Increasing the quantity of forb and grass cover can enhance bee and predatory ground beetle abundance

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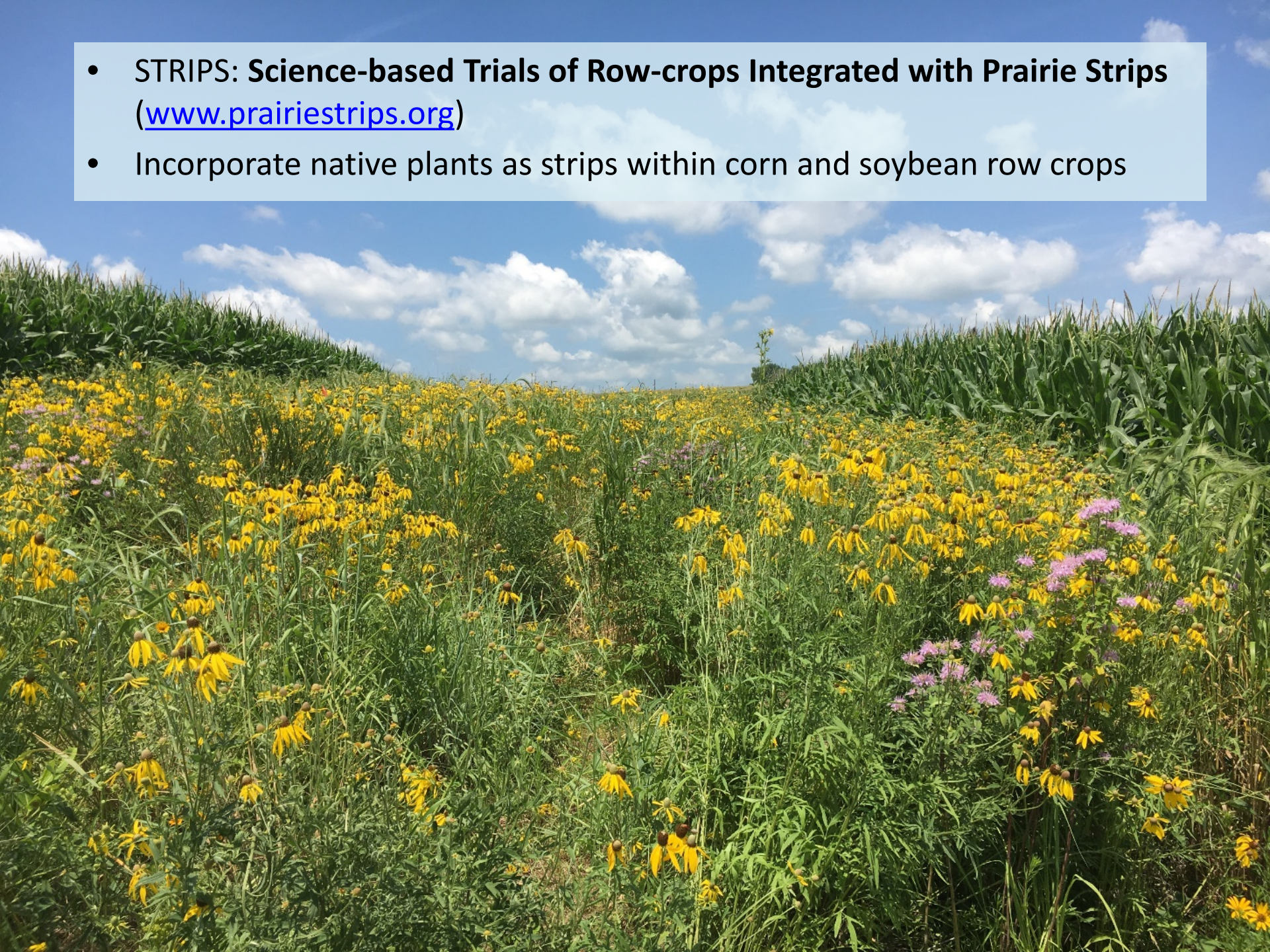
- Over the last several decades a high proportion of **land** in the US including Iowa has been **converted to corn and soybean**

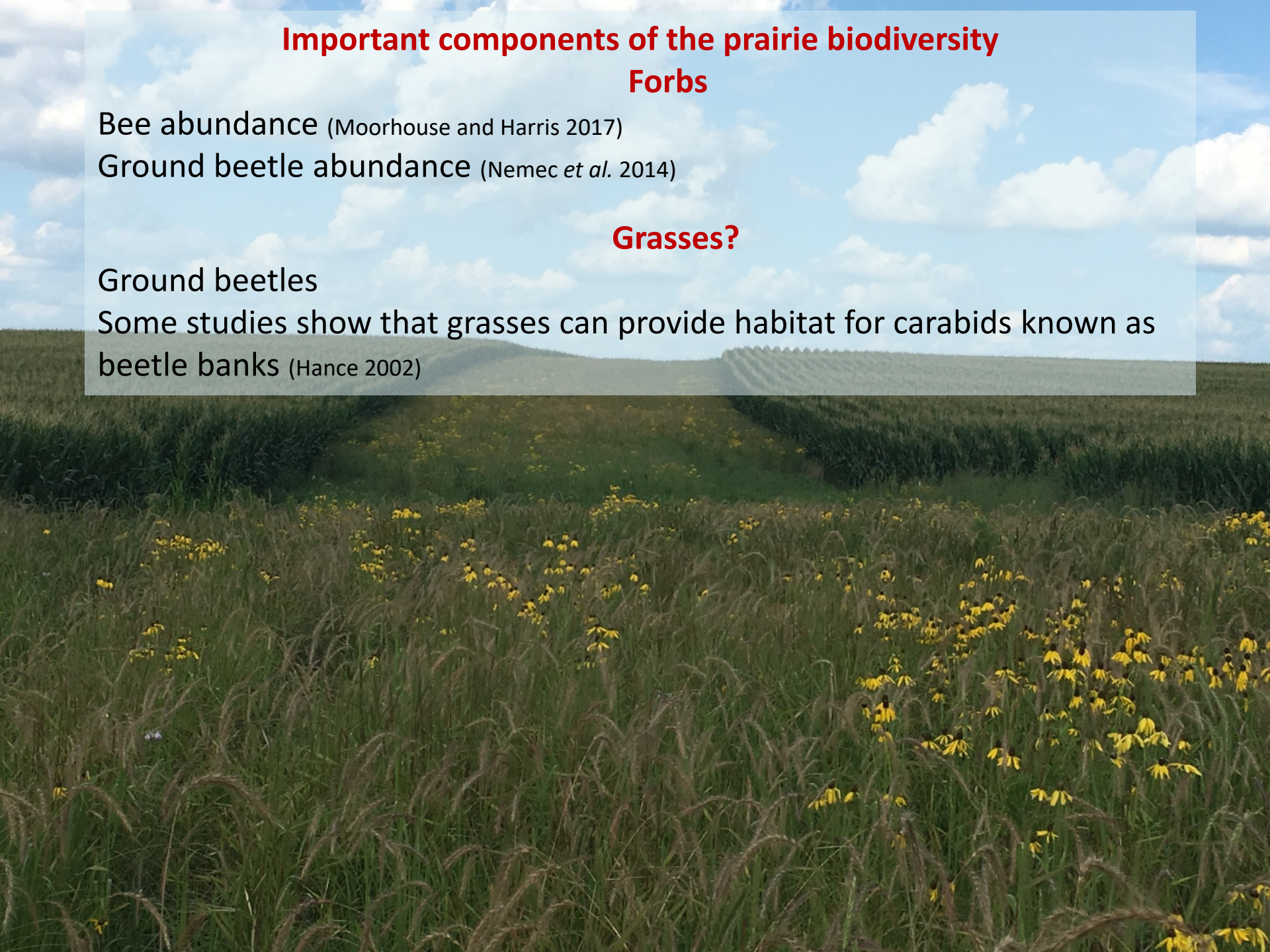
- **Reduction of habitat diversity and resources** supporting bees and ground beetles (Hull Sieg *et al.* 1999, Turner & Rabalais 2003, Robertson & Swinton 2005, Heathcote *et al.* 2013, McGranahan *et al.* 2013, Wright & Wimberly 2013)

Decline of bee and predatory ground beetles

- **Habitat restoration on former cropland is needed**



- STRIPS: **Science-based Trials of Row-crops Integrated with Prairie Strips** (www.prairiestrips.org)
- Incorporate native plants as strips within corn and soybean row crops



Important components of the prairie biodiversity

Forbs

Bee abundance (Moorhouse and Harris 2017)

Ground beetle abundance (Nemec *et al.* 2014)

Grasses?

Ground beetles

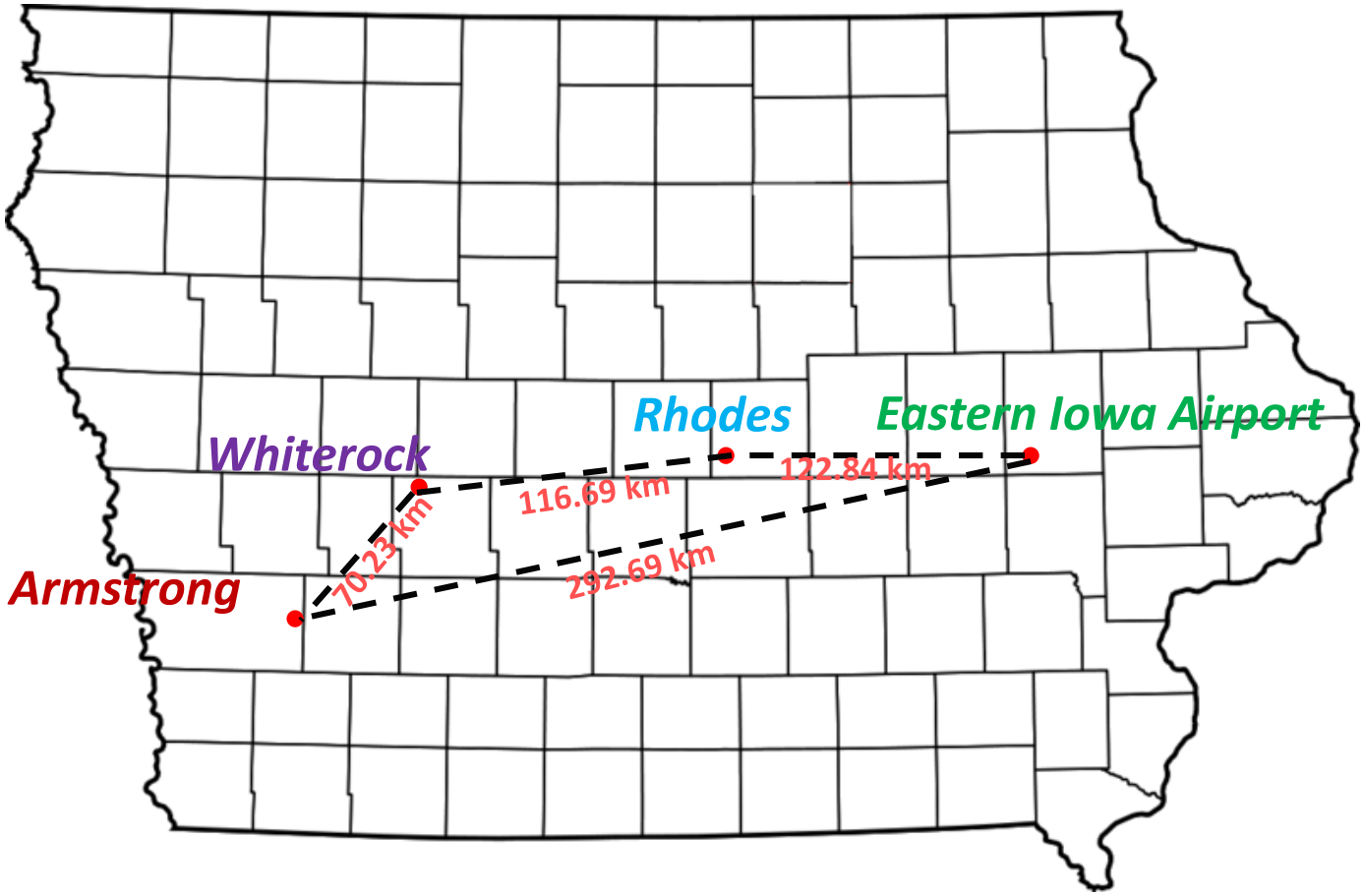
Some studies show that grasses can provide habitat for carabids known as beetle banks (Hance 2002)

Which components of prairie plant communities have the most important roles in maintaining and increasing bee and ground beetle population

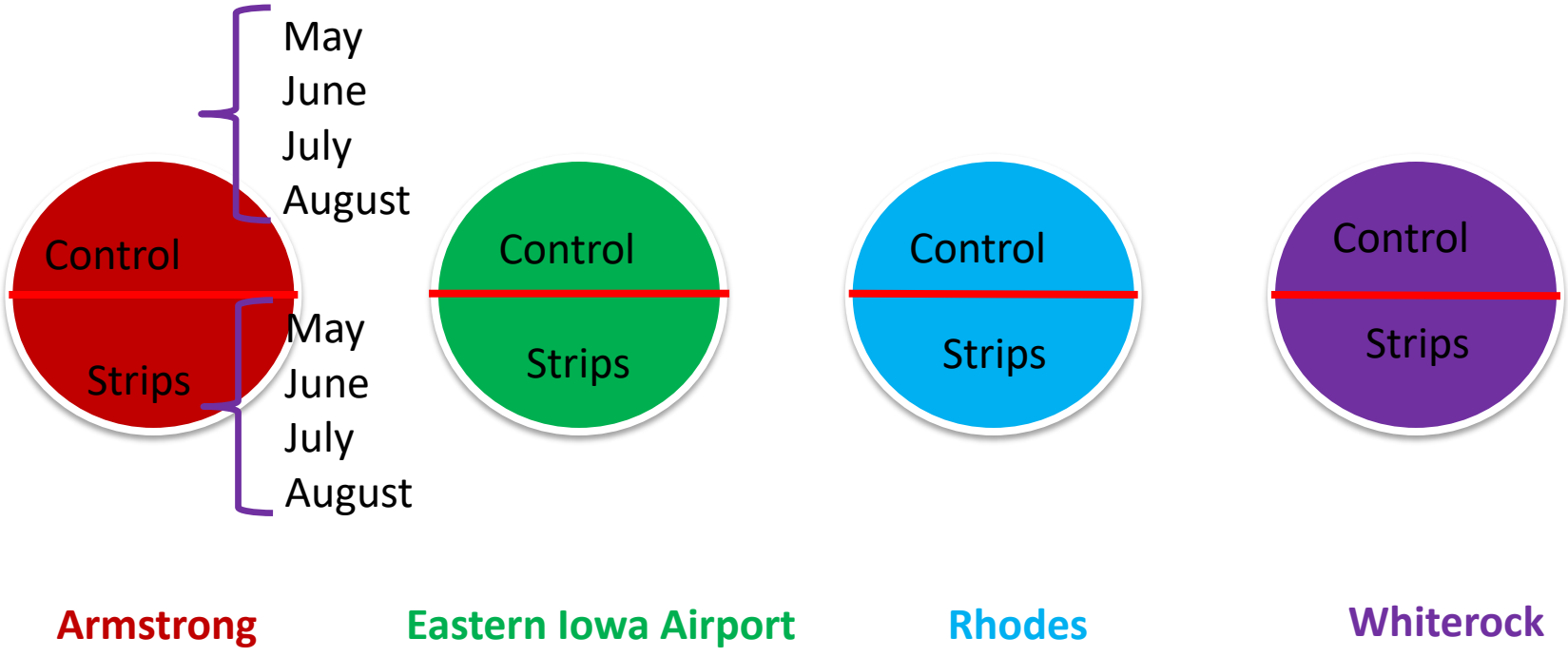
?

MATERIALS & METHODS

Locations of experimental sites in Iowa



Experimental design



Bee trapping methods: standardized pan trapping

(Droege et al. 2010; Roulston et al. 2007)

Bee trapping methods: Blue vane

- Targeted and non-targeted sweeping for 48 minutes (Bryant and Euliss unpub.)

Sample collection after 6 hours

Vegetation monitoring

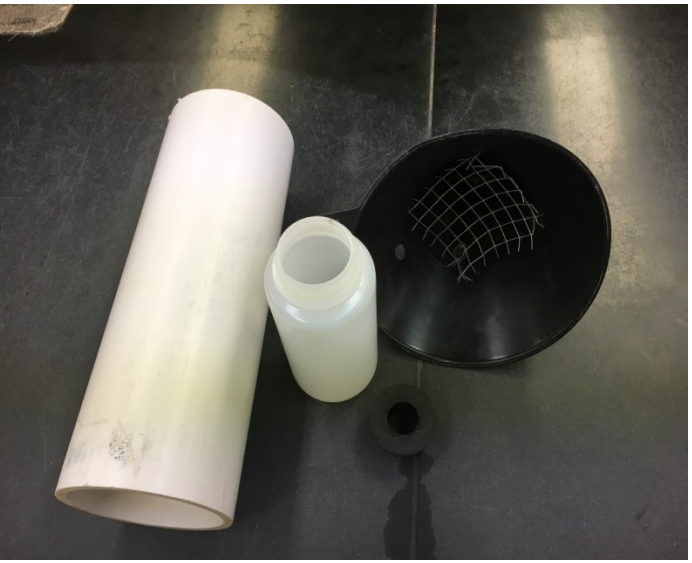
Prairie-Forb

Weed-Forb

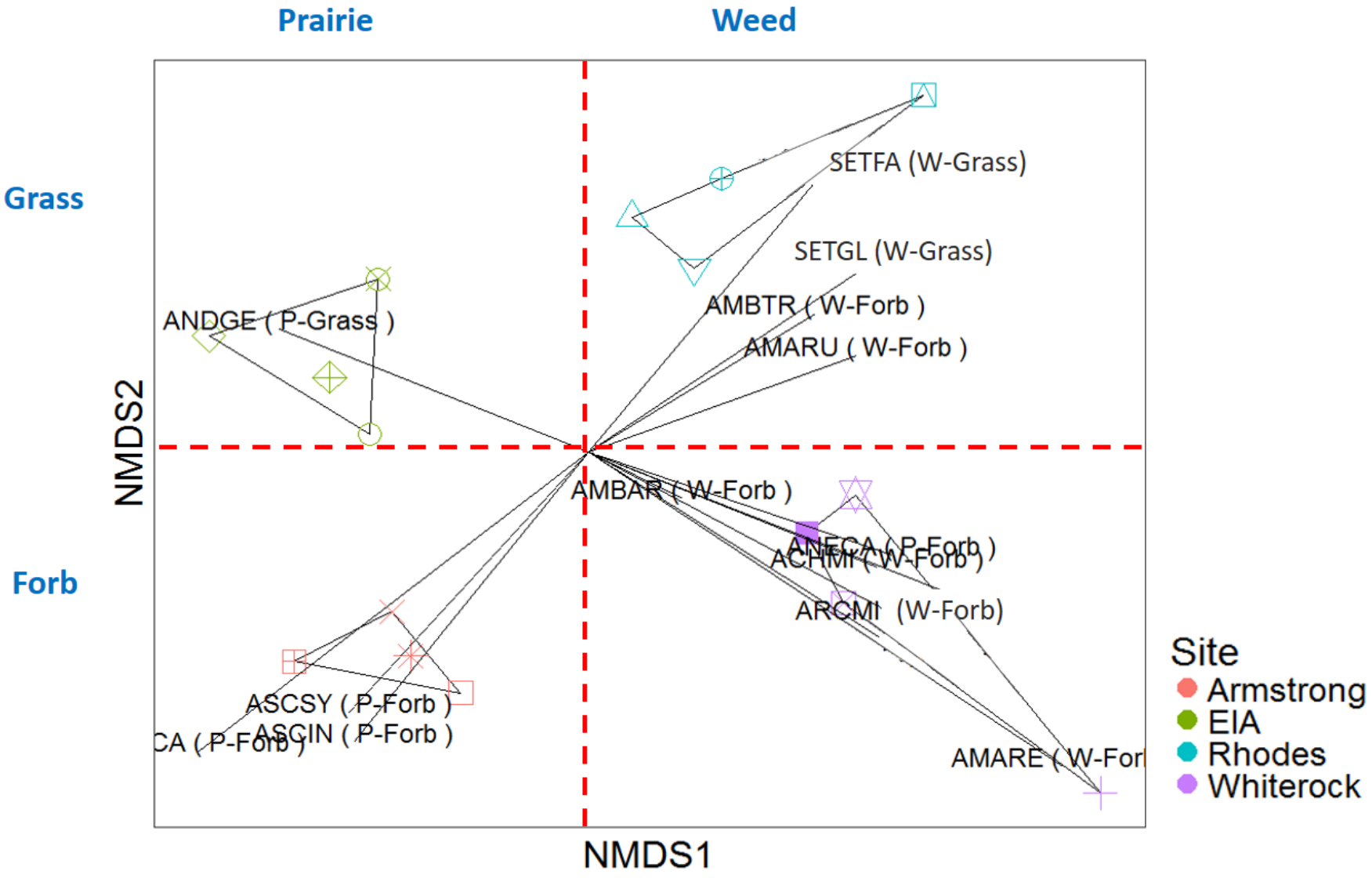
Prairie-Grass

Weed-Grass

Ground beetle Pitfall trap



Are sites different in species composition?

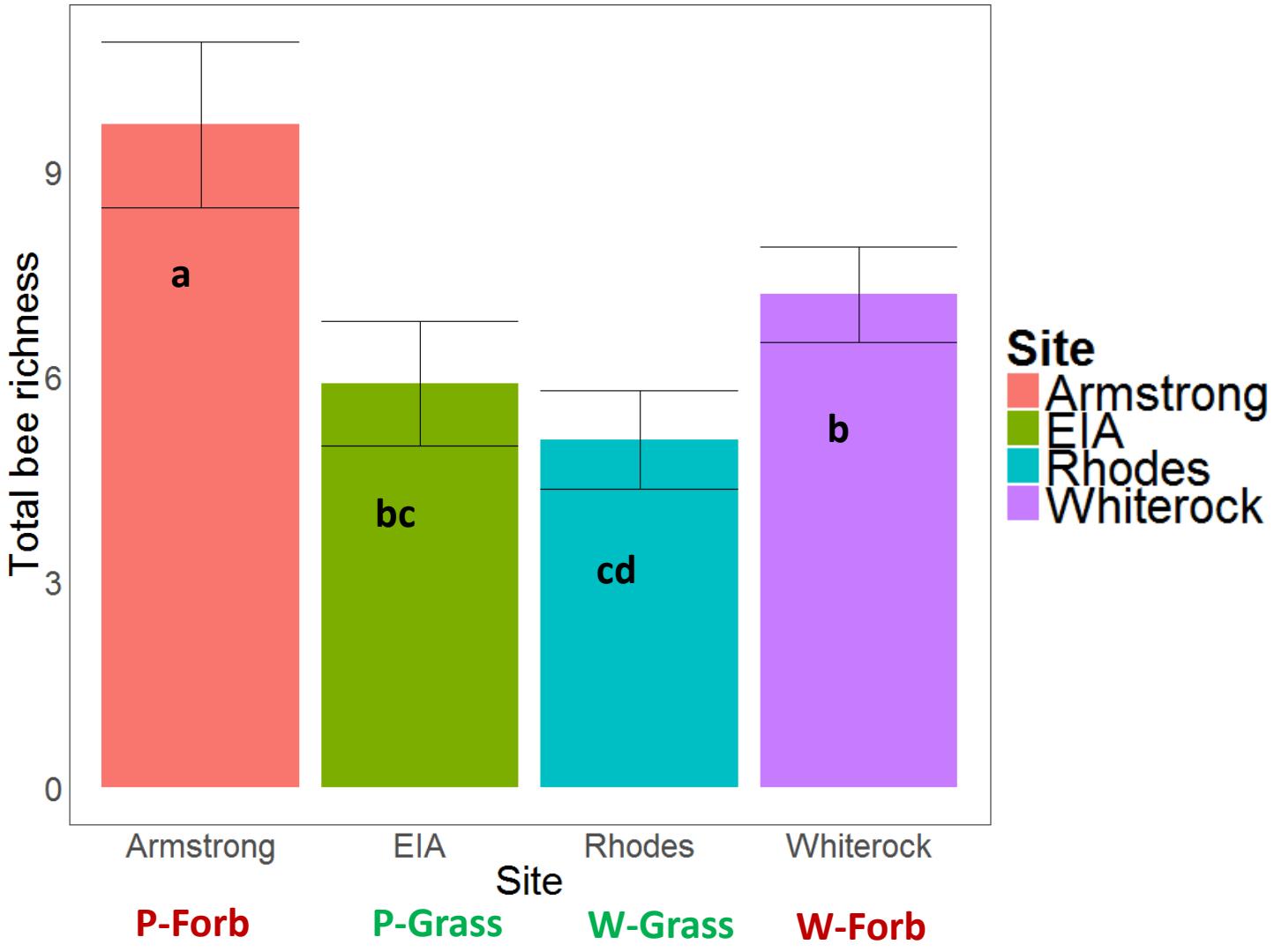


Proportion of Prairie and Weed Species

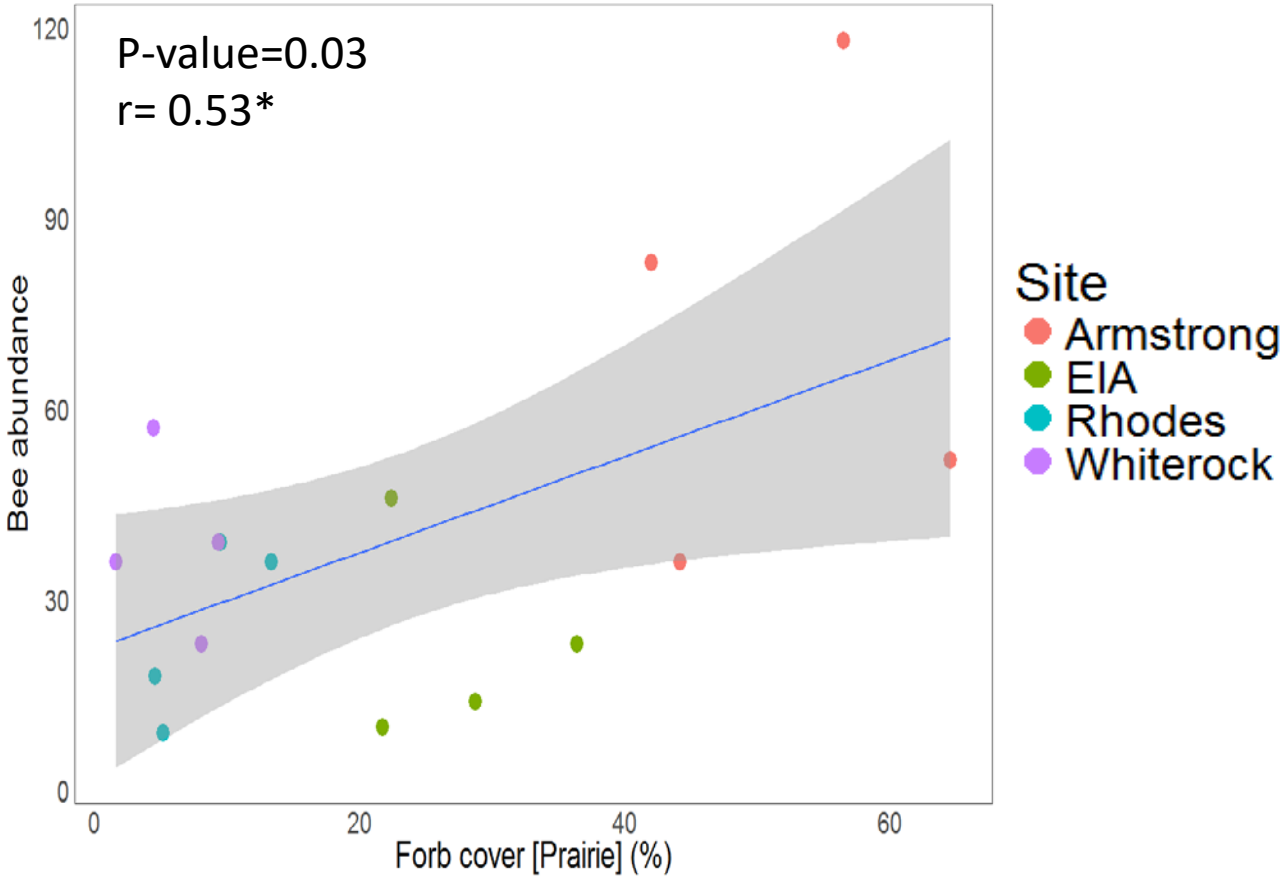
- Armstrong and EIA = Prairie
- Rhodes and Whiterock = Weedy

Total number of individual bees at different sites

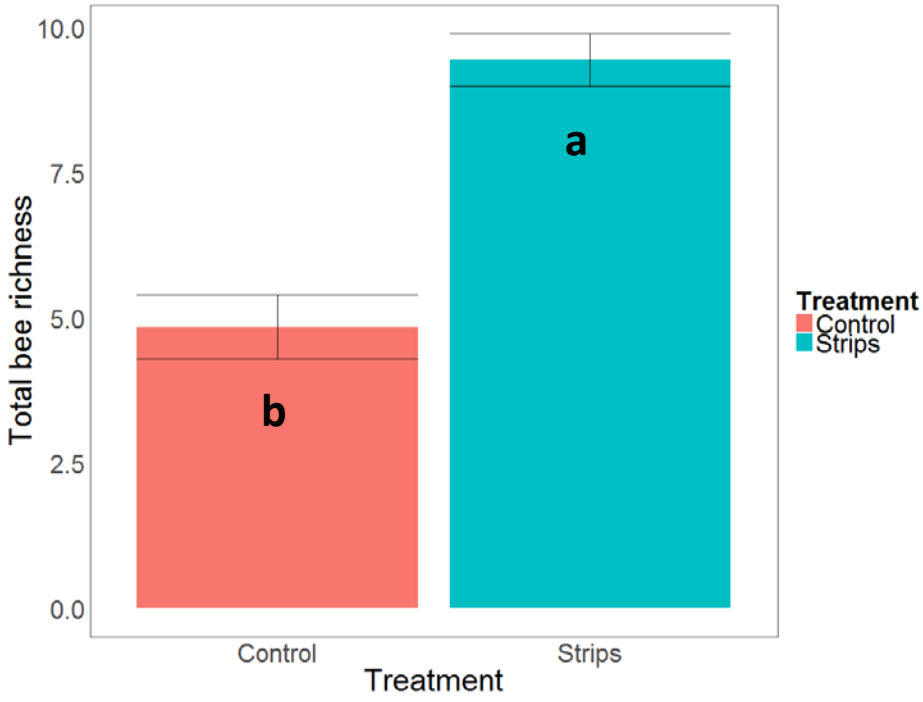
Total number of bee species at different sites

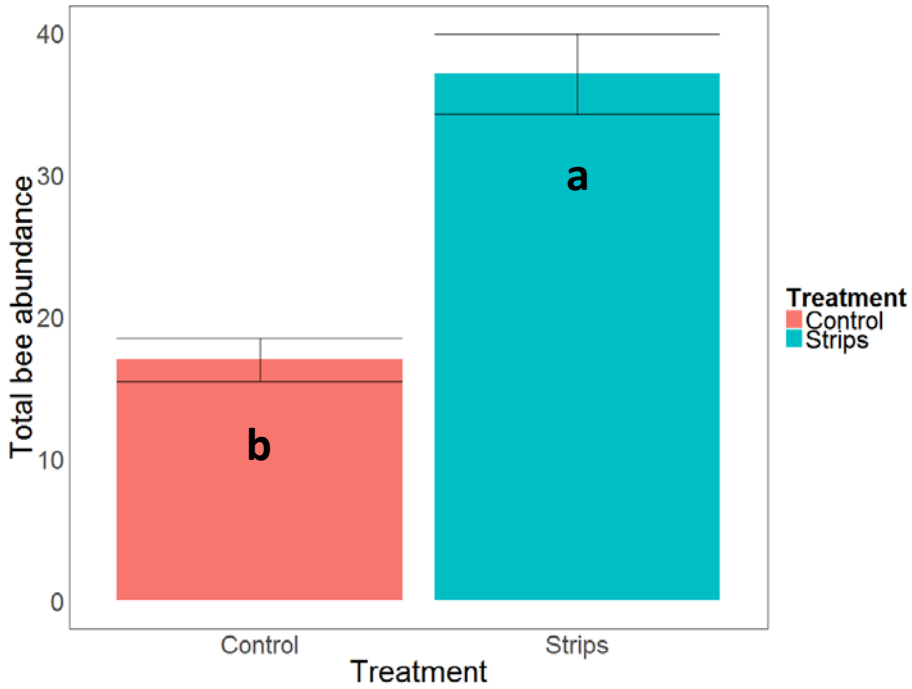


Relationship between total number of individual bees and Forb-coverage (%)

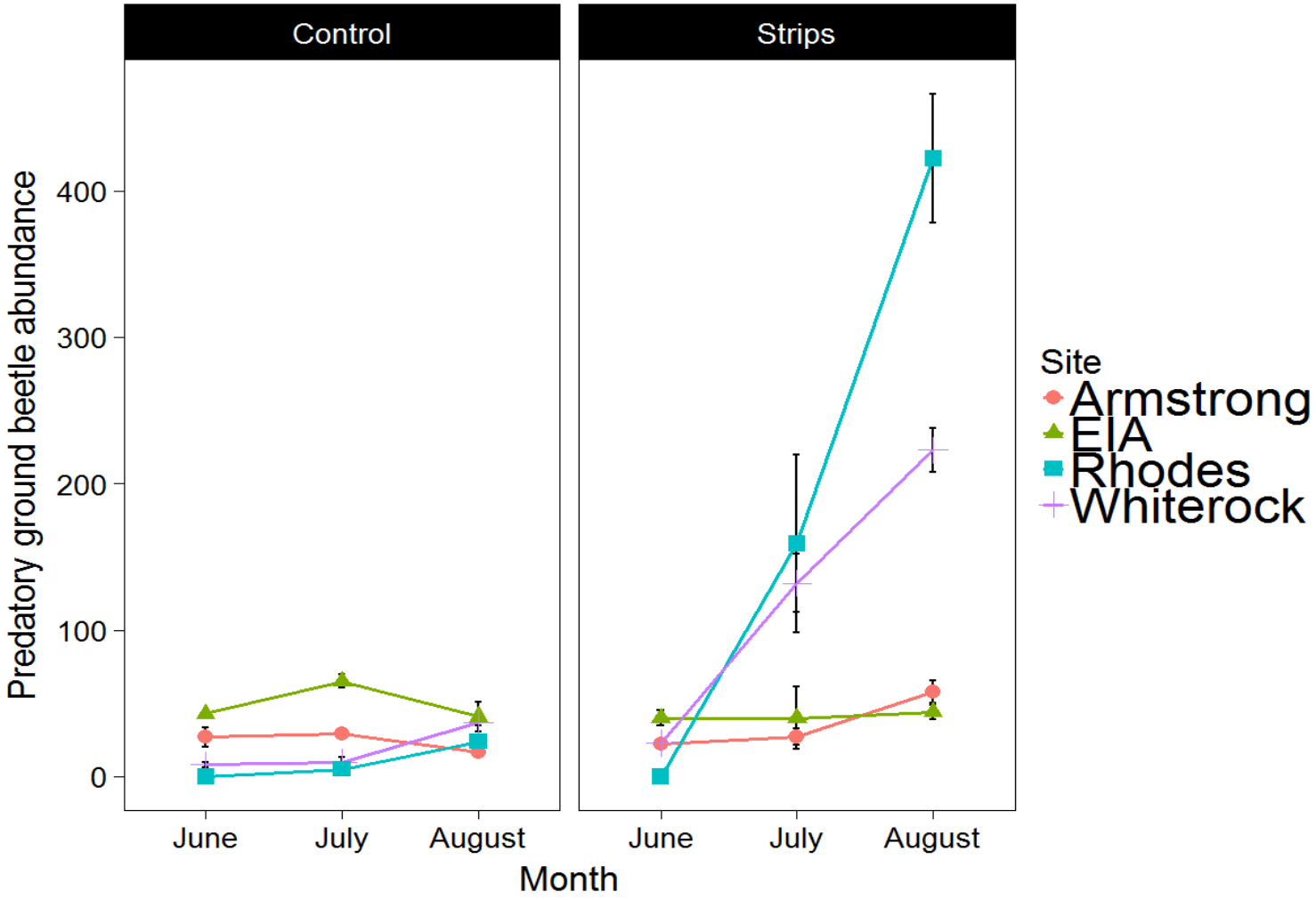


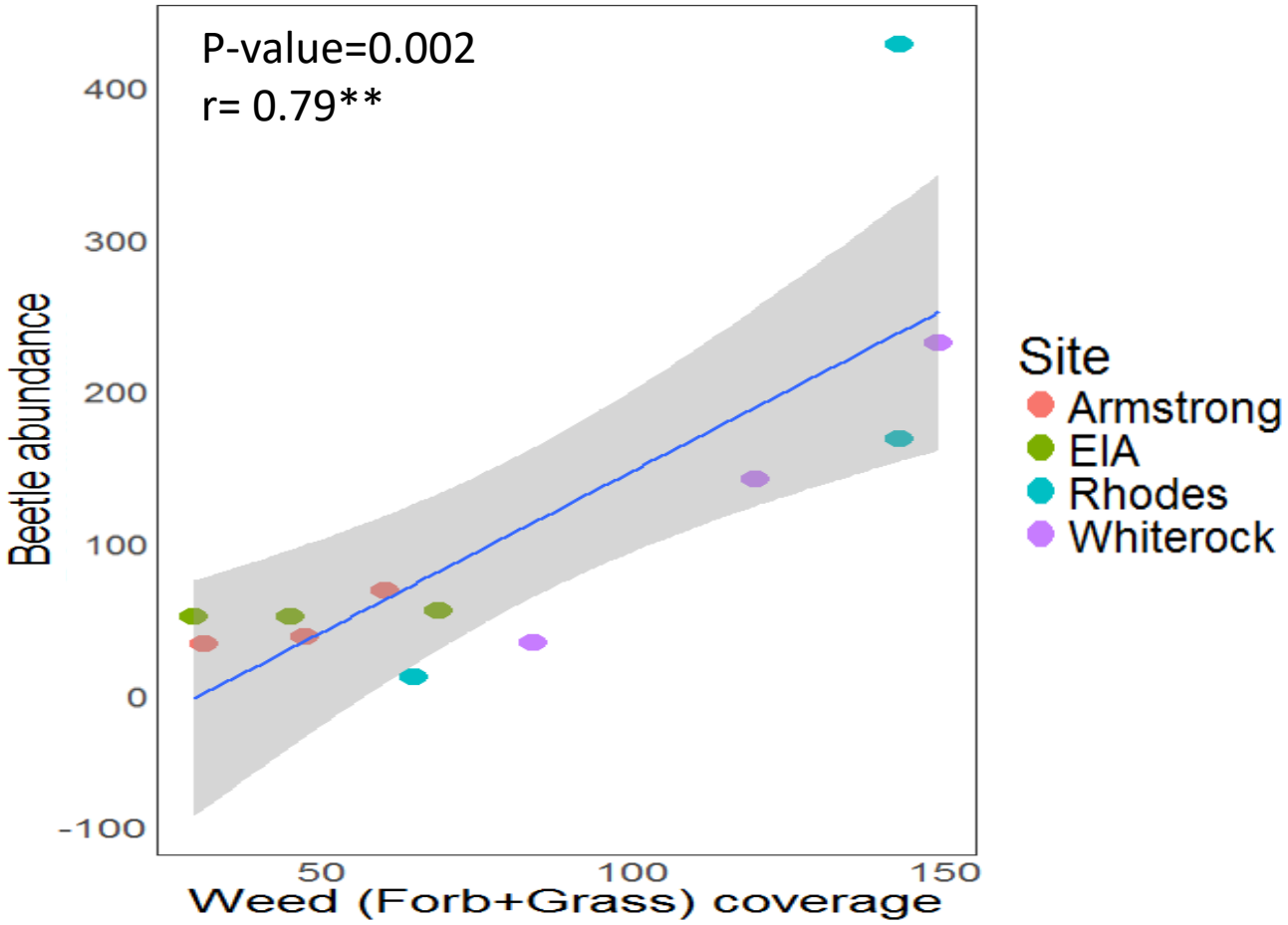
Higher number of species and individuals at strips vs. control





Predatory ground beetle abundance




P-value=0.002
r= 0.79**
400
300
200
100
0
-100
Beetle abundance
50
100
150
Weed (Forb+Grass) coverage
Site
Armstrong
EIA
Rhodes
Whiterock

Conclusion

- Higher forb coverage can increase the bee and ground beetle populations
- However, only the enhancement of weed (forb and grass) can ascend ground beetles abundance

Thank you