

Contributions of managed and wild bumble bees to blueberry pollination



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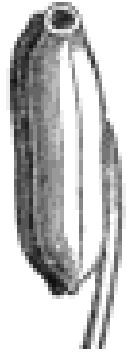


Pollination is essential for fruit production in blueberry



Blueberry is “buzz pollinated”

- Poricidal anthers must be sonicated to release pollen
- While many genera of bees use this behavior, *Apis* does not



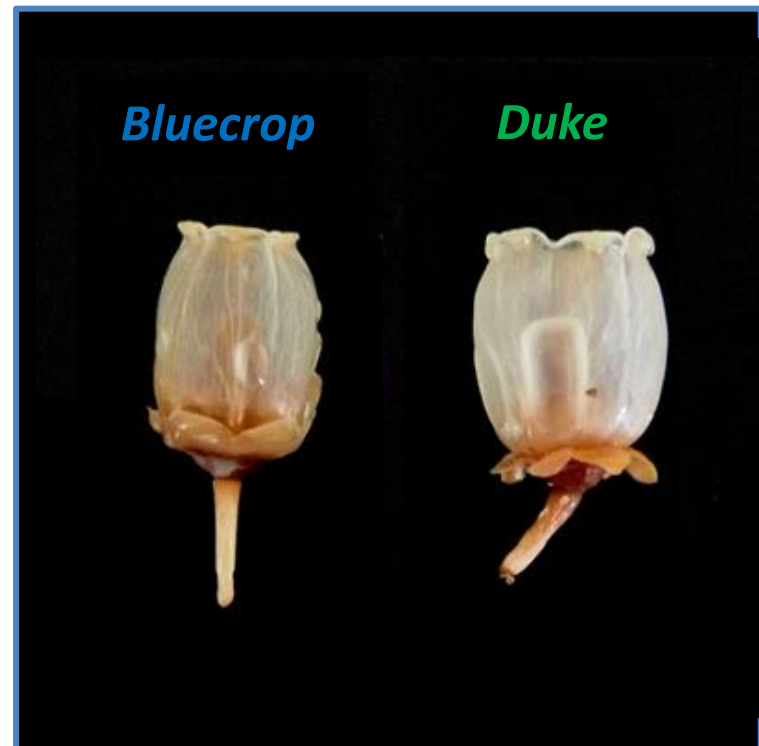
Visit quality differs among bees

- Honey bees forage for nectar, rarely collect pollen from blueberry (Mackenzie 1994, Javorek et al 2002)
- *Bombus*, *Andrena* transfer more pollen per visit and have higher visit rates (Javorek et al 2002)



Visit behavior varies among cultivars

- In BC, honey bees visits to Bluecrop are 50% less frequent than visits to Duke
- 43% of “visits” to Bluecrop are nectar robbing



Our premise....

- An integrated pollination system that includes managed honey bees *and* managed and wild other bees should provide pollination insurance for blueberry

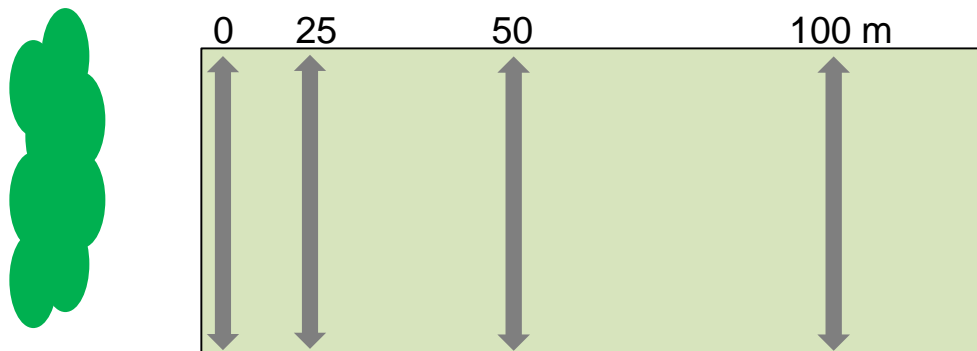


Questions

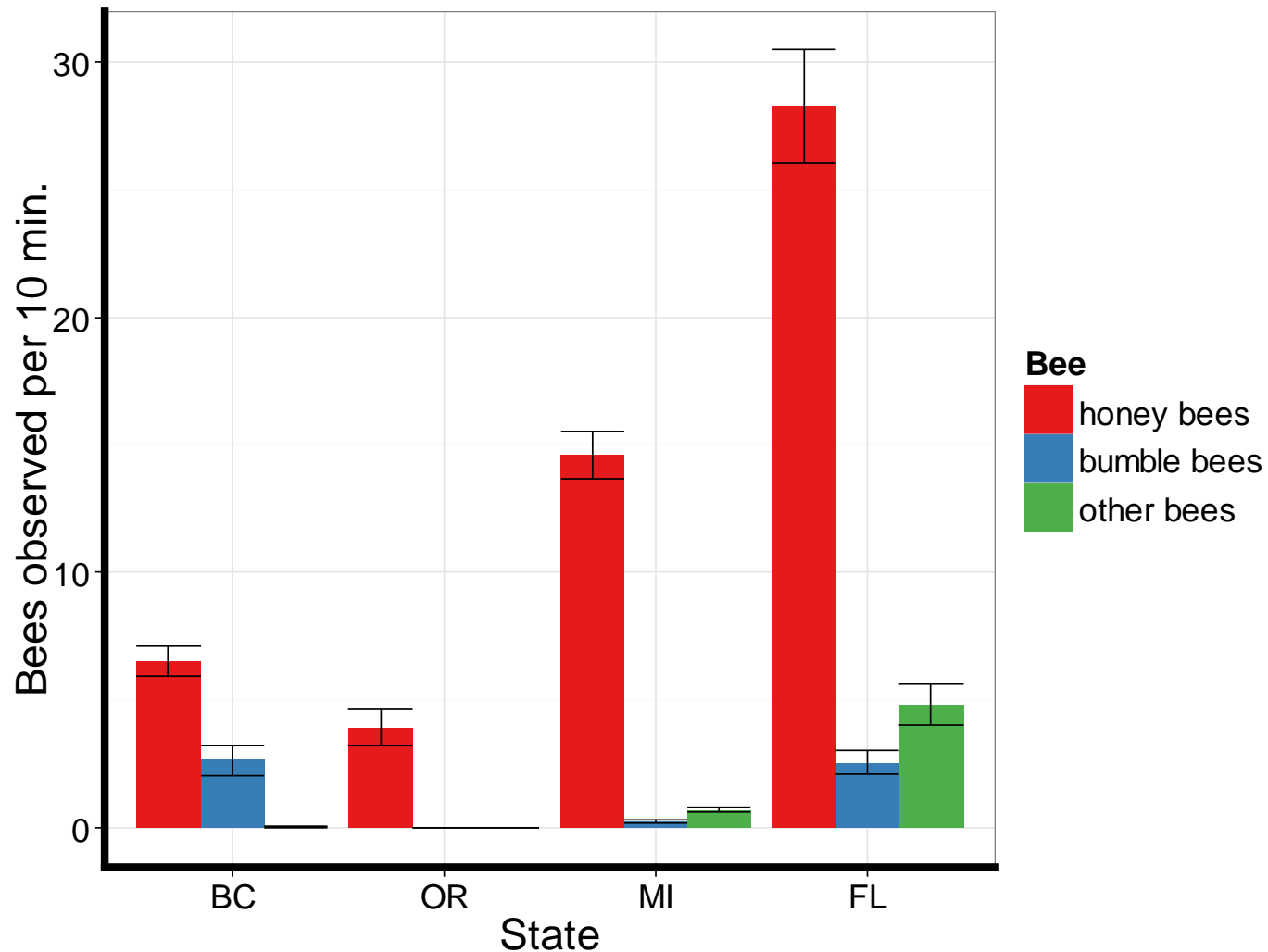
- What are the pollination needs in blueberry, and how do they vary across North America?
 - Visit rates, pollination deficits
- Can diversifying managed bees reduce pollination deficits in blueberry?
 - Bumble bee enhancements

General setup

- Project ICP studies blueberry pollination in British Columbia, Oregon, Michigan, Florida
- Visit rates, fruit set, fruit weight are evaluated at 4 distances from “natural habitat”



Do flower visitors and visit rates differ among regions?



Are there pollination deficits?

- Compare fruit number and weight among three treatments
 - Bagged vs. Open: contribution of pollinators
 - Hand vs. Open: pollination deficit

Pollinators excluded (Bagged)



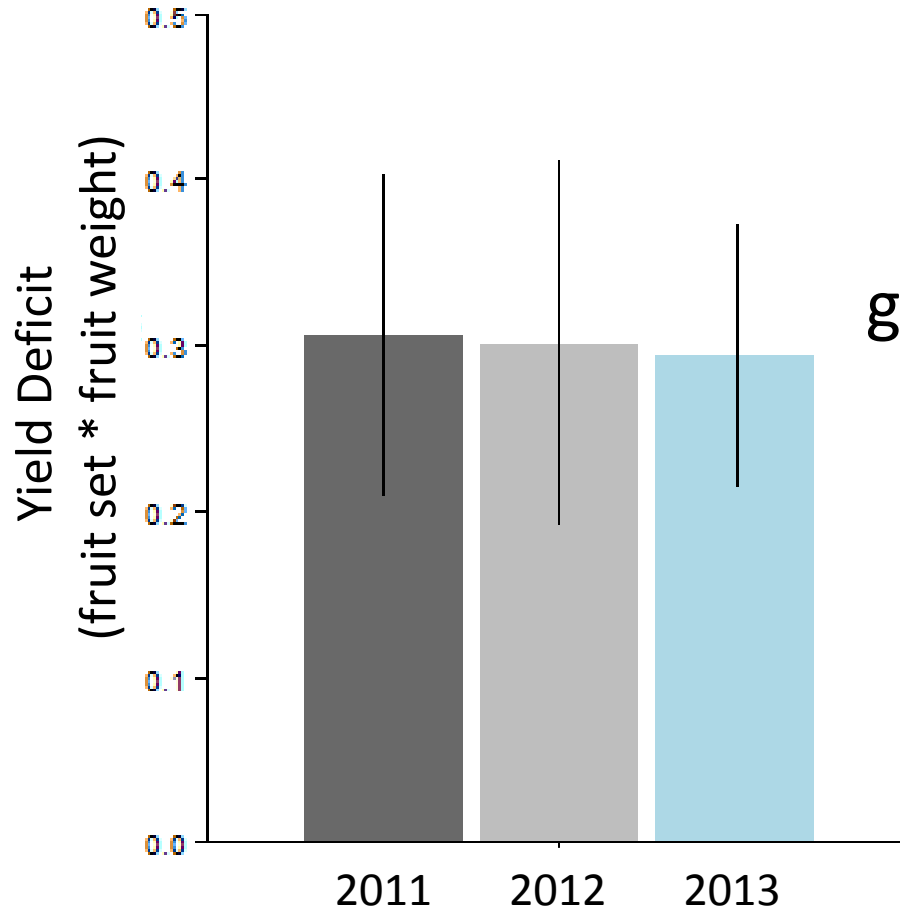
Pollen addition (Hand)



Ambient pollination (Open)

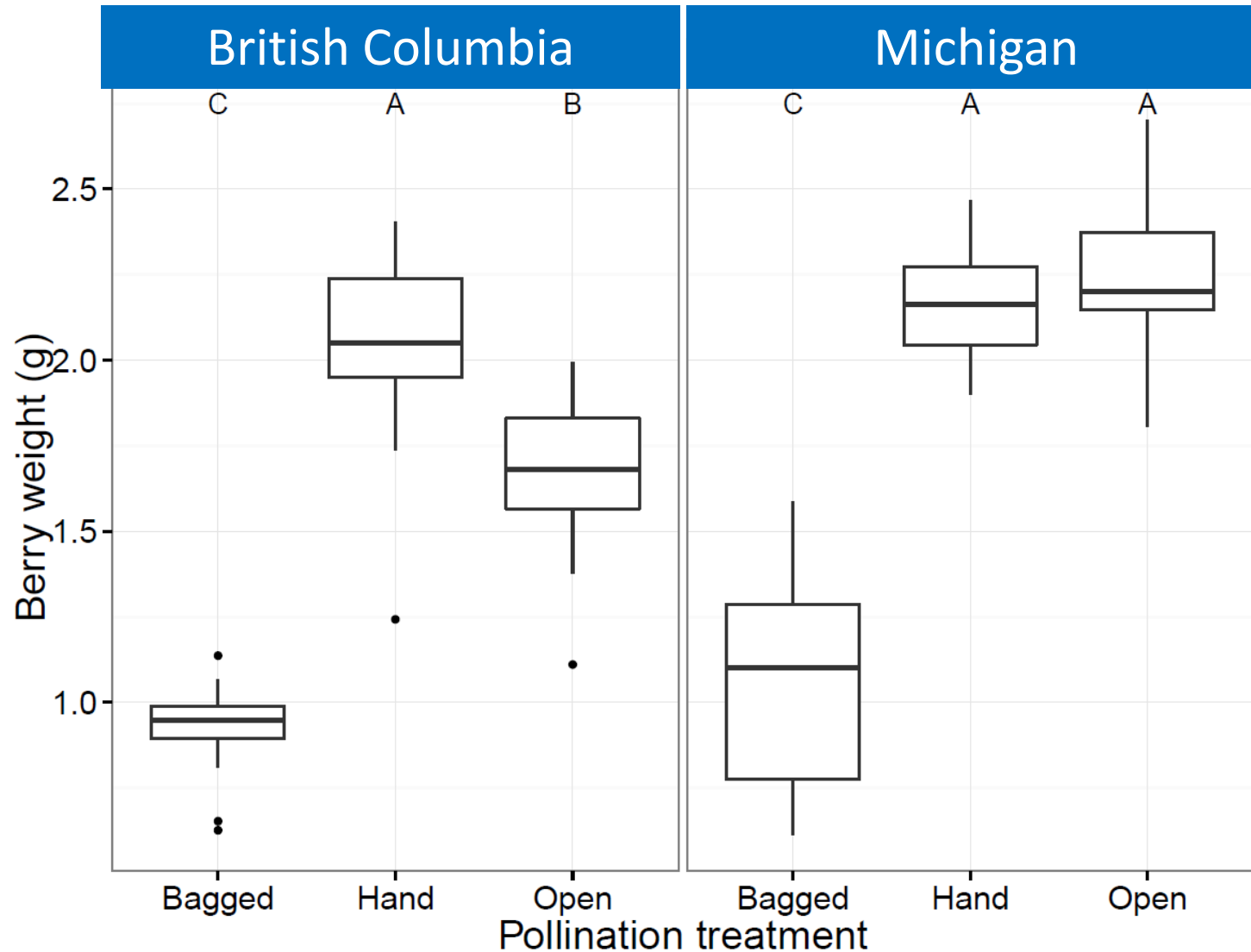


Pollination deficits are common in BC

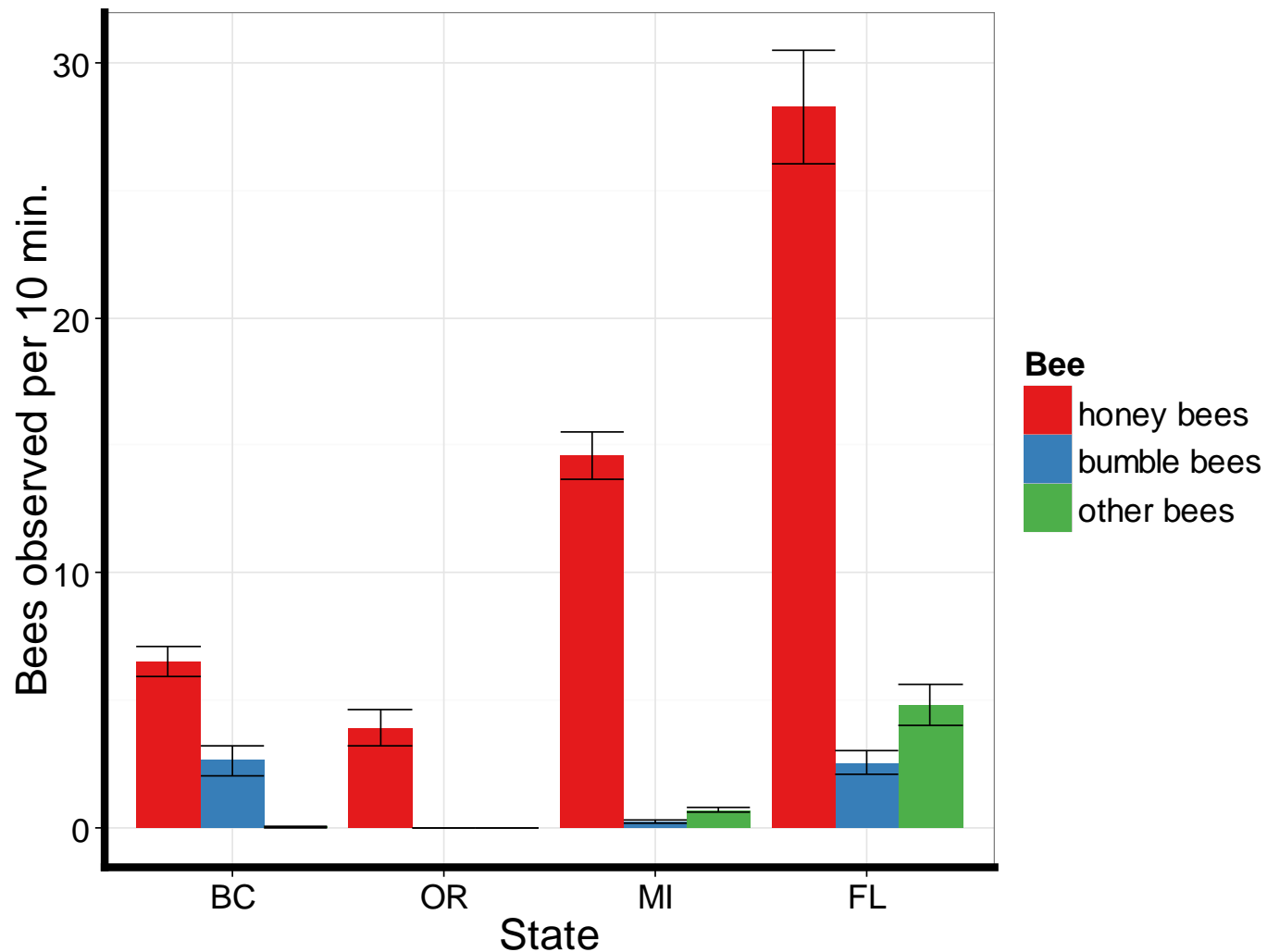


These deficits cost growers an estimated
\$18,000/ha
of lost income!

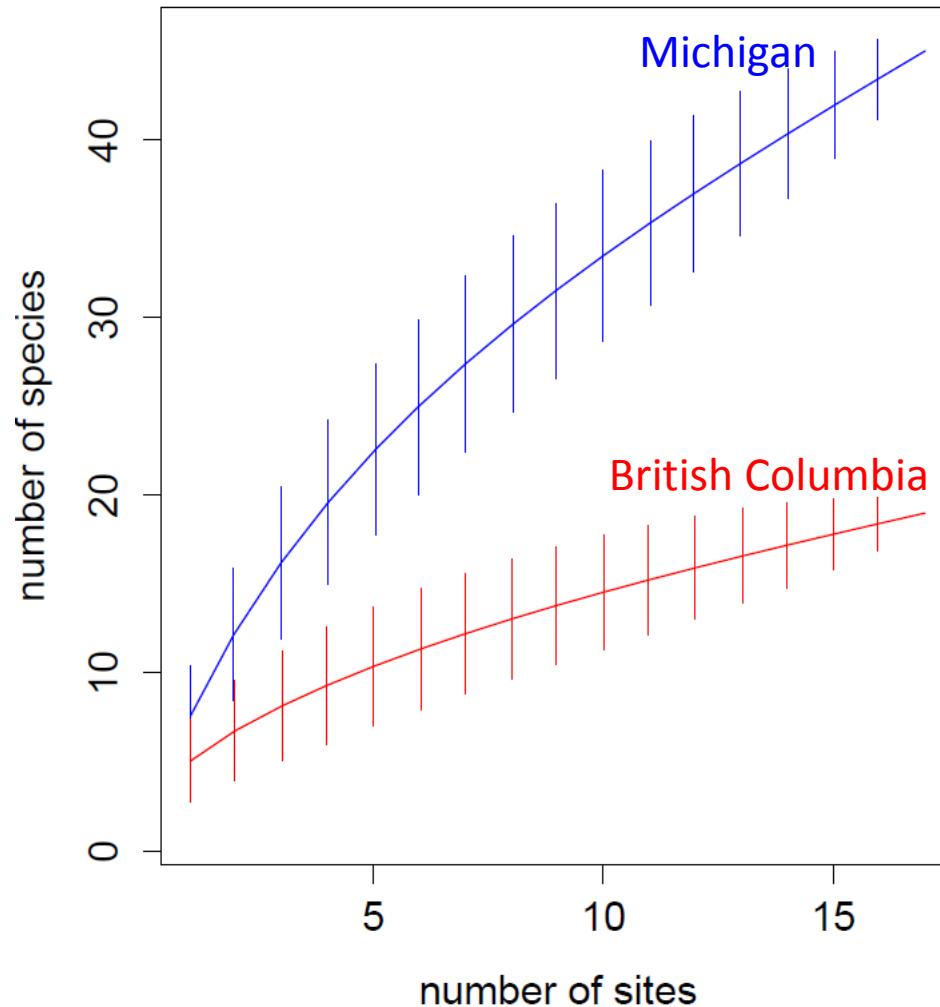
Pollination deficits do not occur everywhere



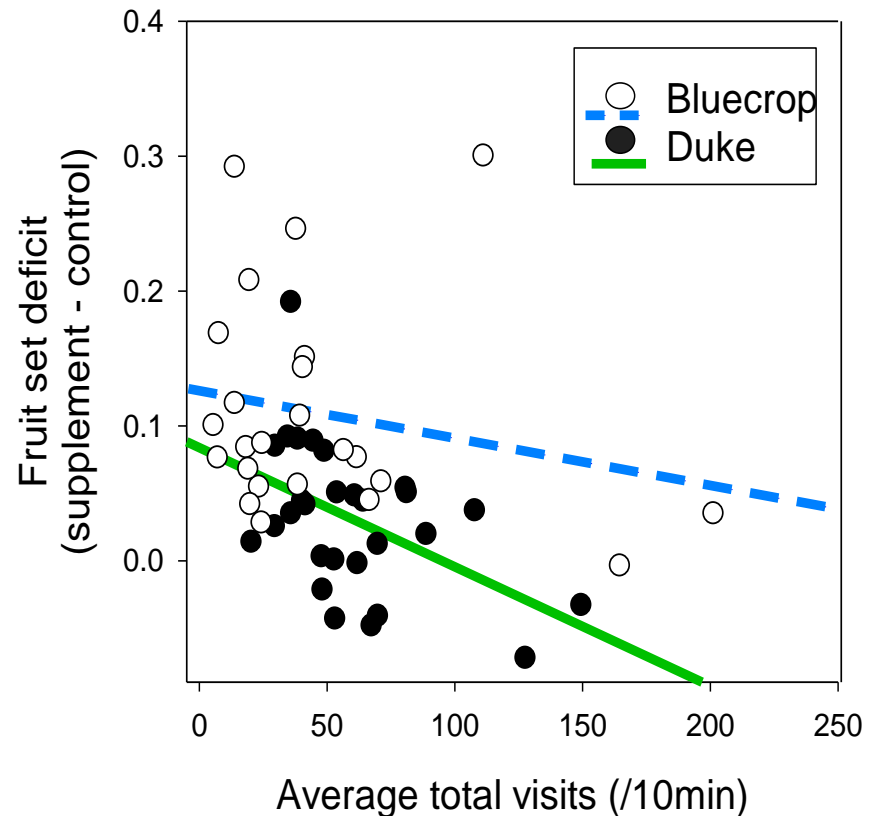
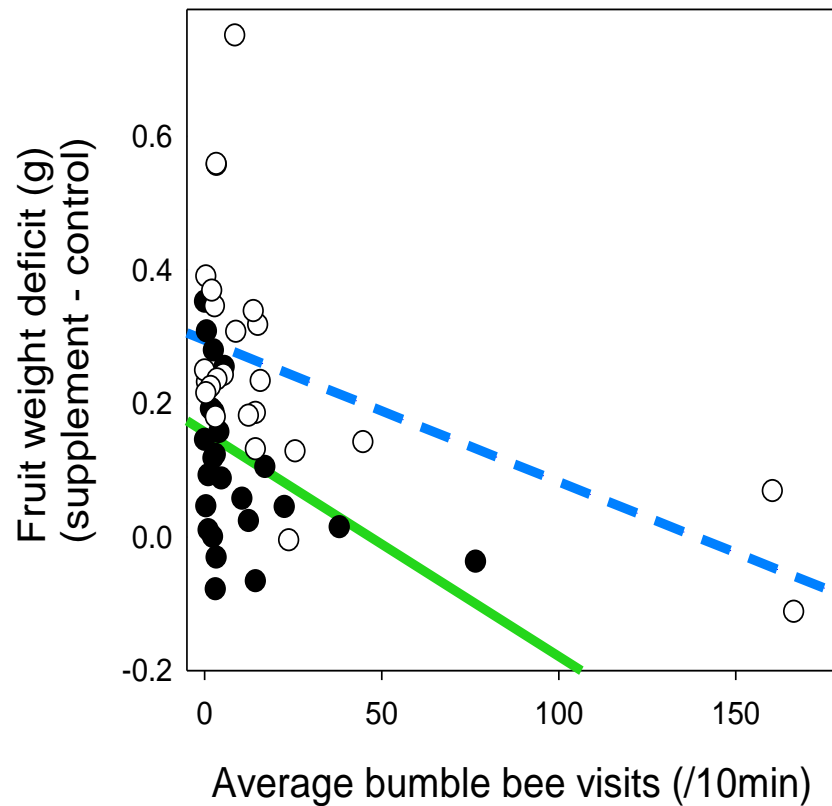
Flower visitors and visit rates differ among regions



Michigan has greater wild bee species richness



Deficits in BC reduced with more wild bumble bees in the landscape

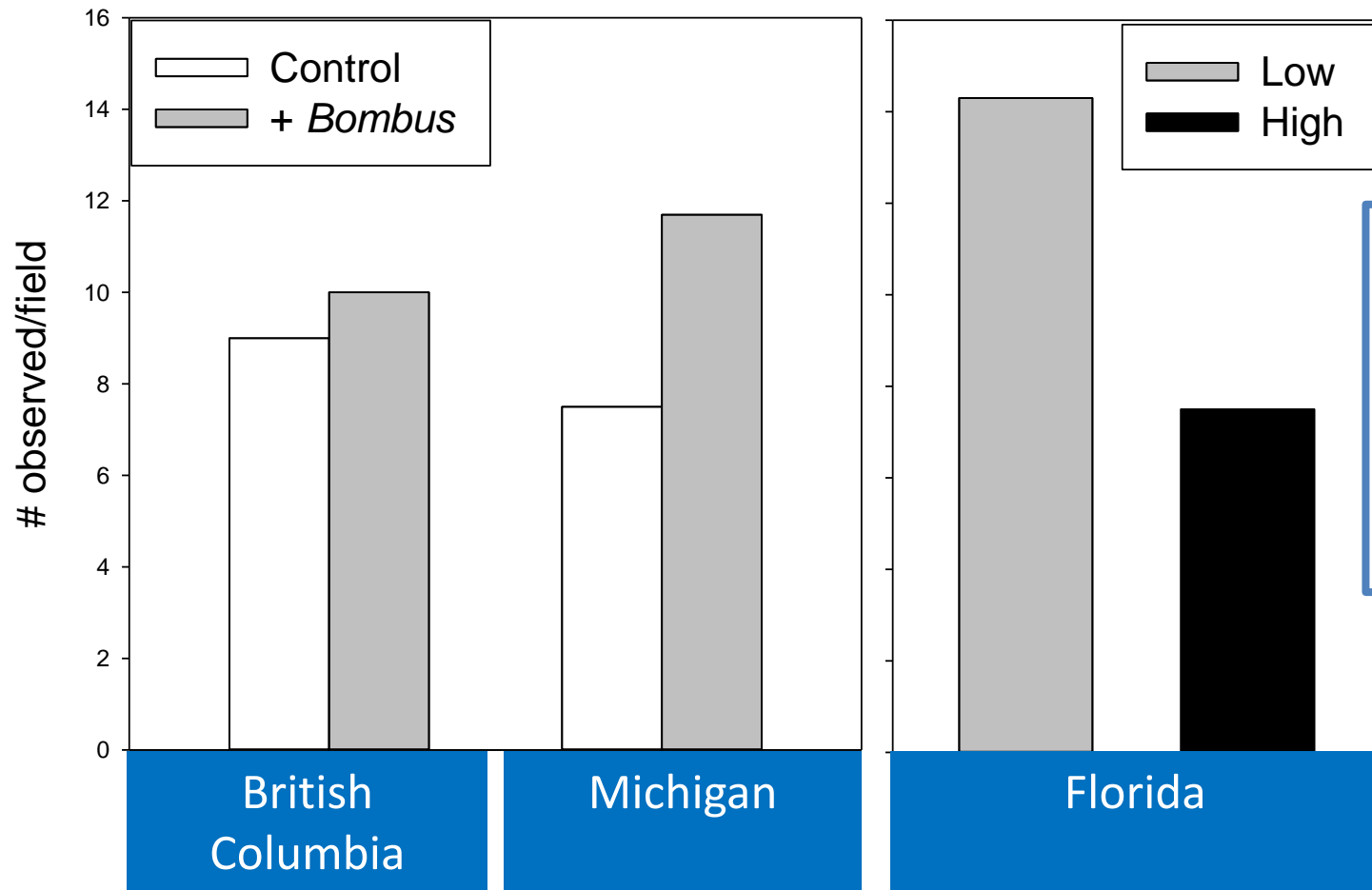


Can adding managed bumble bees improve pollination?

- FL: low vs. high
 - Low: 3 fields, 1 colony/acre
 - High: 2 fields, 3 colonies/acre
- MI and BC: control vs. addition
 - 6 fields per treatment
 - Added 6 quads/field in MI, 2 quads/field in BC; all about 2 colonies/acre relative to Bluecrop acreage

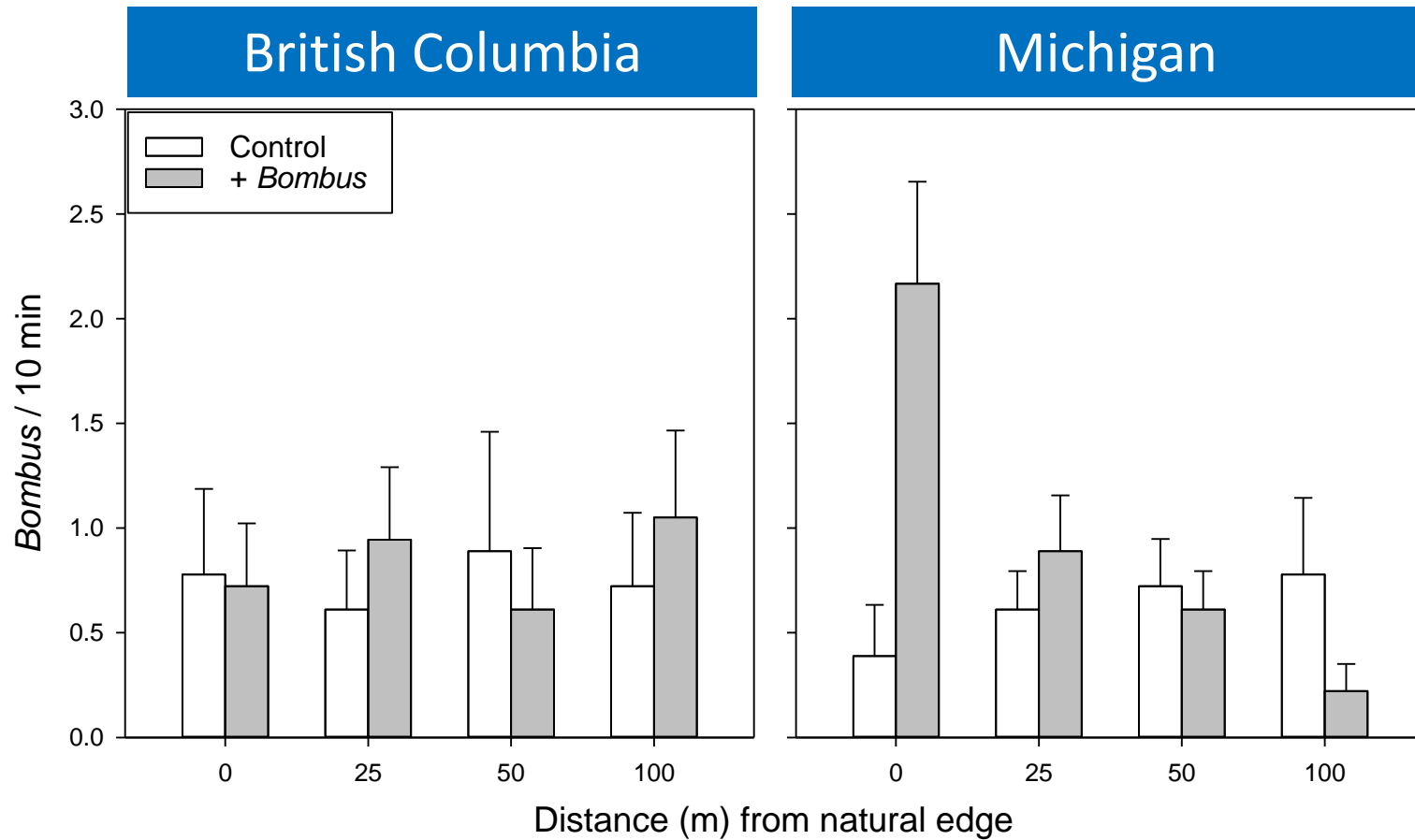


Bumble bees/field across treatments and regions



Similar
PROPORTION
of *Bombus* in
Low vs. High
Fields

Abundance varied with treatment, location, and distance from field edge



Still to come....

- Yield in control vs. bumble bee addition fields
- Foraging strength, colony size & health



Summary

- Floral biology suggests we need integrated pollination recommendations for blueberry
- Pollination deficits vary across regions—but do they vary over time?
- Managed bumble bee additions may be beneficial in some regions

