

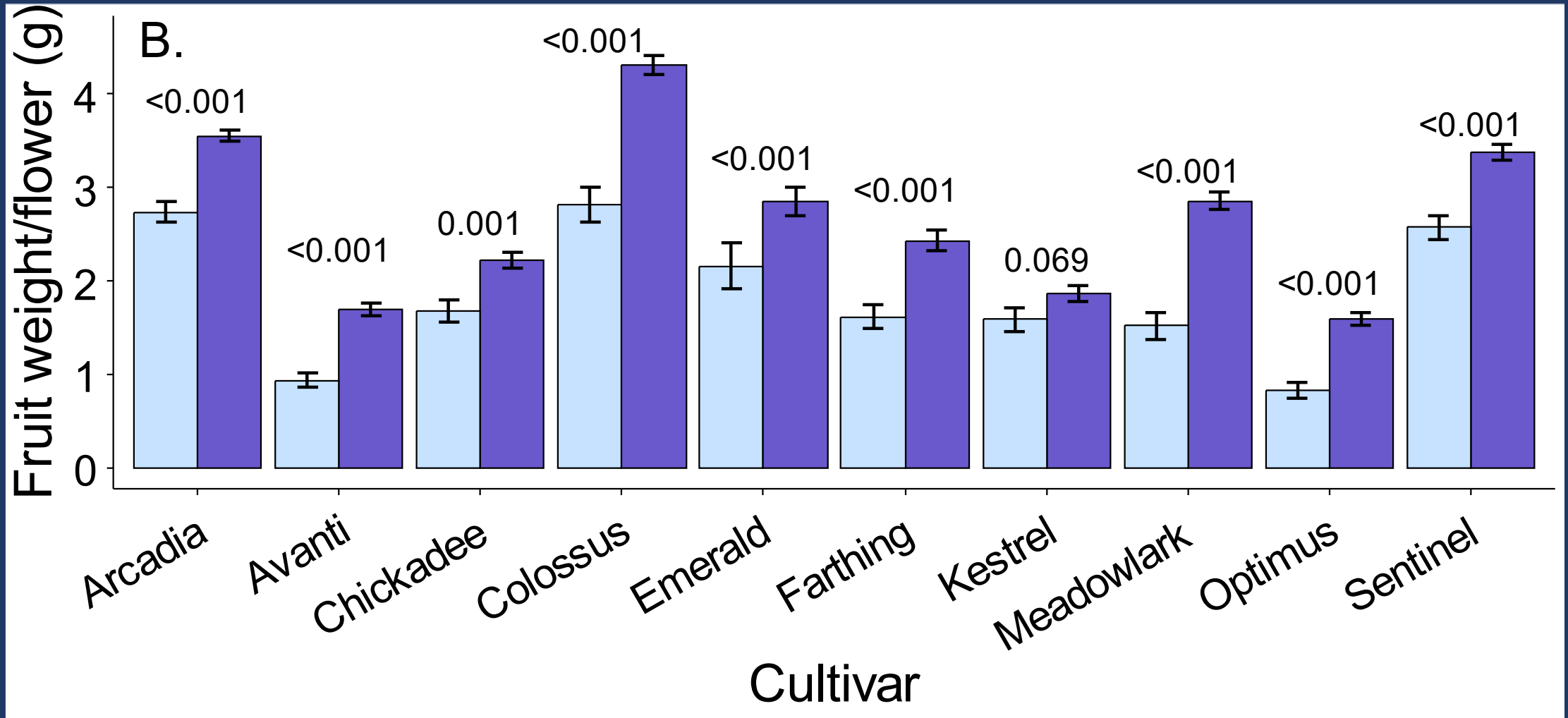
Pollination requirements of new cultivars and optimal planting designs for cross-pollination

Rachel Mallinger, University of Florida

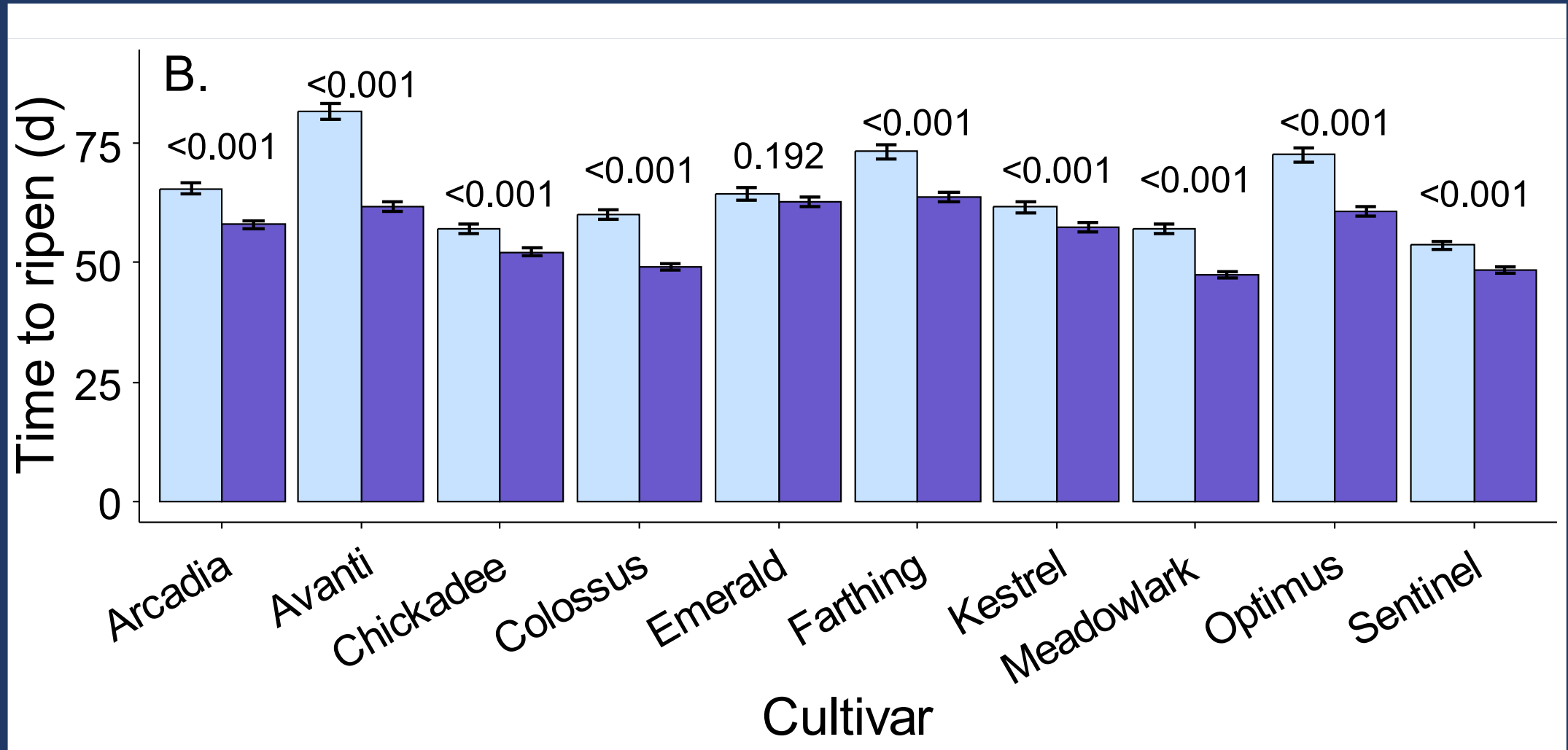
Clement Larue, University of Florida



Cross-pollination increases yield for all cultivars; up to 95%



Cross-pollination reduces time to ripen for 9 of 10 cultivars by up to 20 days



Who does cross-pollination increase berry weight and decrease time to ripen?



Karen Hokanson · Jim Hancock

Early-acting inbreeding depression in three species
of *Vaccinium* (Ericaceae)

Cross-pollination Improves Fruit Quantity and Quality Across Northern and Southern Highbush Blueberry Cultivars

Authors: Stan Chabert, Lisa W. DeVetter, Rufus Isaacs, Shiala Naranjo Morales, Jenna Walters, and Rachel E. Mallinger

Click on author name to view affiliation information

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Benefits of Mixed Cultivar Plantings for Cross-Pollination in Blueberry: A Guide to Maximize Yields¹

Clement Larue, Stan Chabert, Doug Phillips, and Rachel Mallinger²

Current Research

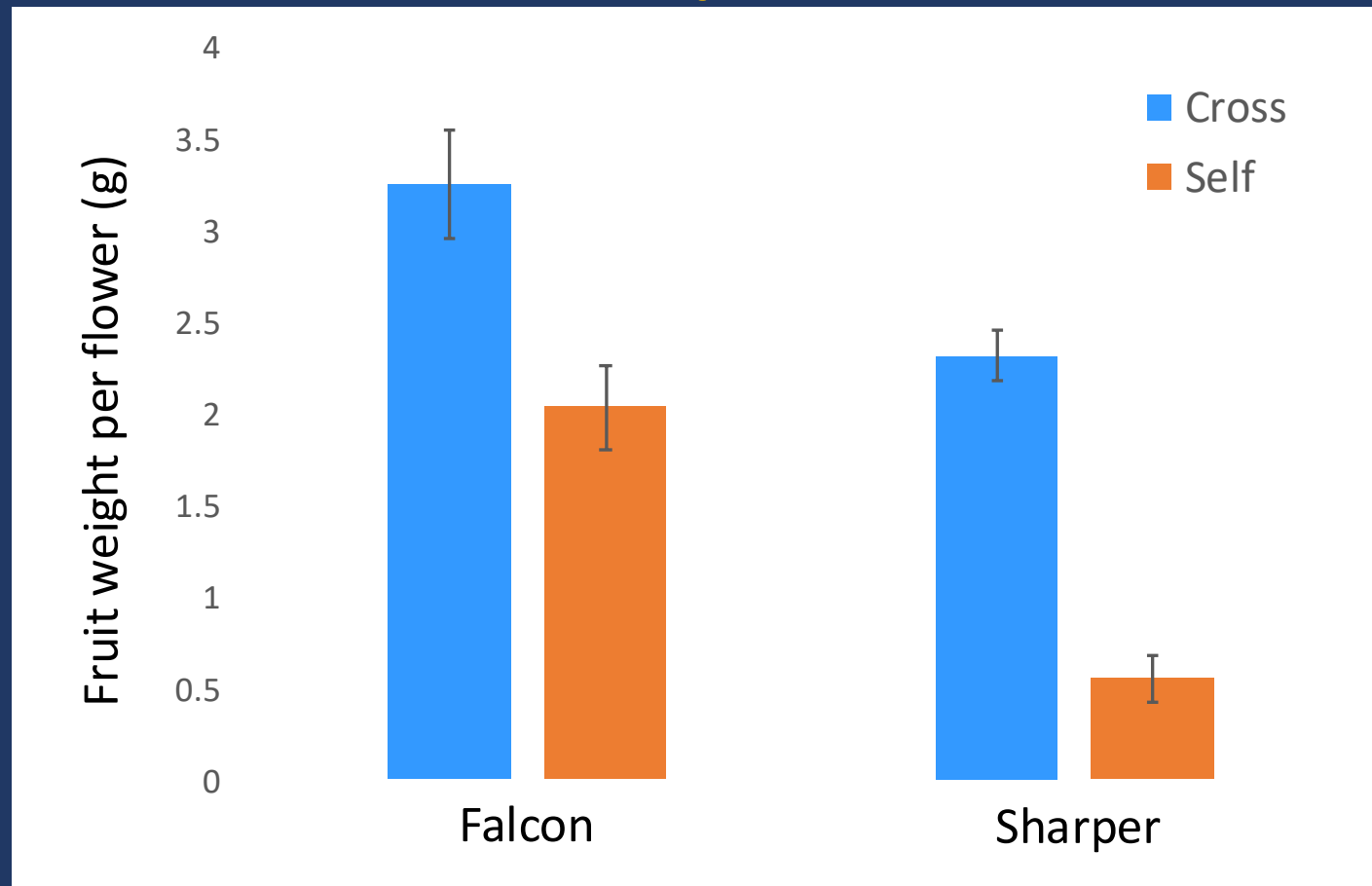
- What about newer cultivars?
 - Newer cultivars may be increasingly self-infertile, require cross-pollination
 - Increased inbreeding over time; May vary across cultivars depending on parentage
- Genotypes/cultivars typically evaluated in mixed plantings in the field

Current Research

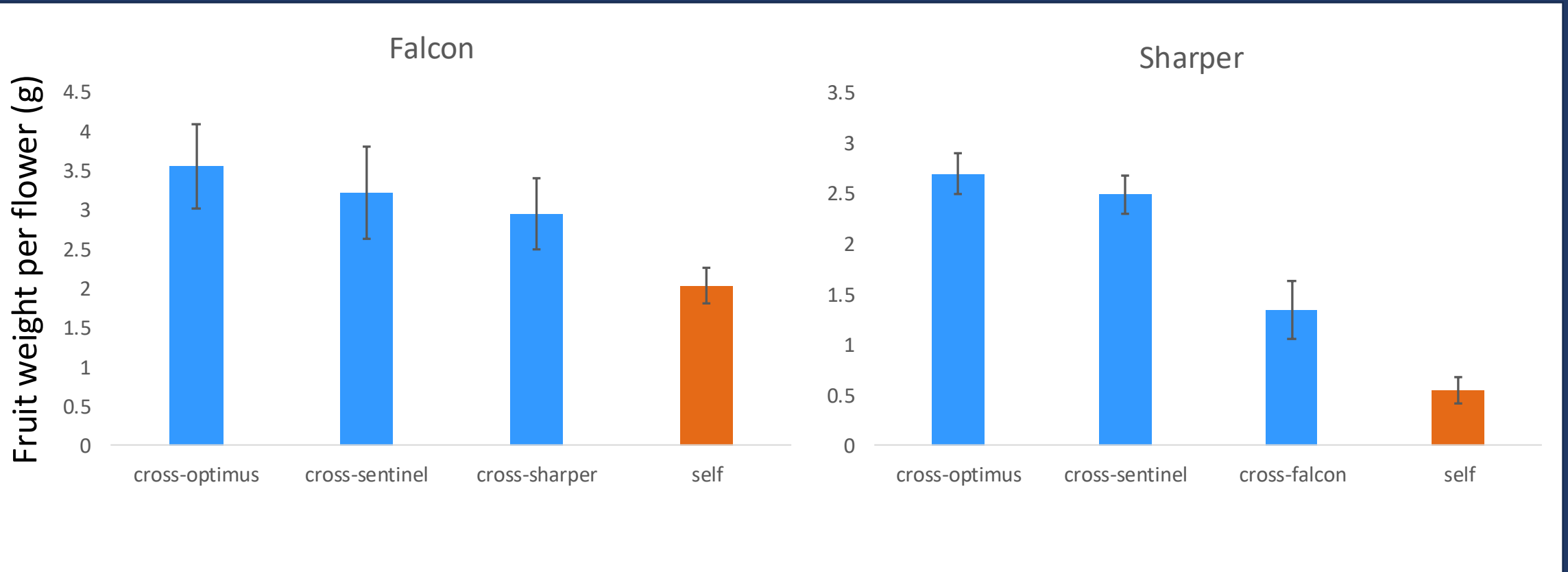
- Sharper and Falcon tested
- Hand pollination in greenhouse
- Cross-pollinate flowers with 3 different donors
 - Optimus
 - Sentinel
 - Sharper/Falcon
- Compare to self-pollination
- Fruit set and weight
- Time to ripen



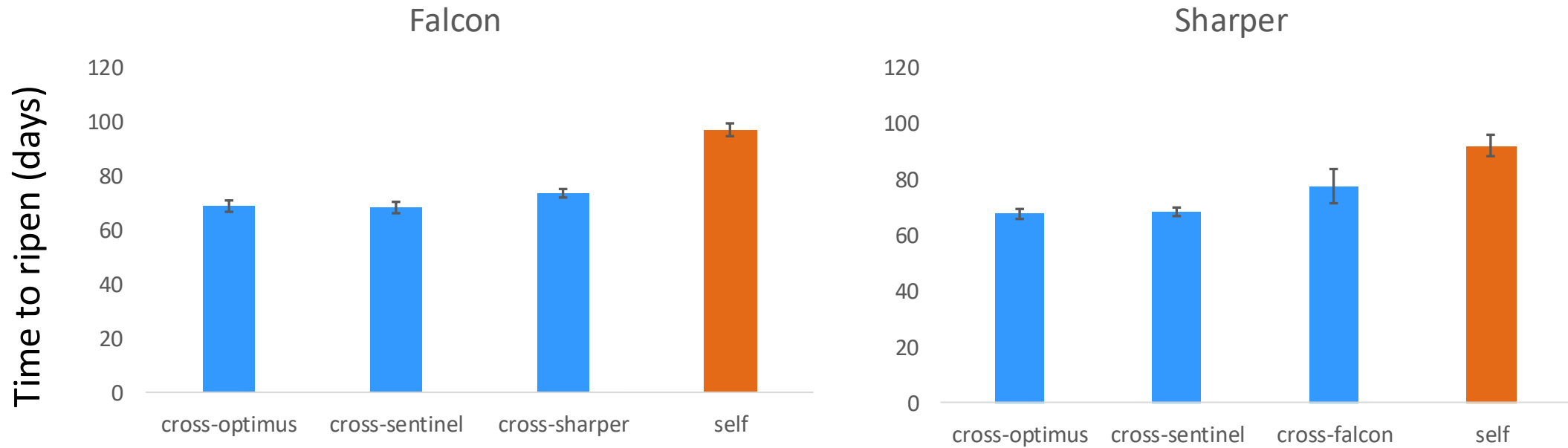
Falcon 60% increase in “yield” Sharper 300+% increase in “yield” with cross-pollination



Individual cross pollen donors all increase “yield” relative to self



Time to ripen shows similar (but inverse) patterns



Current (tentative) conclusions

- Both Sharper and Falcon benefit from cross-pollination
 - Yields increase significantly with cross-pollination
 - Time to ripen decreases significantly with cross-pollination
- All cross-pollen donors tested (Optimus, Sentinel, Sharper/Falcon) improve outcomes relative to self-pollination
 - Falcon did not pollinate Sharper as well as other pollen donors
- Falcon more self-fertile than Sharper

Falcon showed some parthenocarpy;
Sharper did not



Past research

Research Paper

Diversity and spatial arrangement of cultivars influences bee pollination and yields in southern highbush blueberry *Vaccinium corymbosum* x *darrowii*

Rachel E. Mallinger  , Stan Chabert ¹, Shiala Morales Naranjo, Victoria Vo

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<https://doi.org/10.1016/j.scienta.2024.113321> 

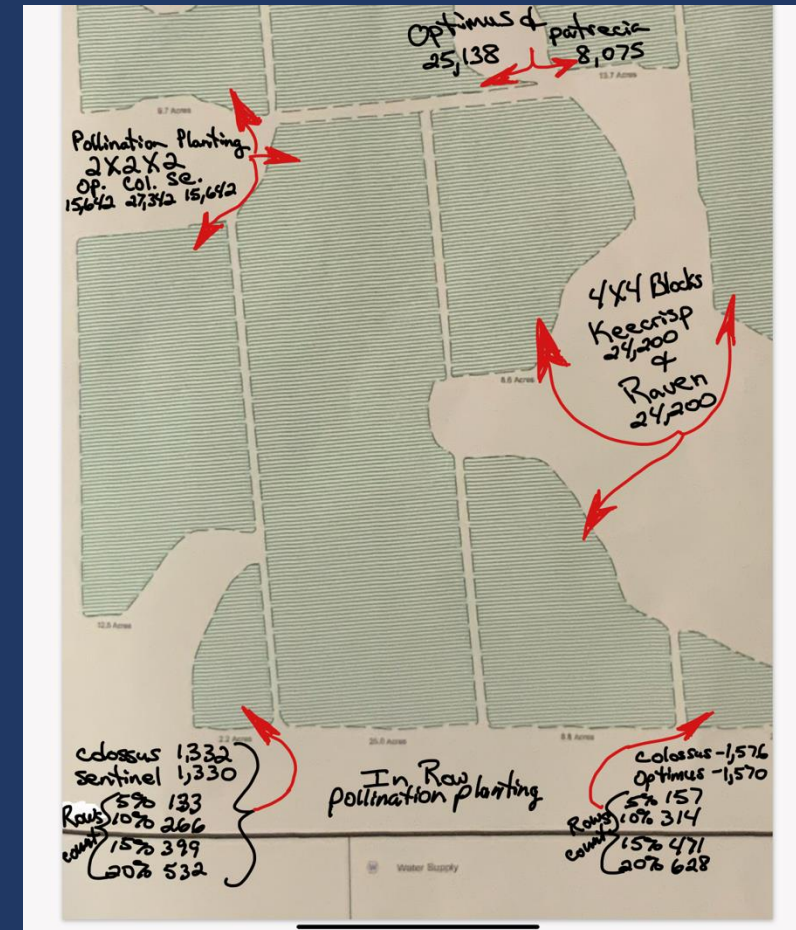
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- Mixing cultivars within rows increases yields by ~40% compared to single-cultivar blocks
- Mixing cultivars across rows increases yields by ~20% compared to single-cultivar blocks

Current Research

- What about more common planting arrangements?
- At what distance does cross-pollination occur?

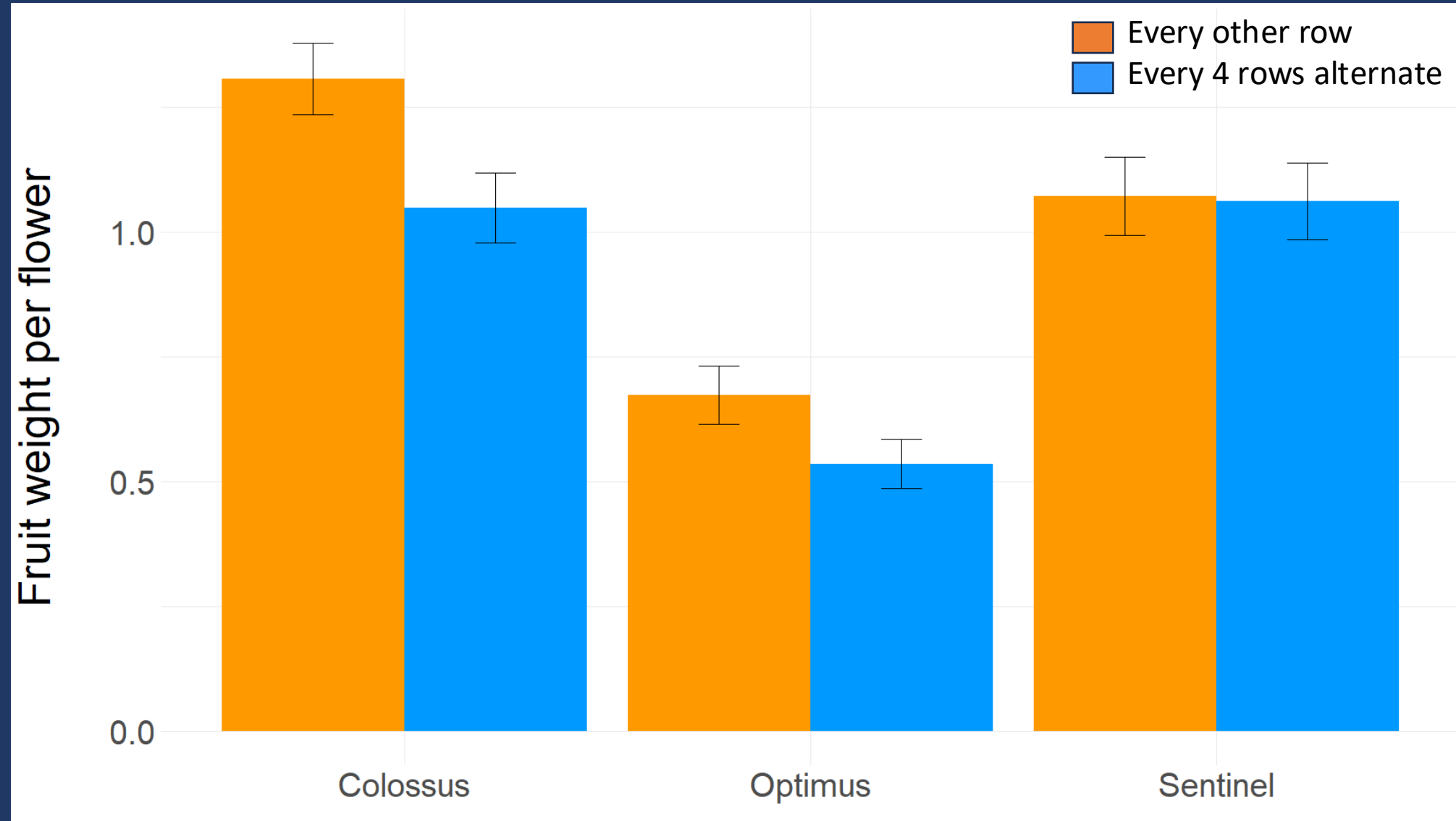


How to interplant cultivars?

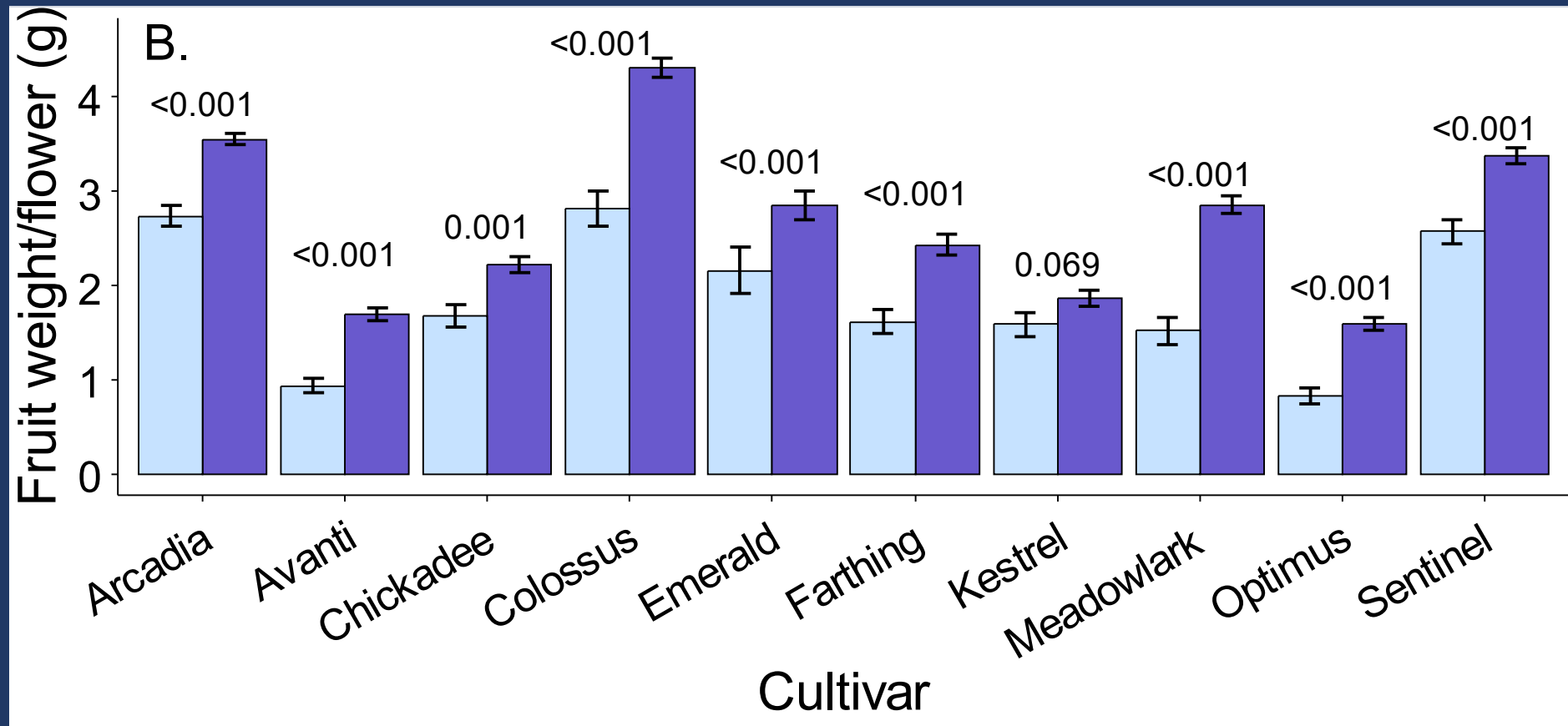


- Plots with potted plants
- Spacing similar to production fields
- Every other row vs. every 4 rows
- Colossus, Sentinel, Optimus alternated

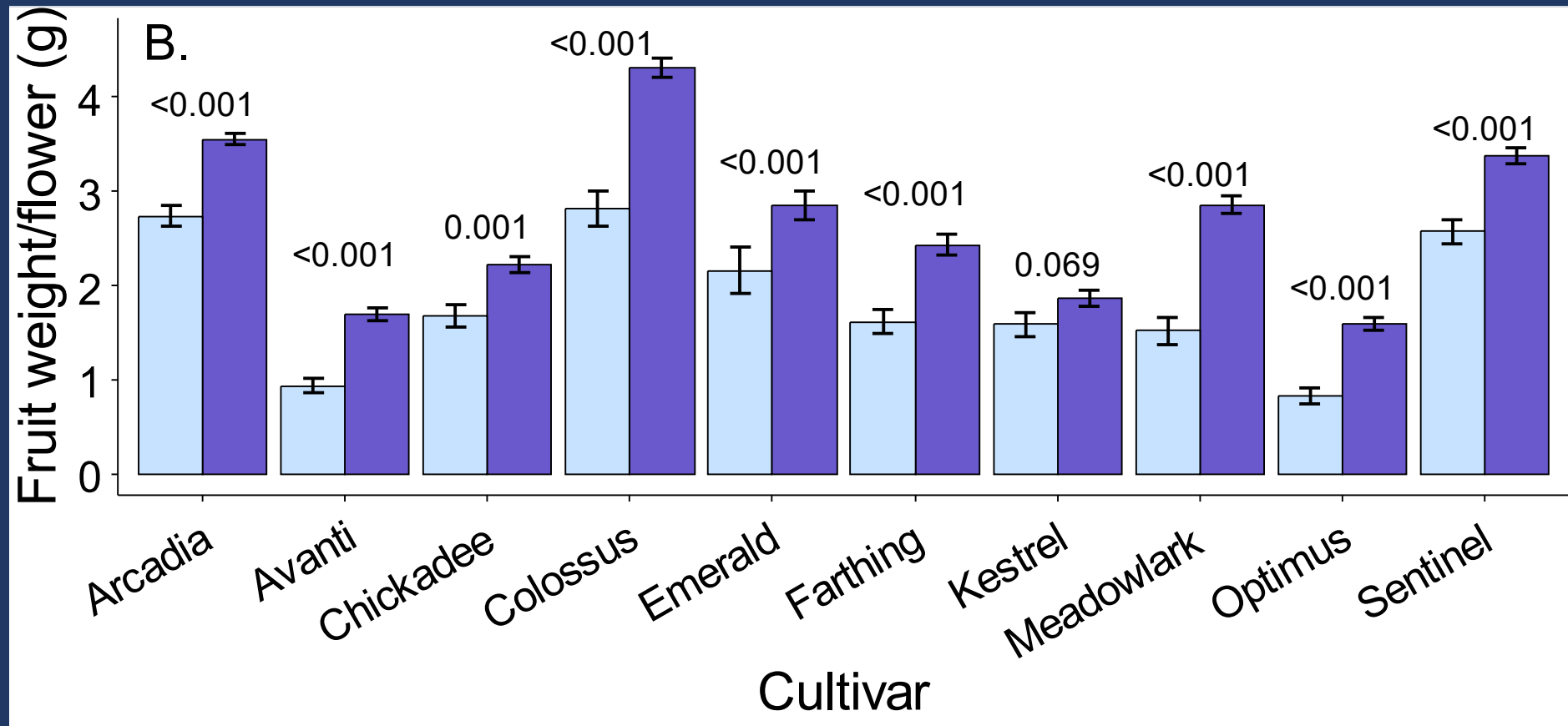
Colossus and Optimus benefit from alternating cultivars every row; Sentinel did not



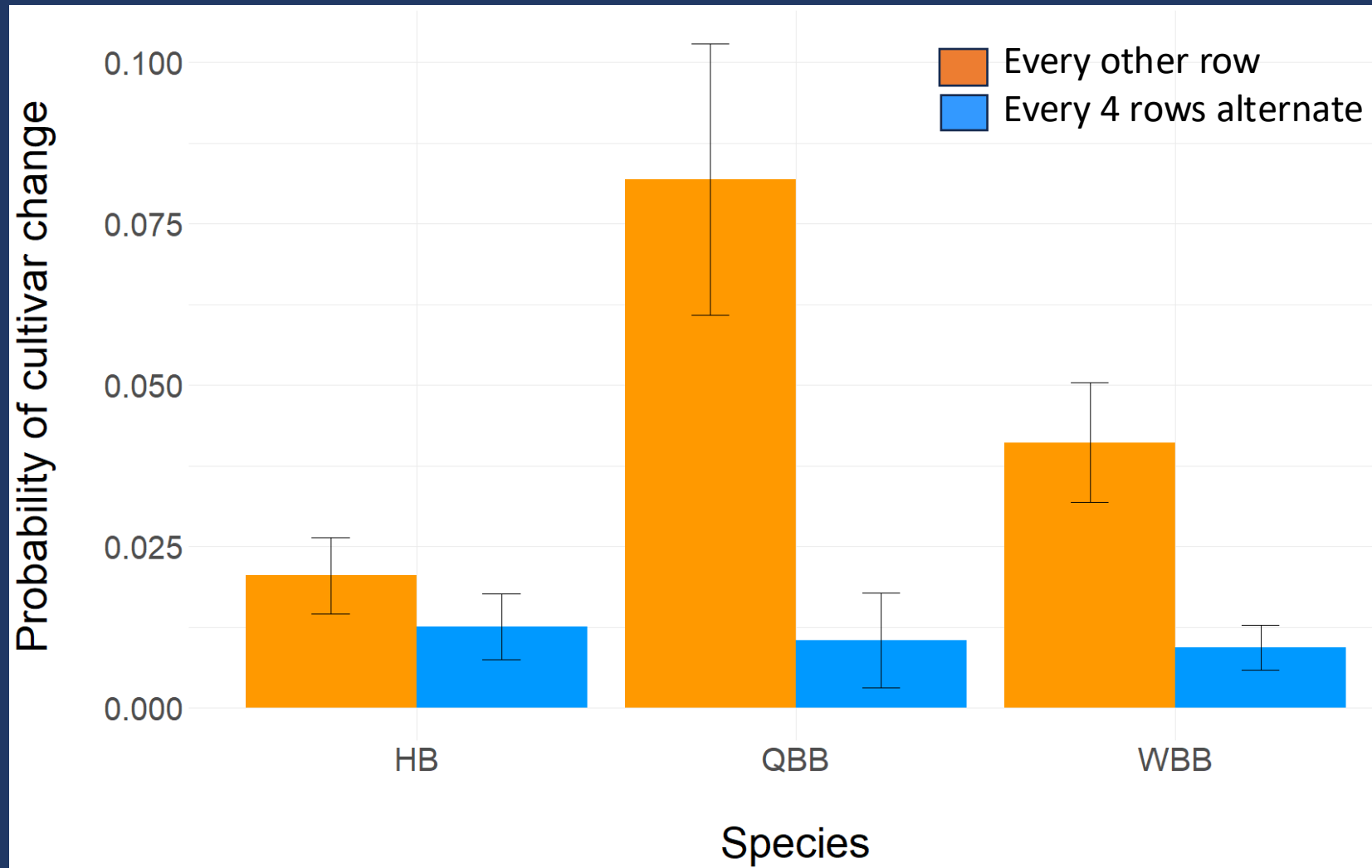
In greenhouse, cross-pollination increased
Optimus yields by ~94%, Colossus by ~53%, but
Sentinel only by ~31%



Greenhouse experiments may be able to predict how plants will do in field under different planting arrangements

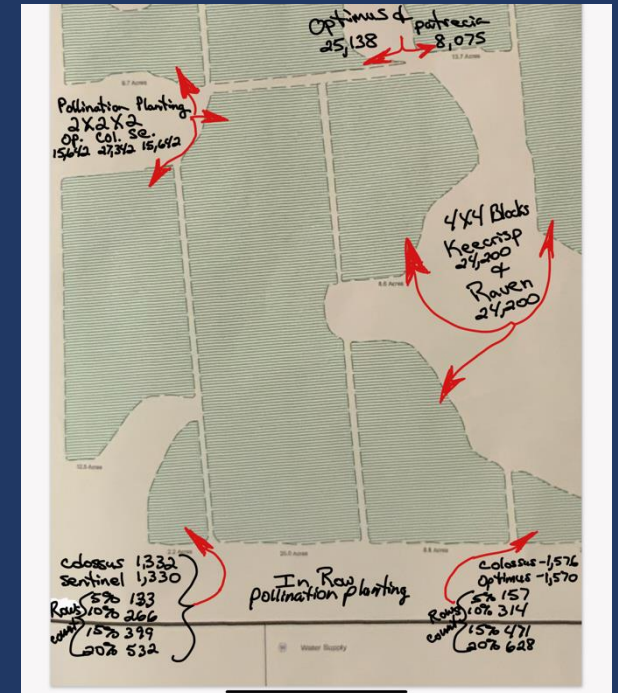
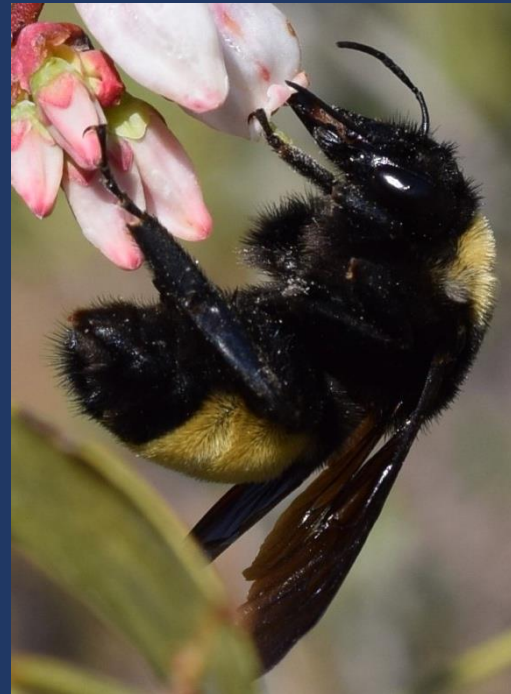


Bees switch cultivars more when alternated every other row; Queen bumbles most often



Conclusions

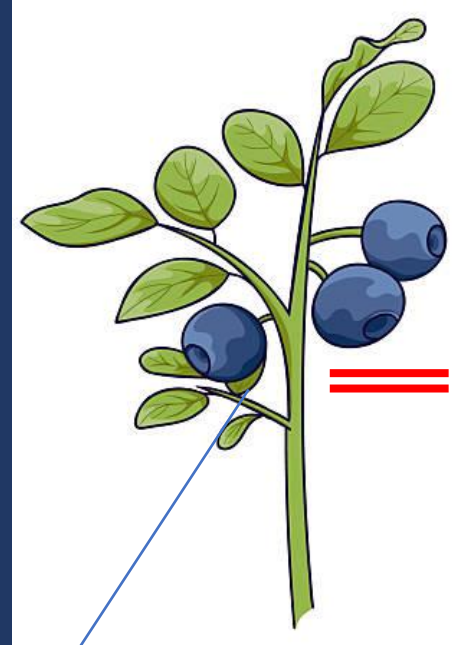
- Close planting of cultivars may benefit cultivars with low self-fertility but not ones with higher self-fertility
- Alternating cultivars every other or 2 rows better for Colossus and Optimus
- Bees switch cultivars more often when alternated every other row



How far does pollen move via bees?



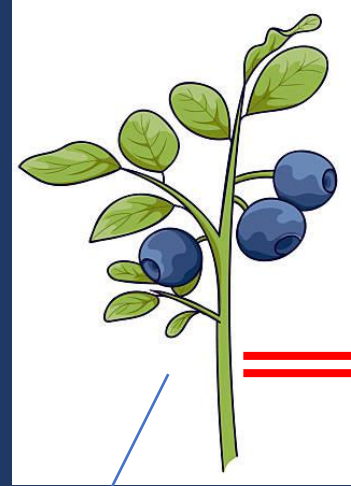
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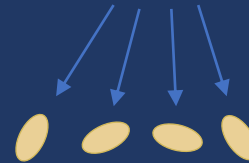
- 1) Select mother bushes from red cultivar (cultivar A)
- 2) Harvest Berries



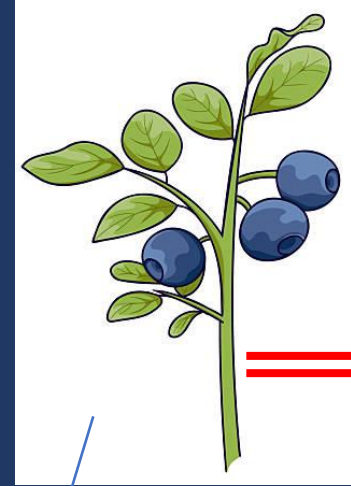
How far does pollen move via bees?



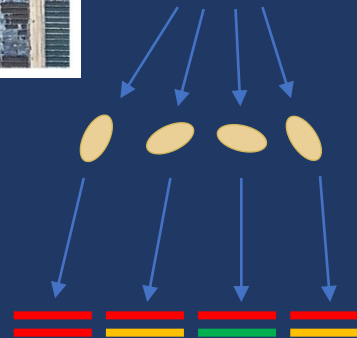
- 1) Select mother bushes from red cultivar (cultivar A)
- 2) Harvest Berries
- 3) Harvest and germinate seeds into seedlings



How far does pollen move via bees?



- 1) Select mother bushes from red cultivar (cultivar A)
- 2) Harvest Berries
- 3) Harvest and germinate seeds into seedlings
- 4) Determine who fathered the seedling (paternity analysis)



Results:

- 1 self pollination
- 2 seeds fertilized by cultivar B (yellow)
- 1 seed fertilized by cultivar C (green)

Questions?

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United States Department of Agriculture
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