Modeling cross-pollination rate of C. Anuum via insects

PRESENTER:
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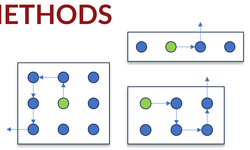
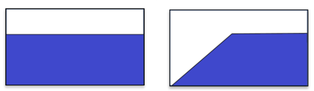
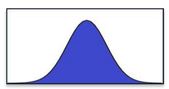
BACKGROUND

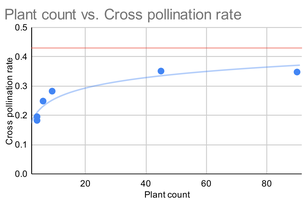
- The *Canyon City Pepper Project* works with the community to breed a locally-adapted, sunburn-resistant pepper. Plants involved will be grown at research plots, community gardens, high school clubs, and at home. This raises the question: are we sacrificing genetic diversity by growing in multiple plots isolated from each other, rather than growing all in one field?
- A Monte Carlo analysis is used to simulate cross pollination rates in plots of different layouts and sizes, with consideration for insect pollination.

METHODS









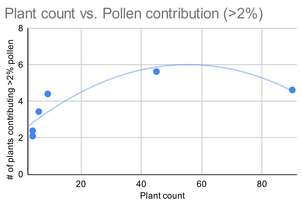
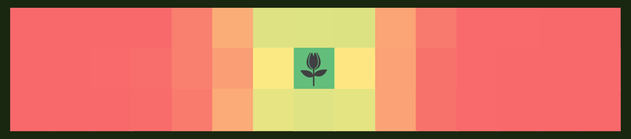


Fig. 1 Generate plot configurations (1x4, 2x2, 2x3, 3x3, etc.) along with bee path simulations.

Fig. 2 Generate variables according to distribution and run 200 trials for each plot configurations

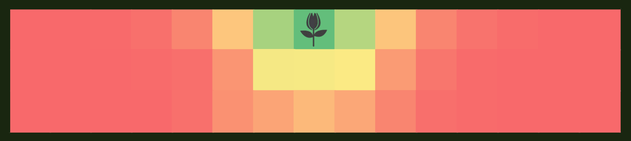
Fig. 3 Combine data from trials to get average cross pollination rate for each plot configuration

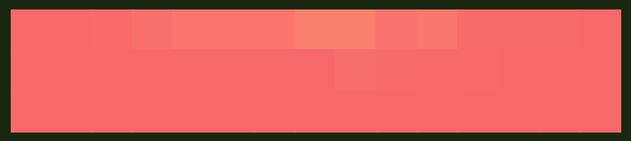
Fig. 4 Number of meaningful pollen contributions (>2%) is the greatest in the 3x15 plot.



Two independent 3x15 plot configurations, with green being how often its pollen pollinates the target plant

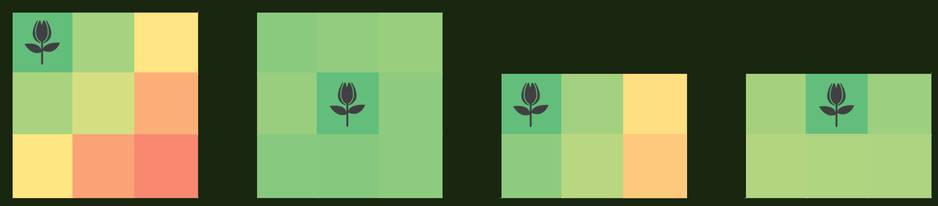
Double 3x15 plot configuration, same layout as the current research plot at Segerstrom Science Center, APU





Most pollen involved in **cross-pollinations** are from plants within **two feet**

Smaller plots has **more crosses** per plant with **minimal** tradeoffs in diversity



Various smaller plot configurations with different target plant locations

Scan the **QR code** to **join our project!**

CONCLUSION

- Using smaller plots does reduce diversity but is ultimately not detrimental to the project's goal of maintaining high diversity while outputting higher numbers of each cross.
- Participants that do not have space for a larger plot size can still make immense contributions to the project.

FUTURE OF THE PROJECT

- Measuring possible adapted traits, such as rate of photosynthesis or time for peppers to mature.
- Launching the program to the public, with the goal of putting out 500 plants across Azusa

WHY COMMUNITY-BASED SCIENCE?

- Community-based science allows participants throughout the community to participate in all parts of the research process, including decision-making and proposing ideas for future study. Previous work has suggested that these opportunities increase the science identity of participants.
- We are investigating the effects of community-based research on a culturally-relevant subject on family science identity, i.e., the effects on parents/grandparents as well as their children.

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Fig. 4 - Number of meaningful pollen contributions (>2%) is the greatest in the 3x15 plot.

Conclusion: Using smaller plots does reduce diversity but is ultimately not detrimental to the project's goal of maintaining high diversity while outputting higher numbers of each cross.

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Future Work: Measuring possible adapted traits, such as rate of photosynthesis or time for peppers to mature.

Launching the program to the public, with the goal of putting out 500 plants across Azusa.

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