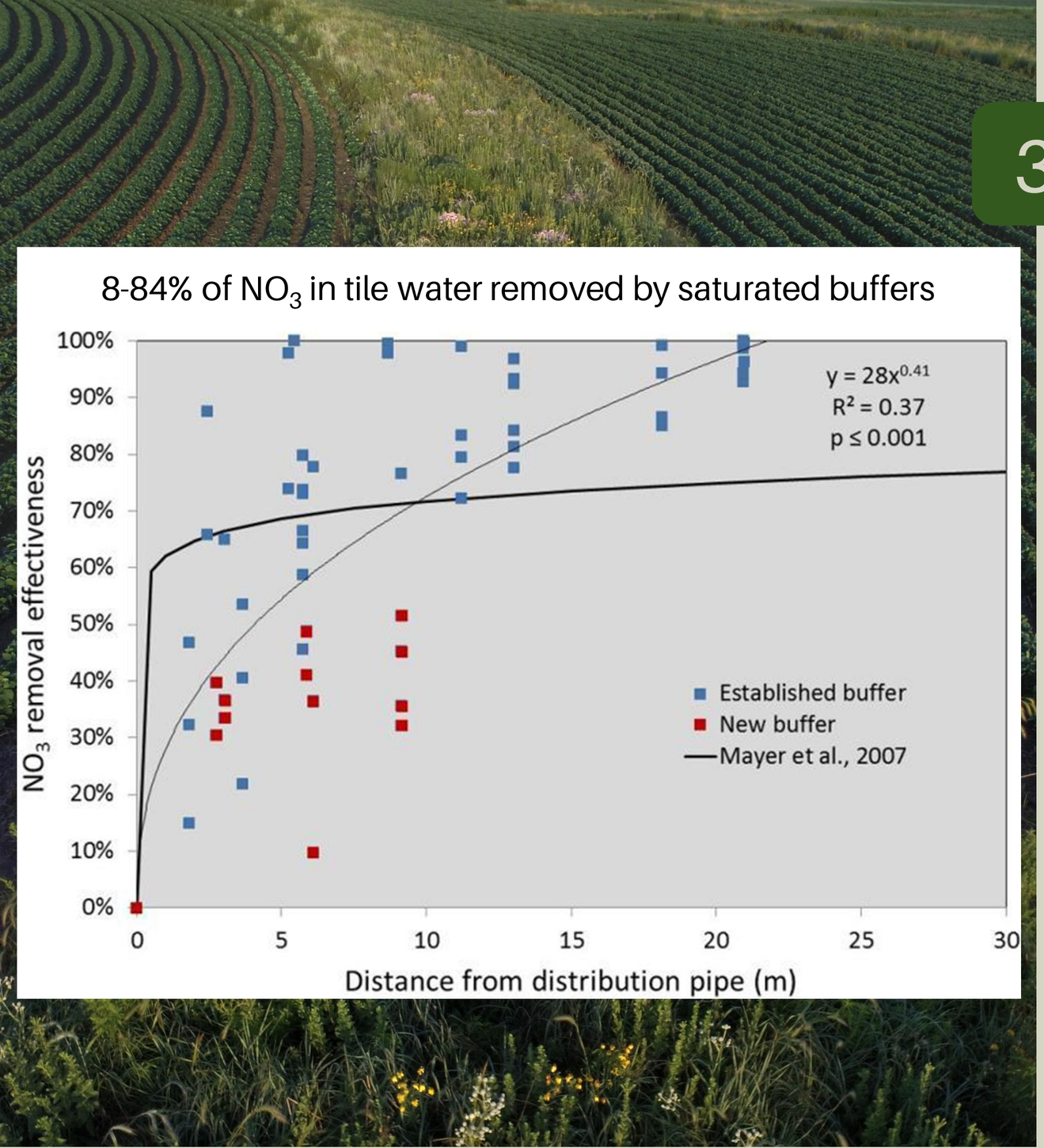
Nitrate intercepted at footslopes can be fully denitrified to N_2

Thus, prairie strips do not pose tradeoff between water and air quality

Source: Iqbal et al. 2015 SSSAJ



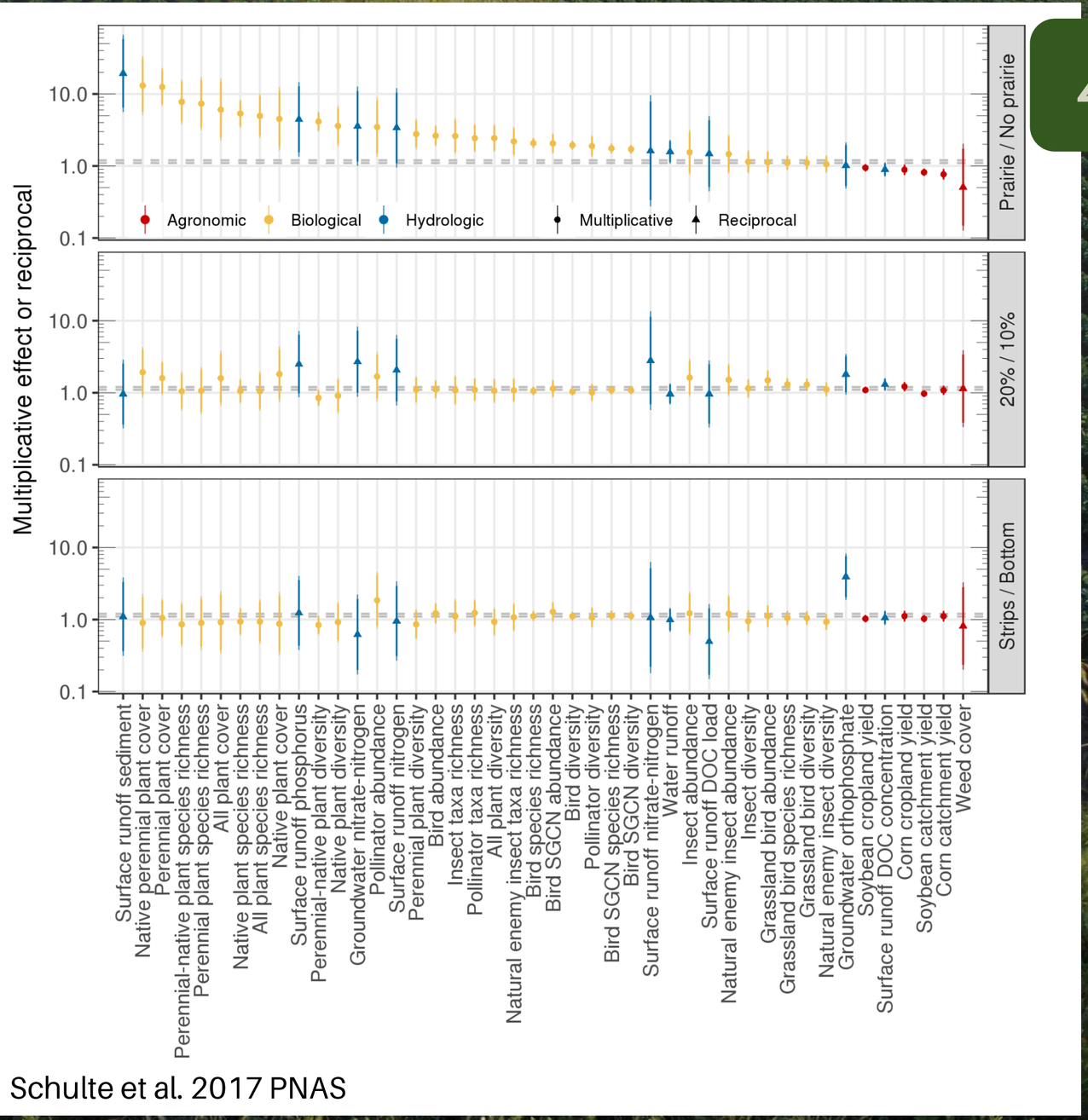
8-84% of NO_3 in tile water removed by saturated buffers

3

On *tiled* crop fields, prairie strips could be paired with a saturated buffer

Other in-field & edge-of-field practices might also apply

Source: Jaynes & Isenhart 2019 JEQ



Schulte et al. 2017 PNAS

4

Prairie strips pose additional benefits:

Reducing flow, sediment loss, soil carbon accrual, bird habitat, pollinators & honeybee health

Sources: Schulte et al. 2017 PNAS, Kordbacheh et al. 2020, Zhang et al. 2021 EnvEnt, Dutter & McDaniel Unpublished data, Giese, Stephenson, Klaver, & Schulte Unpublished data

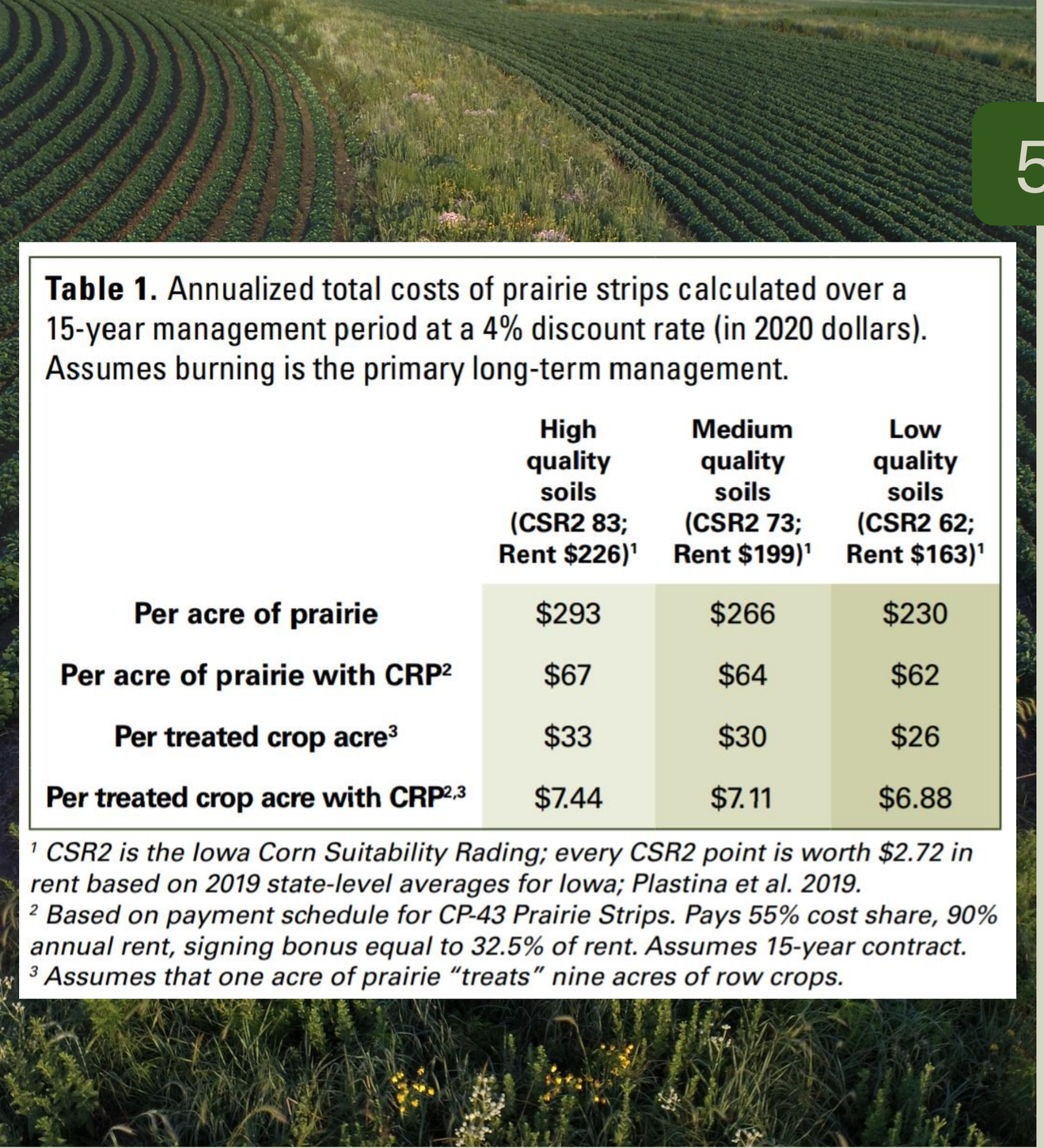


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Table 1. Annualized total costs of prairie strips calculated over a 15-year management period at a 4% discount rate (in 2020 dollars). Assumes burning is the primary long-term management.

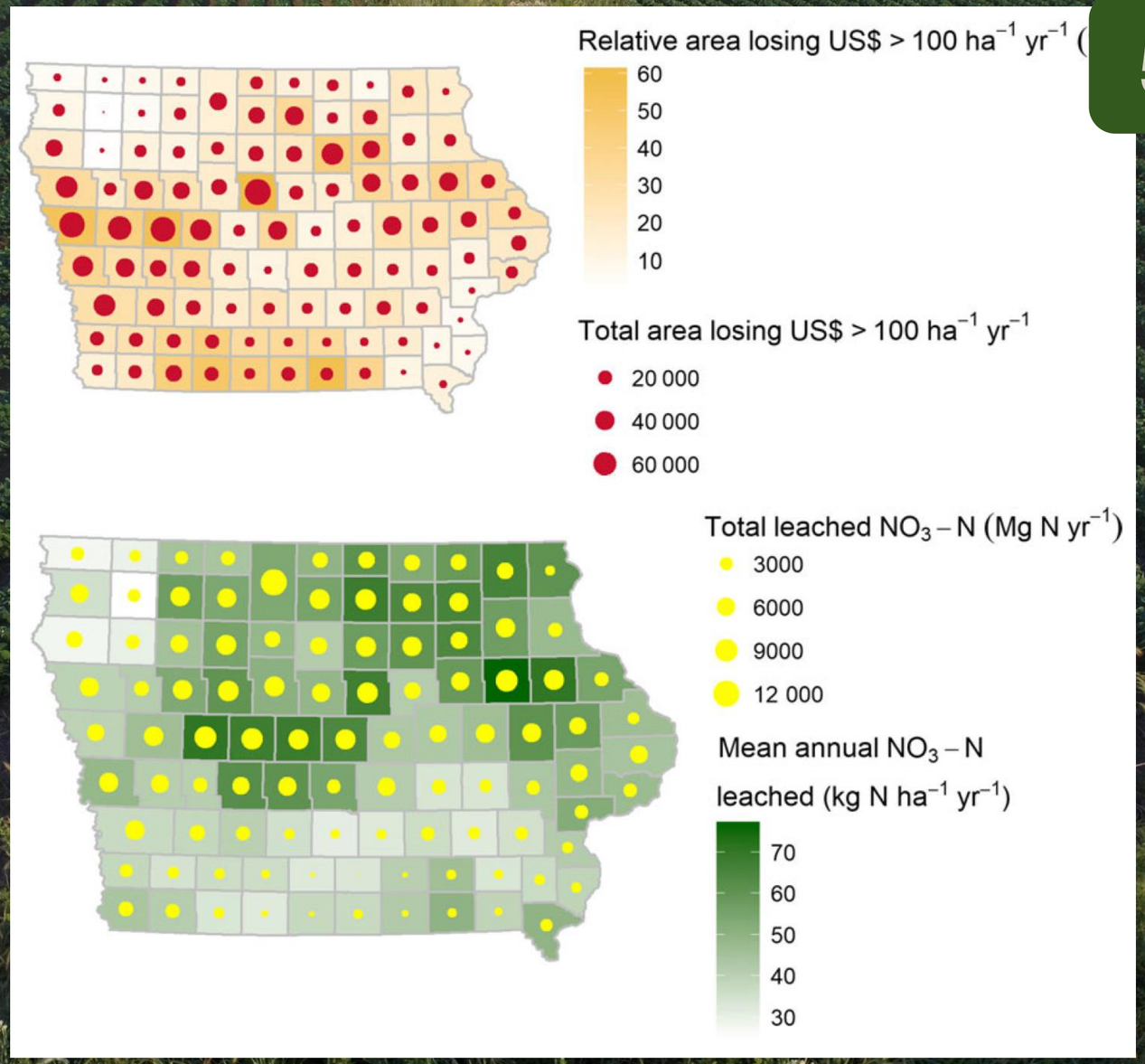
	High quality soils (CSR2 83; Rent $226)[1]	Medium quality soils (CSR2 73; Rent $199)[1]	Low quality soils (CSR2 62; Rent $163)[1]
Per acre of prairie	$293	$266	$230
Per acre of prairie with CRP[2]	$67	$64	$62
Per treated crop acre[3]	$33	$30	$26
Per treated crop acre with CRP[2,3]	$7.44	$7.11	$6.88

[1] CSR2 is the Iowa Corn Suitability Rading; every CSR2 point is worth $2.72 in rent based on 2019 state-level averages for Iowa; Plastina et al. 2019.
[2] Based on payment schedule for CP-43 Prairie Strips. Pays 55% cost share, 90% annual rent, signing bonus equal to 32.5% of rent. Assumes 15-year contract.
[3] Assumes that one acre of prairie "treats" nine acres of row crops.

Prairie strips are one of the cheapest cropland conservation practices

Especially if paired with a USDA Conservation Reserve Program (CRP) payment and/or placed on consistently poor yielding crop acres

Sources: Tyndall et al. 2013 EnvManag, Brandes et al. 2018 GCBBioenergy



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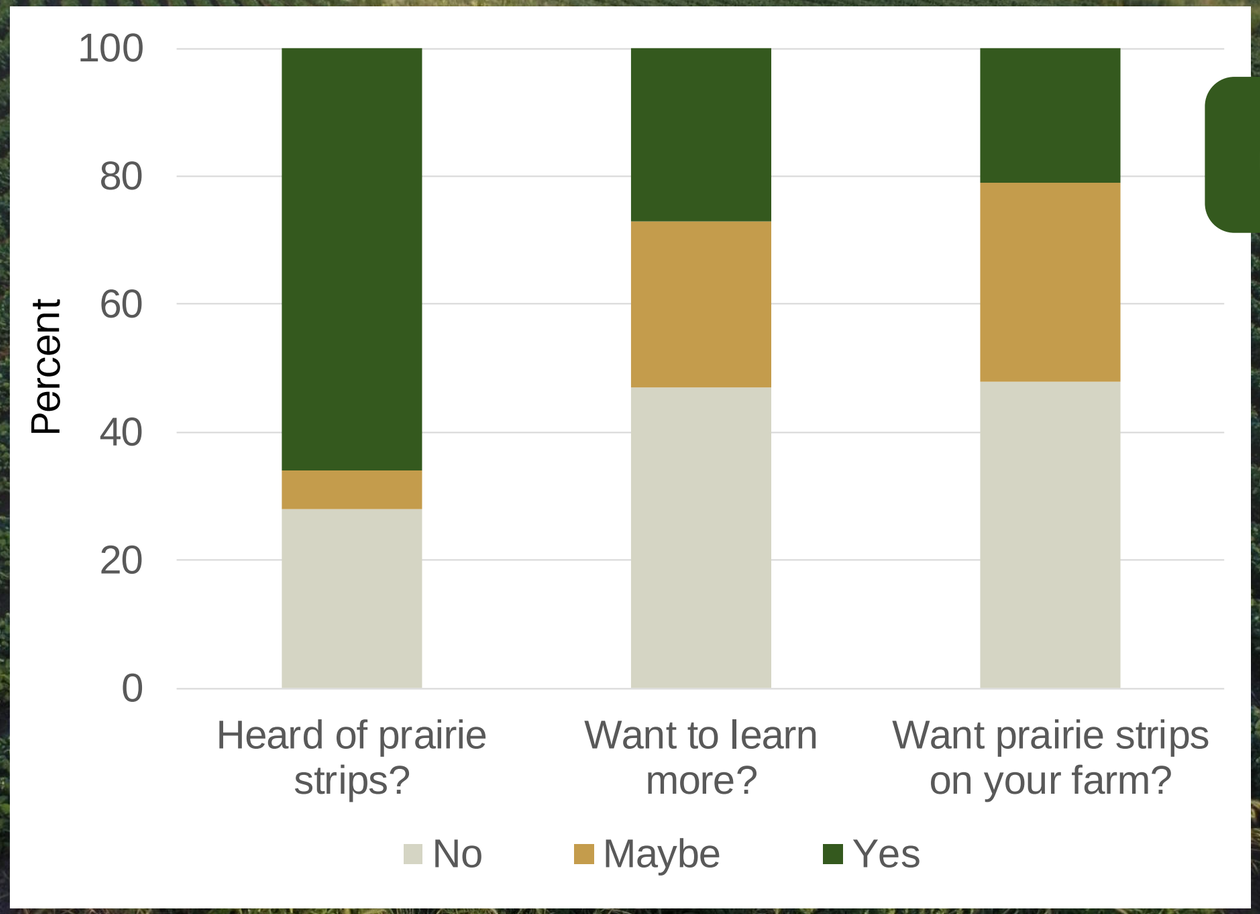

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Farmers are increasingly aware and accepting of prairie strips

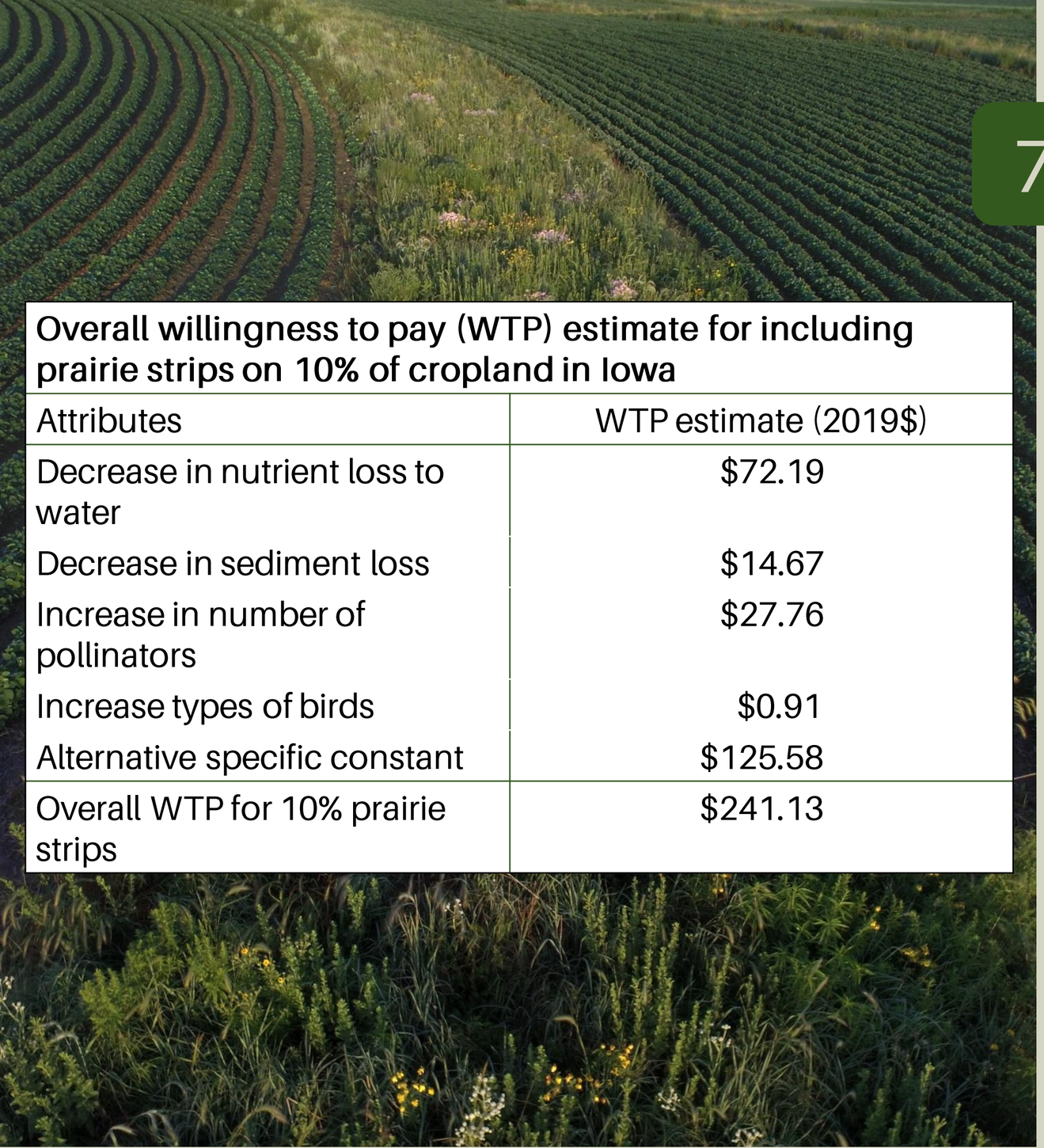
CRP improves adoption

Source: Arbuckle 2020 ISU Extension & Outreach, USDA 2021

9,251
CRP acres with prairie strips

More than
112,707
acres of cropland

13
US states



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Iowans are willing to pay for the benefits associated with prairie strips

Especially nutrient removal

Overall willingness to pay (WTP) estimate for including prairie strips on 10% of cropland in Iowa	
Attributes	WTP estimate (2019$)
Decrease in nutrient loss to water	$72.19
Decrease in sediment loss	$14.67
Increase in number of pollinators	$27.76
Increase types of birds	$0.91
Alternative specific constant	$125.58
Overall WTP for 10% prairie strips	$241.13

Source: Khanal, Schoengold, et al. Unpublished data

Thank You!!!

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More on prairie strips:
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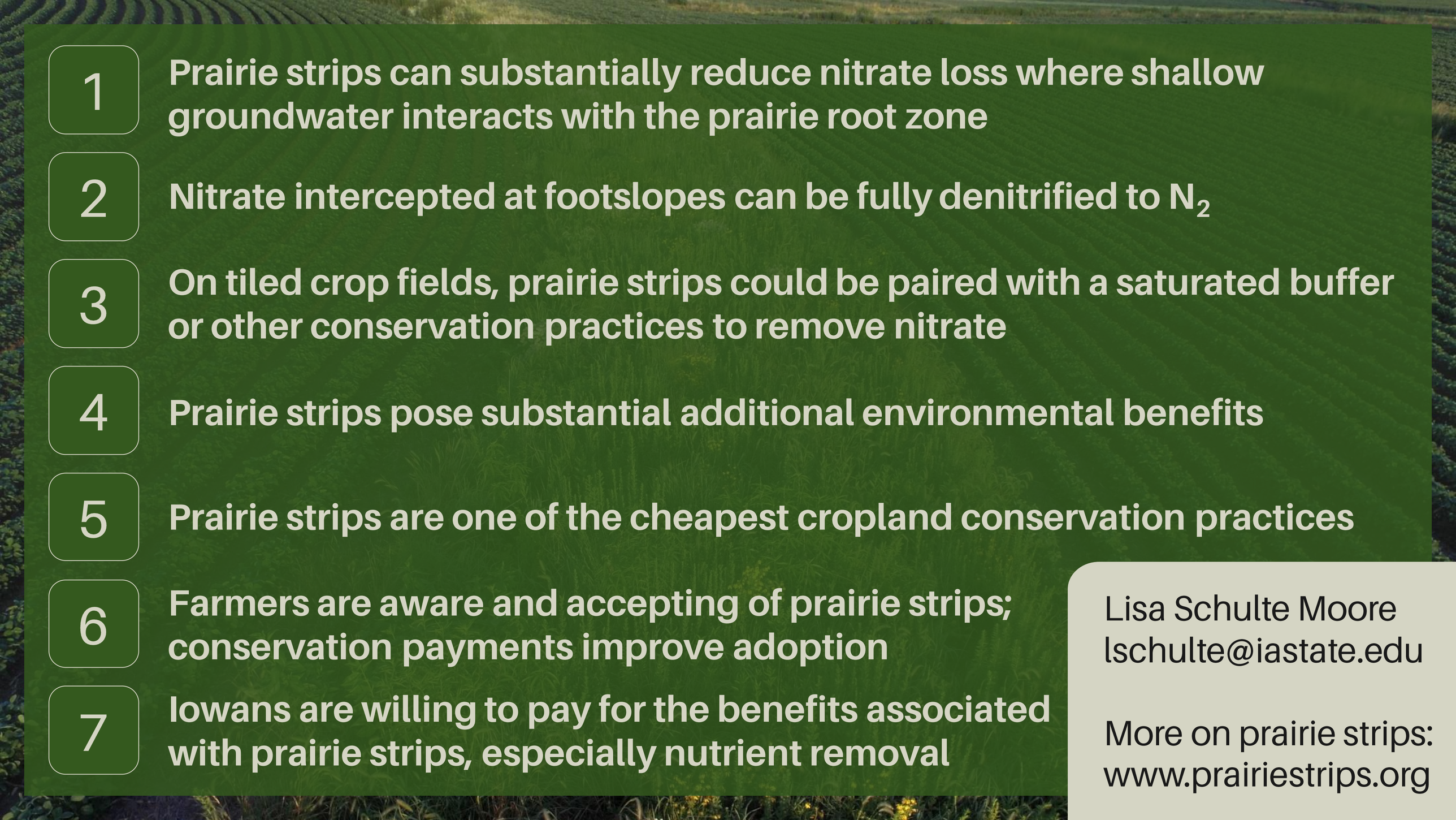

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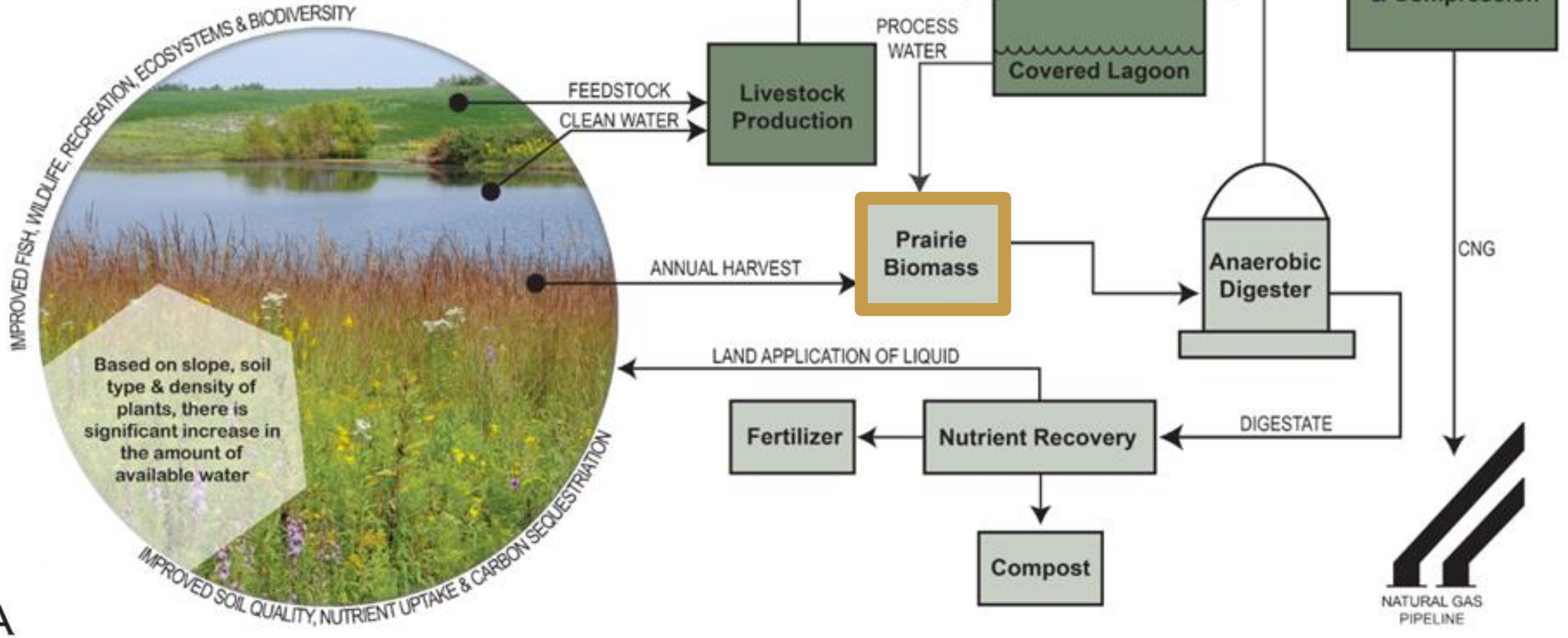
C-CHANGE Grass2Gas
www.agchange.org



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