Blueberry Pollination Research Update

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Blueberry BREEDING PROGRAM

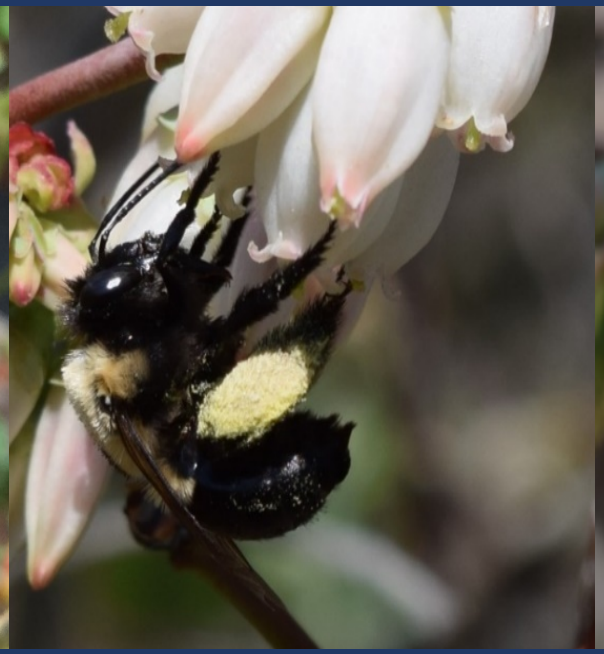
Florida Department of Agriculture and Consumer Services EST. 1868

Photo credit: Rufus Isaacs et al. 2016

Insect pollinators necessary for **all** cultivars

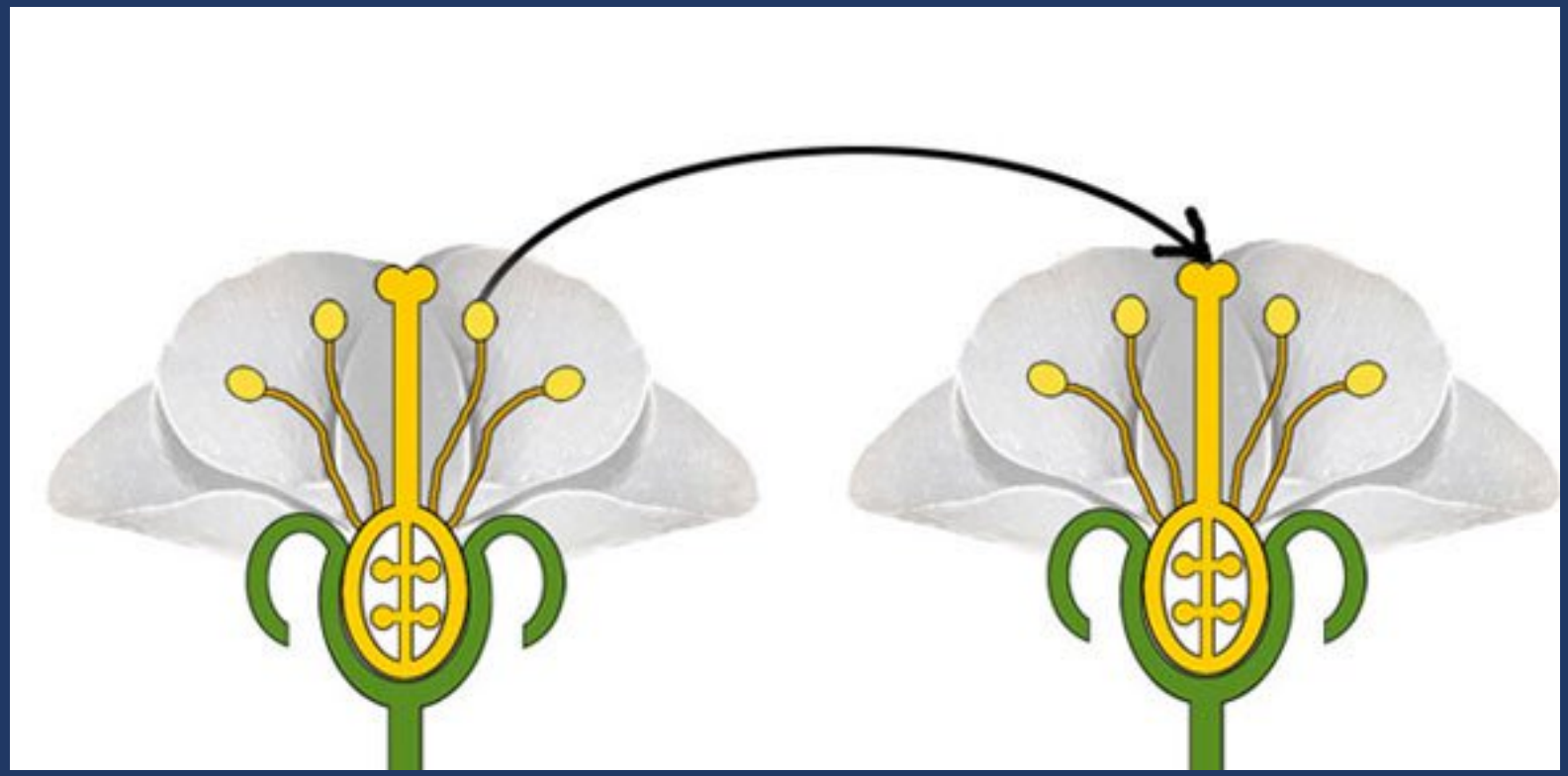
- Regardless of selfing
- Pollen not readily released without insects
- Wind pollination not effective






4 main pollinators in SE USA : Bumble bee, carpenter bee, southeastern blueberry bee, honey bee

Bees self and cross pollinate!



Self pollination = within same flower or plant

Cross-pollination = across different plants (cultivars)

Research update

- Managed honey bee and bumble bee recommendations
- Cultivar pollination requirements: Mixed versus single cultivar blocks
- Effects of weather on pollination

Standard bee stocking densities

4.5 – 5 honey bee hives/acre on average

- Adjusted for flower density

0 - 1.5 bumble bee quads/acre

- 0 – 6 colonies/acre

Is there a benefit to increasing hive density?

- 2021 and 2023
- 8-12 farms in pairs
- 1 farm typical honey bee density, one double density
- Emerald, Jewel, Arcadia

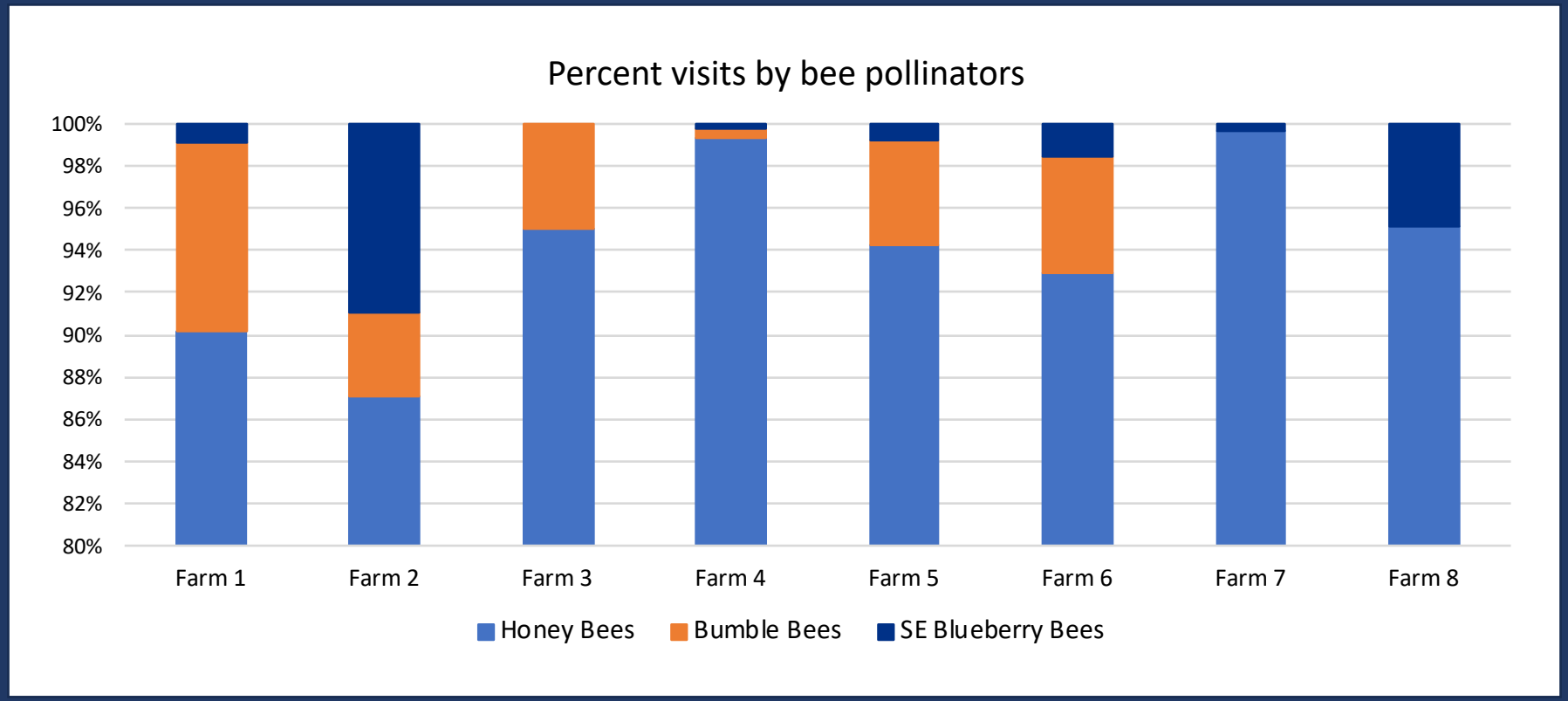
Is there a benefit to increasing hive density?

2021:

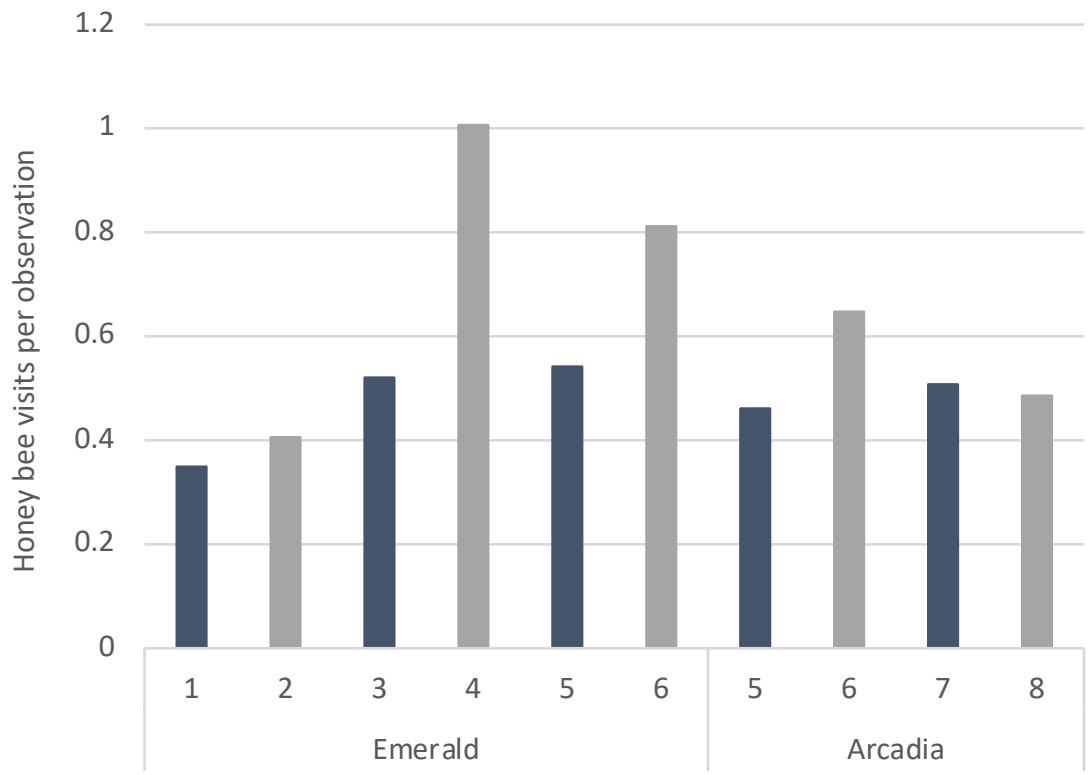
- No benefit to doubling honey bee density for Emerald or Jewel yields
- Double density did not result in more bee visits

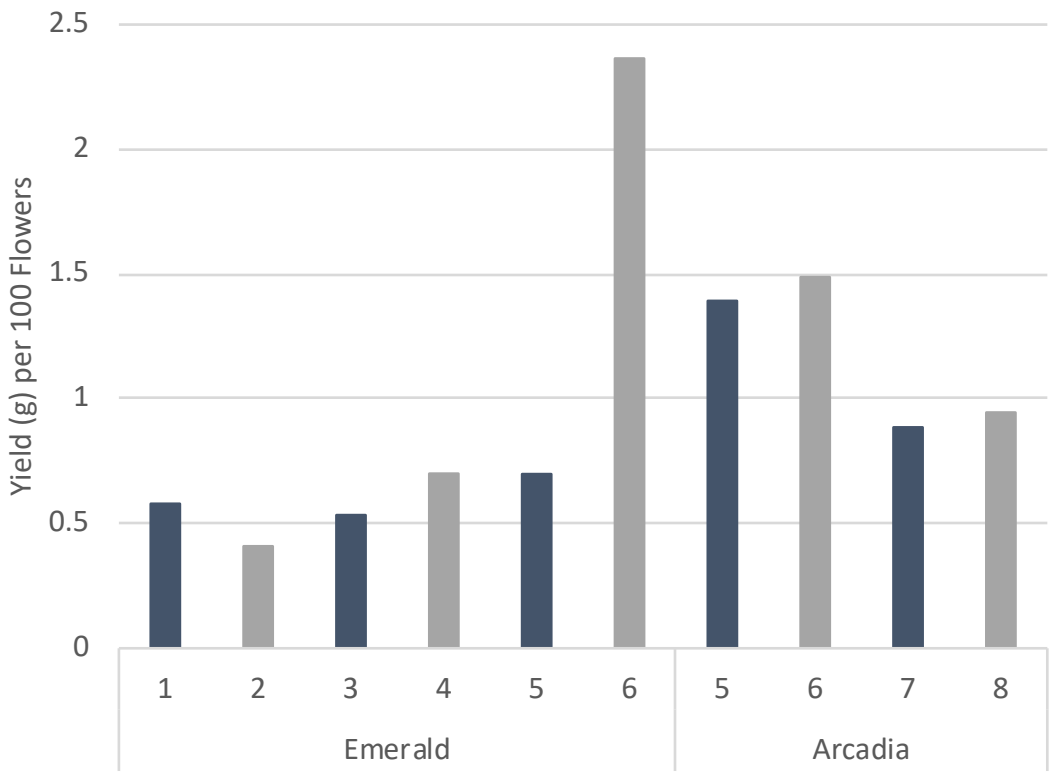
2023 findings

Majority honey bees but some farms had significant bumble bee and blueberry bee pollination



Doubling honey bee hive density does not result in more bee visits or higher yields





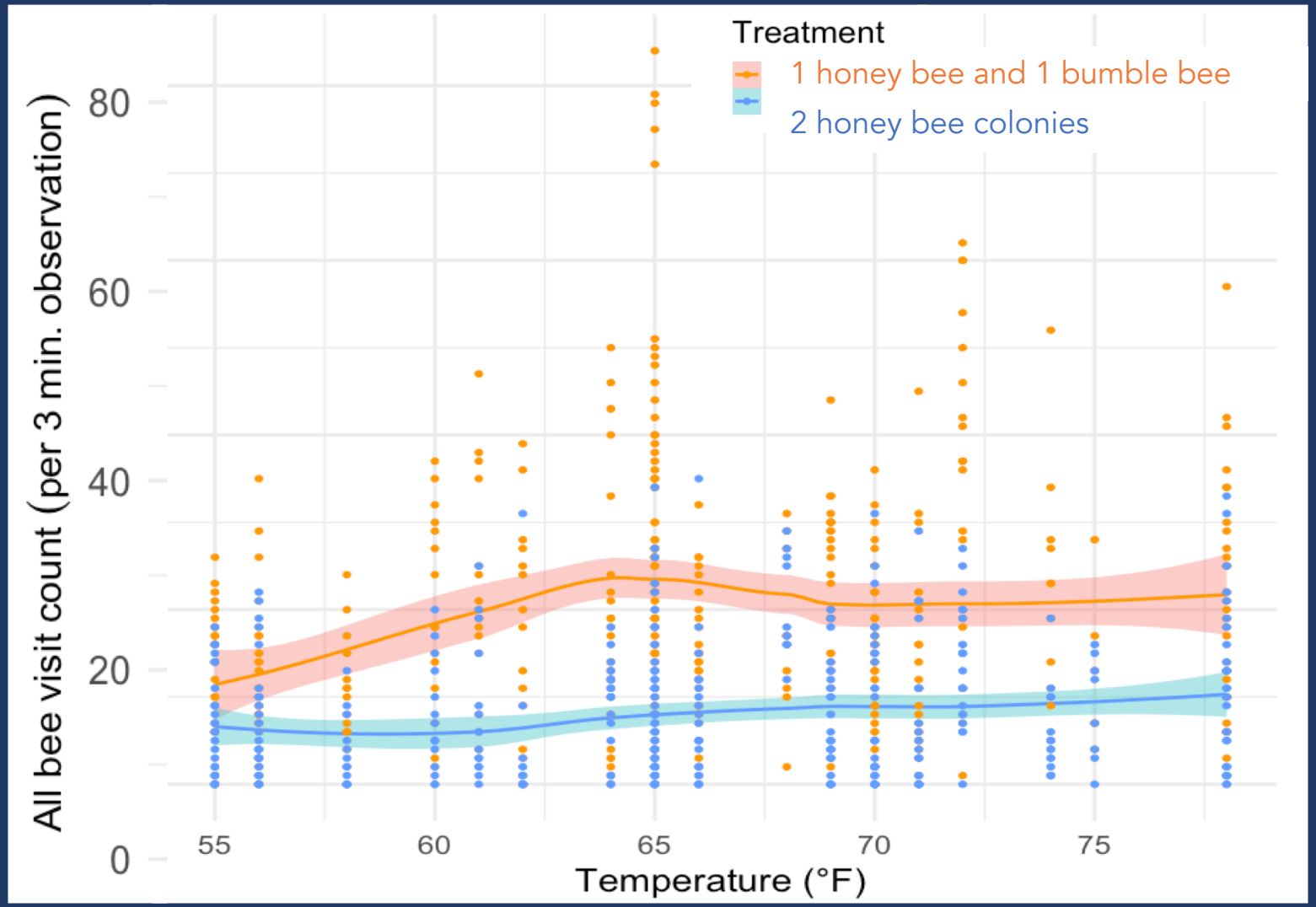
Honey Bee Density Double density Typical density

Doubling honey bee hive density does not result in more bee visits or higher yields

- Higher honey bee density does not result in more bee visits to flowers
  - Honey bees foraging elsewhere
- Farms currently using optimal (max) density
  - Threshold after which there is no benefit to more honey bees

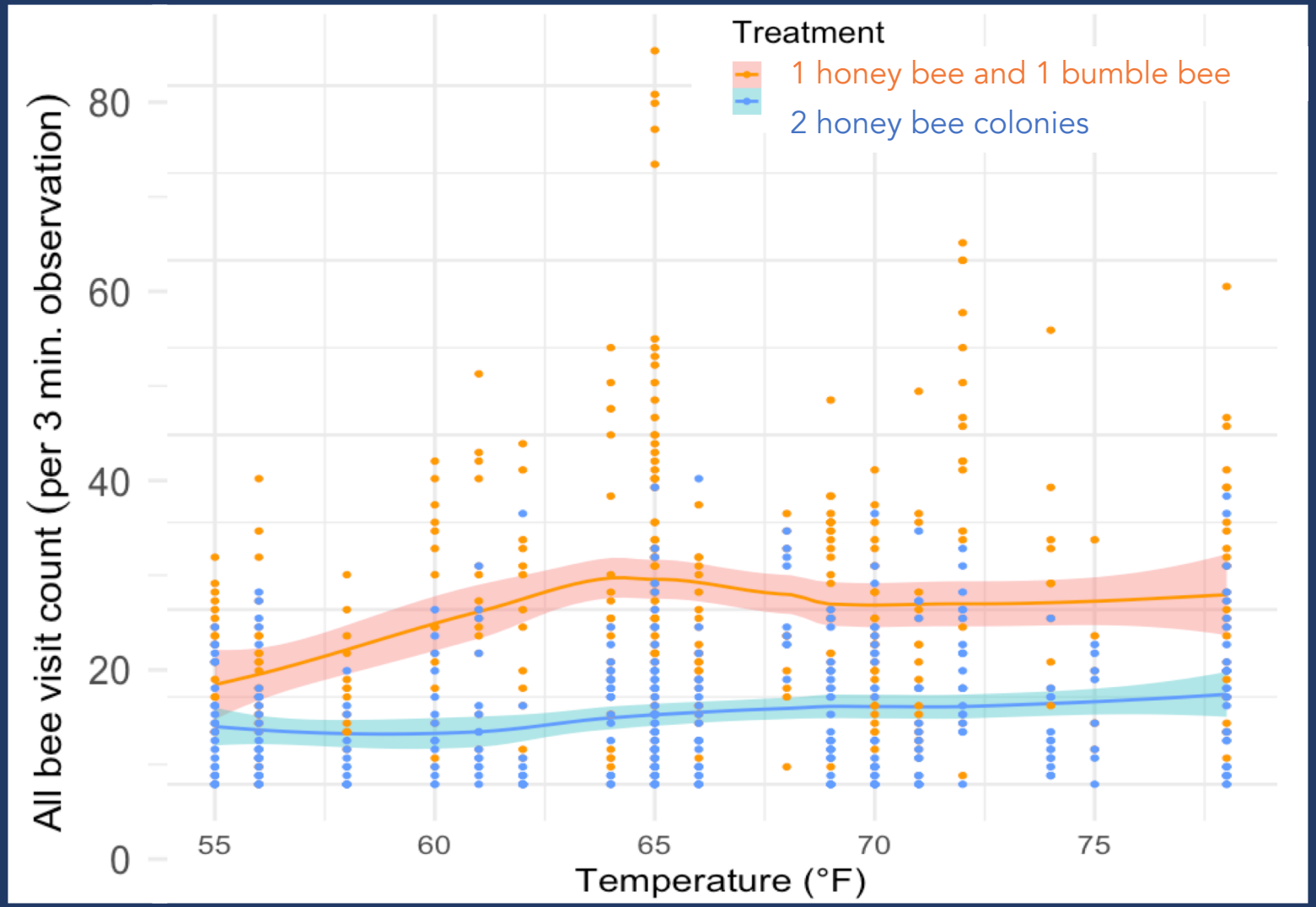
What about bumble bees?

More total bee visits when bumble bees are used with honey



What about bumble bees?

Especially at cool temperatures (60 – 65 F)



Research update

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- Cultivar pollination requirements: Mixed versus single cultivar blocks
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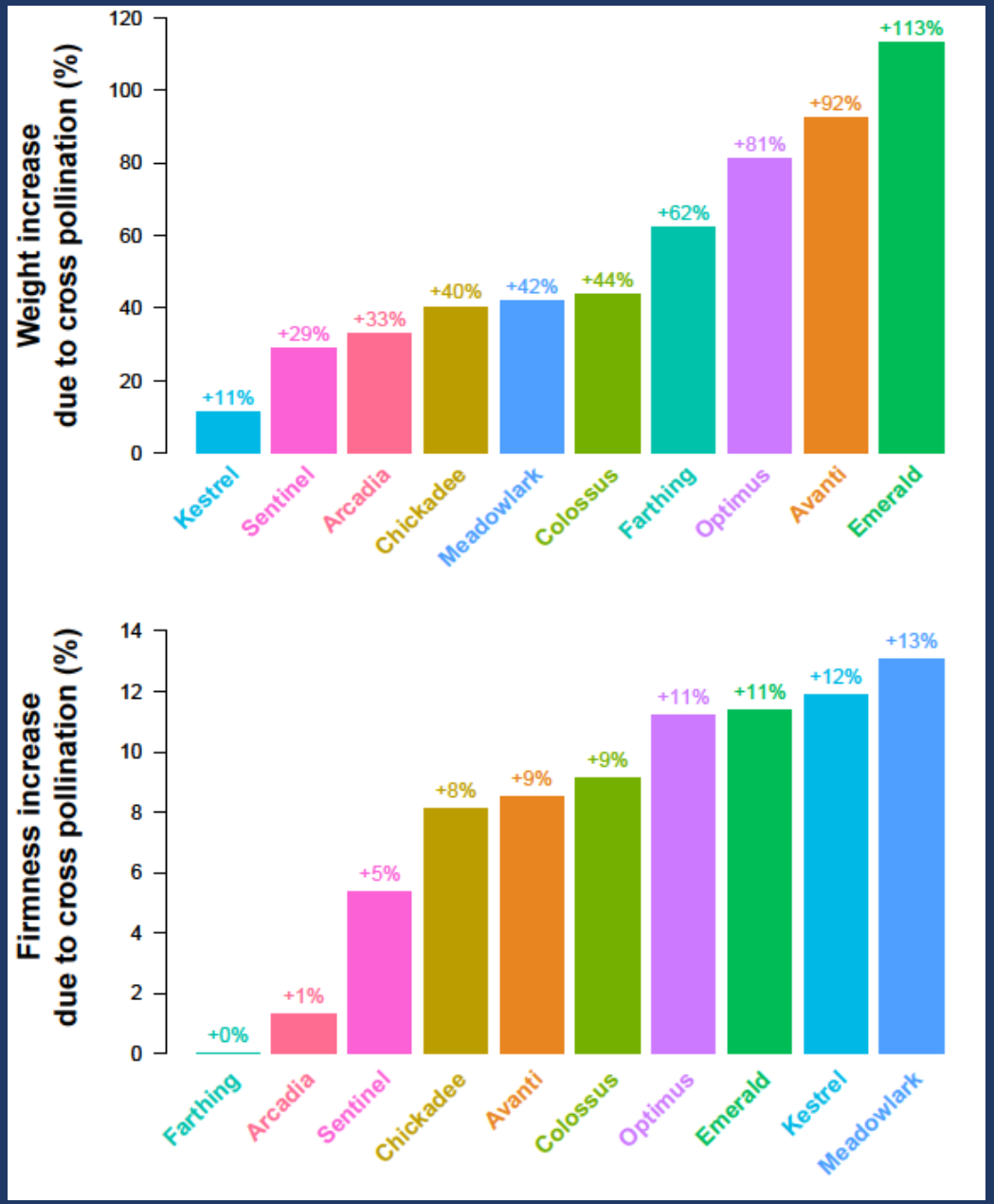
Does cross pollination improve yields and quality?

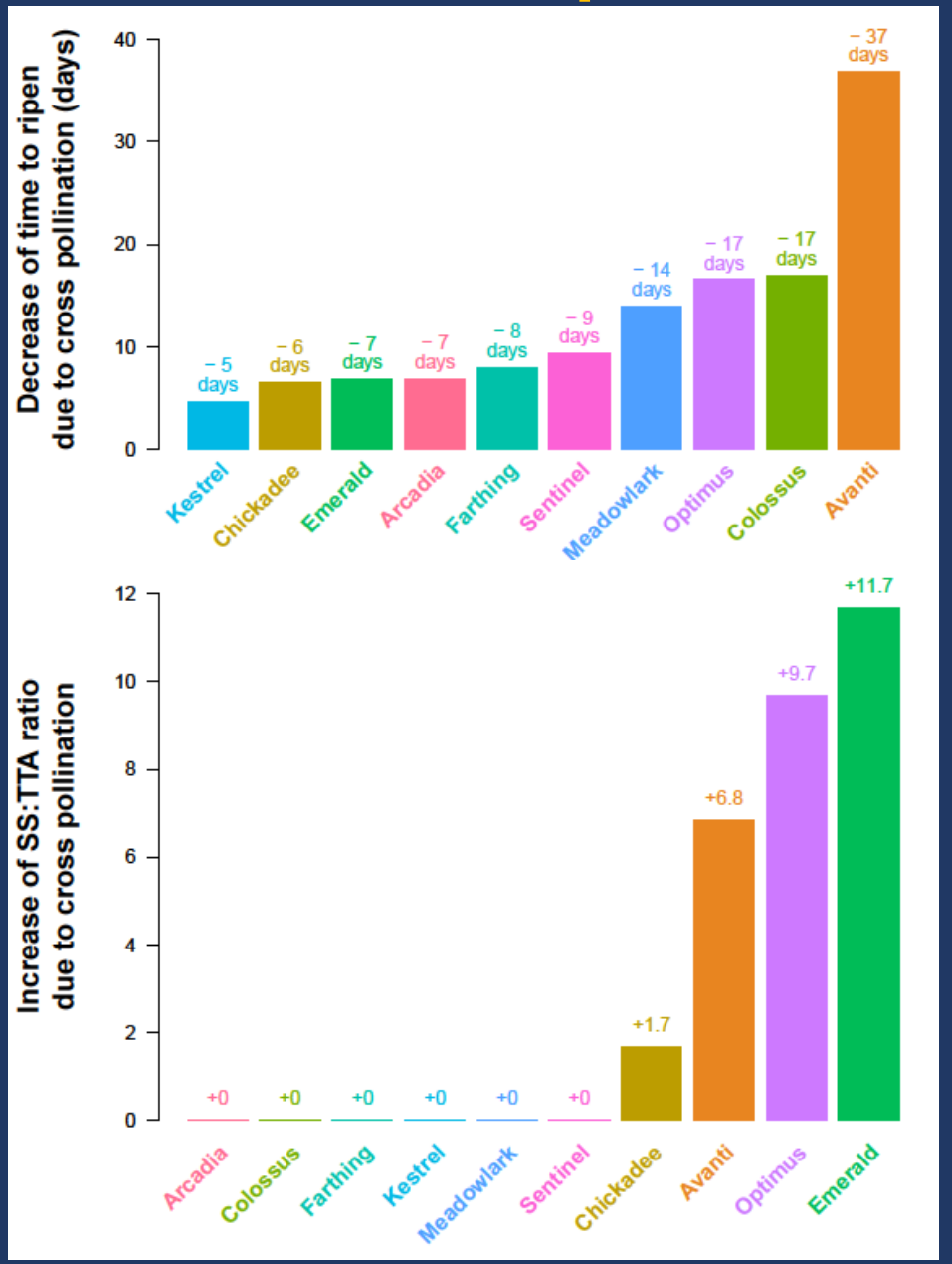
Hand pollination with self-pollen

Autonomous self-pollination (undisturbed flowers)

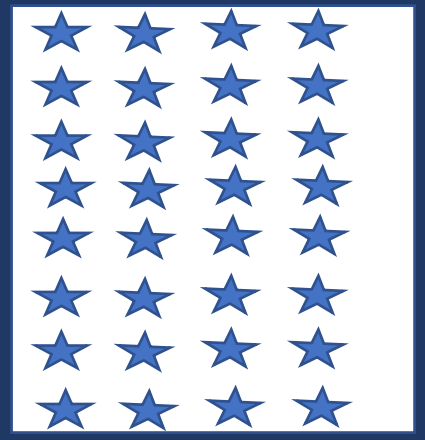
Hand pollination with cross-pollen (multiple donors, single and mixed)

Cultivars benefit from cross pollination



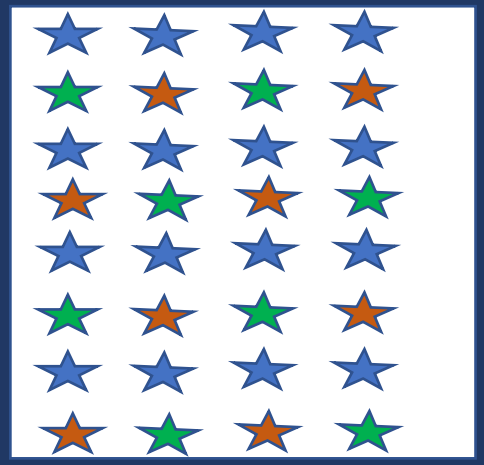


How does planting design impact yields?

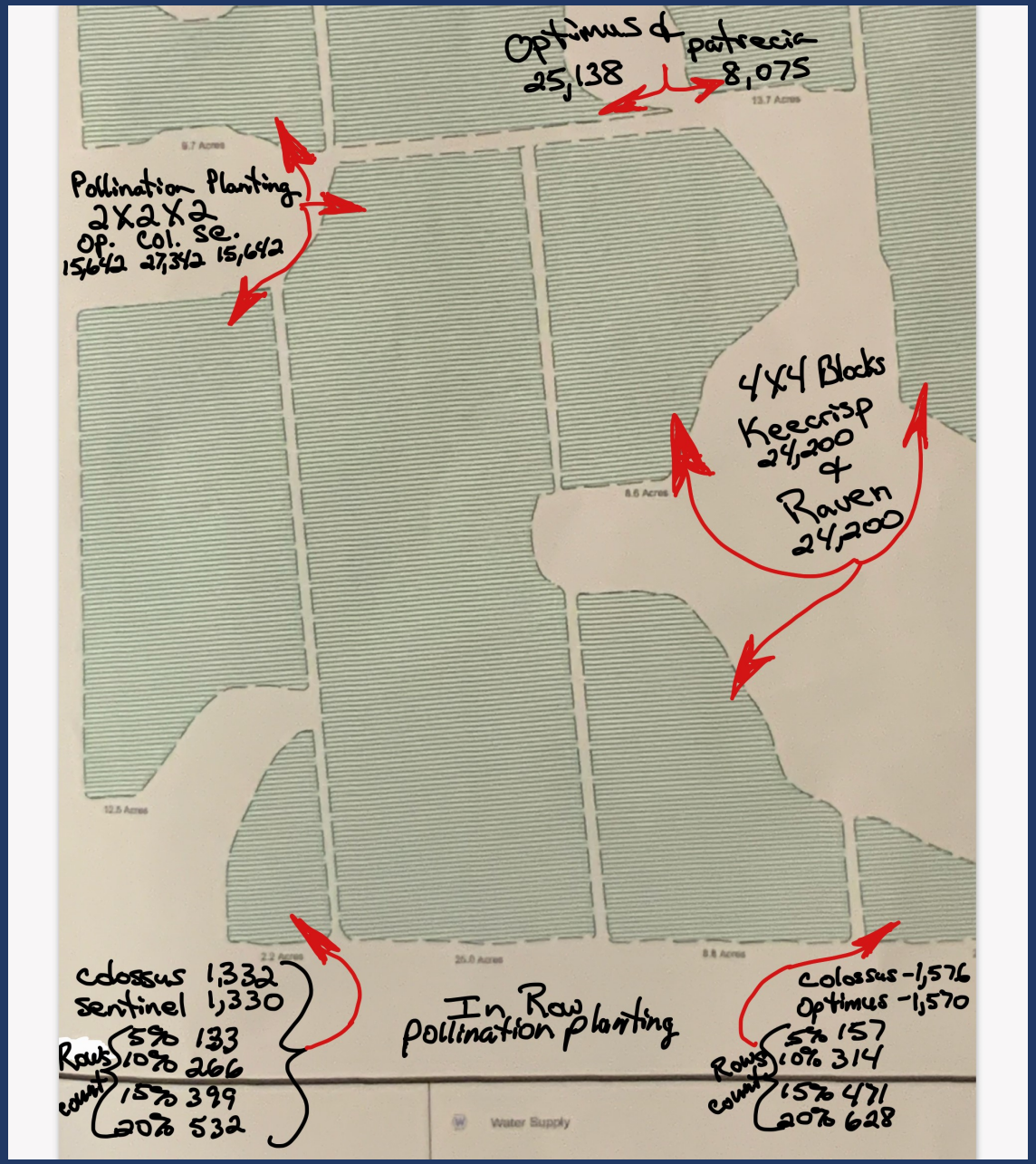


Single cultivar

Mixed cultivar across rows



Mixed cultivar within row



- On-farm trial
- Alternating rows Optimus, Colossus, Sentinel (2x2x2)
- Within rows alternating Colossus and Sentinel, and Colossus and Optimus
  - 5, 10, 15, 20% mixing

- Yields higher in mixed versus single cultivar plantings
- Inconsistent benefit to mixing within versus across rows
  - Depends on density of cultivars

Research update

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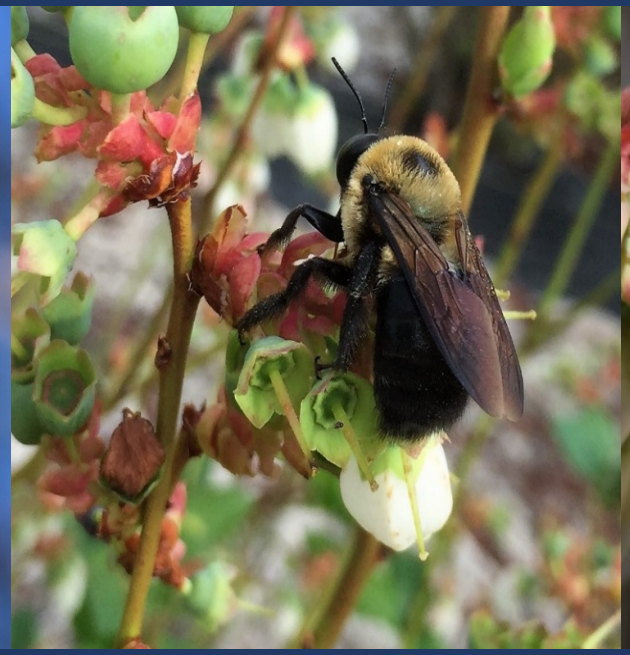
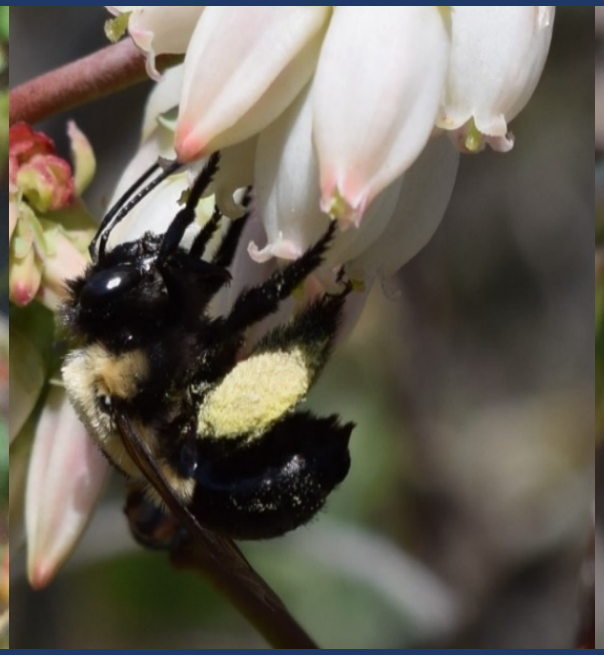
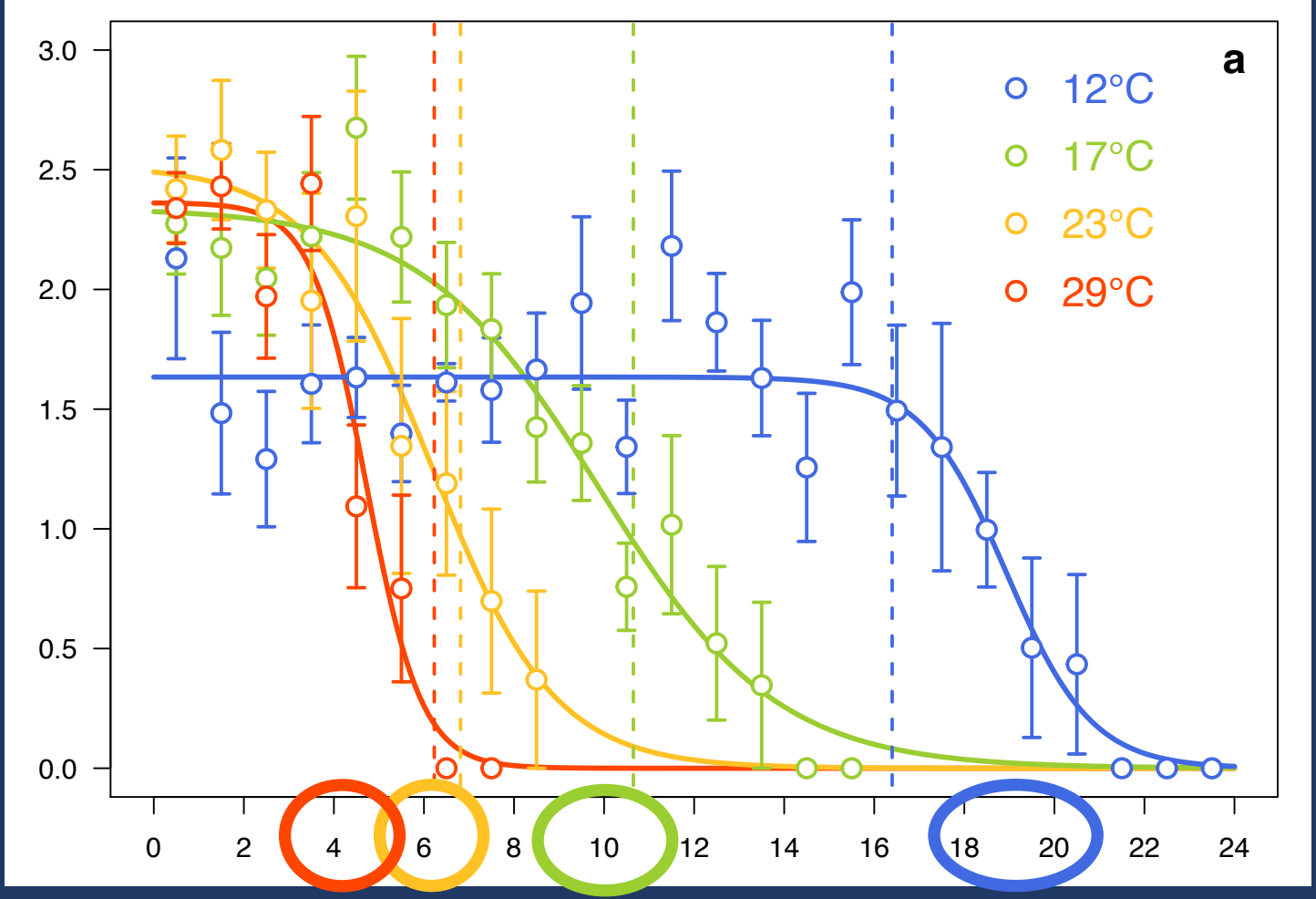
What happens during a cold bloom?

Insect pollinator activity reduced (below ~60 F)
Sunshine, wind, humidity matter too


But…. Flowers last longer!

Fruit weight (g/berry)



Age at which the flower is pollinated

When is fruit weight reduced by 50%?

Recommendations

- Southern highbush cultivars benefit from cross pollination
  - Mixed-cultivar blocks recommended where possible
- Current recommended honey bee density is 4.5 - 5 hives/acre
  - Adjust for flower density/anticipated yields
- Managed bumble bees (up to 1 quad per acre) increase bee visits and yields when used with honey bees
- Important to assess honey bee hive quality
  - Bee activity at hive entrance
  - Cluster counts
  - Frame counts

Questions?

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