TIPS 2025/26: Biology: Food Systems and Staple Crops





Lisa Anderson, CSU San Bernardino
Matt Cover, CSU Stanislaus
Adrienne Edwards, Chico State
Jenny Hazlehurst, CSU East Bay
Facilitator: Wendy St. John, College of Marin

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The lesson:

- Conducted in introductory-level biology courses on 3 campuses:
  - Stanislaus State: Fall 2025 and Spring 2026
    - *General Biology 2* (22): ecology module
    - *Ecology* (8): extra credit activity
  - Chico State: Fall 2025
    - *Food, Fiber, Drugs* (87 students/4 sections)
    - Taught as part of a food lab, previously focused on nutrition of rice, beans, and pseudograins
  - College of Marin: Spring 2026
    - *Organismal Biology, Ecology and Evolution* (25 students)
    - Taught as part of a lab on Angiosperms (Flowering Plants)

Need for Rehumanizing STEM

Historically, biology curriculum:

- Emphasizes scaffolded knowledge
- However, that bank of knowledge can be fairly narrow
  - Emphasis on “achievements” of white, western men
  - Emphasis on “objectivity”; separation from culture
  - Erasing contributions of people outside the white, male-dominated “mainstream”.
  - We recognize only a small subset of our “roots”

Rehumanizing: Ourstories/Theirstories & Windows/Mirrors

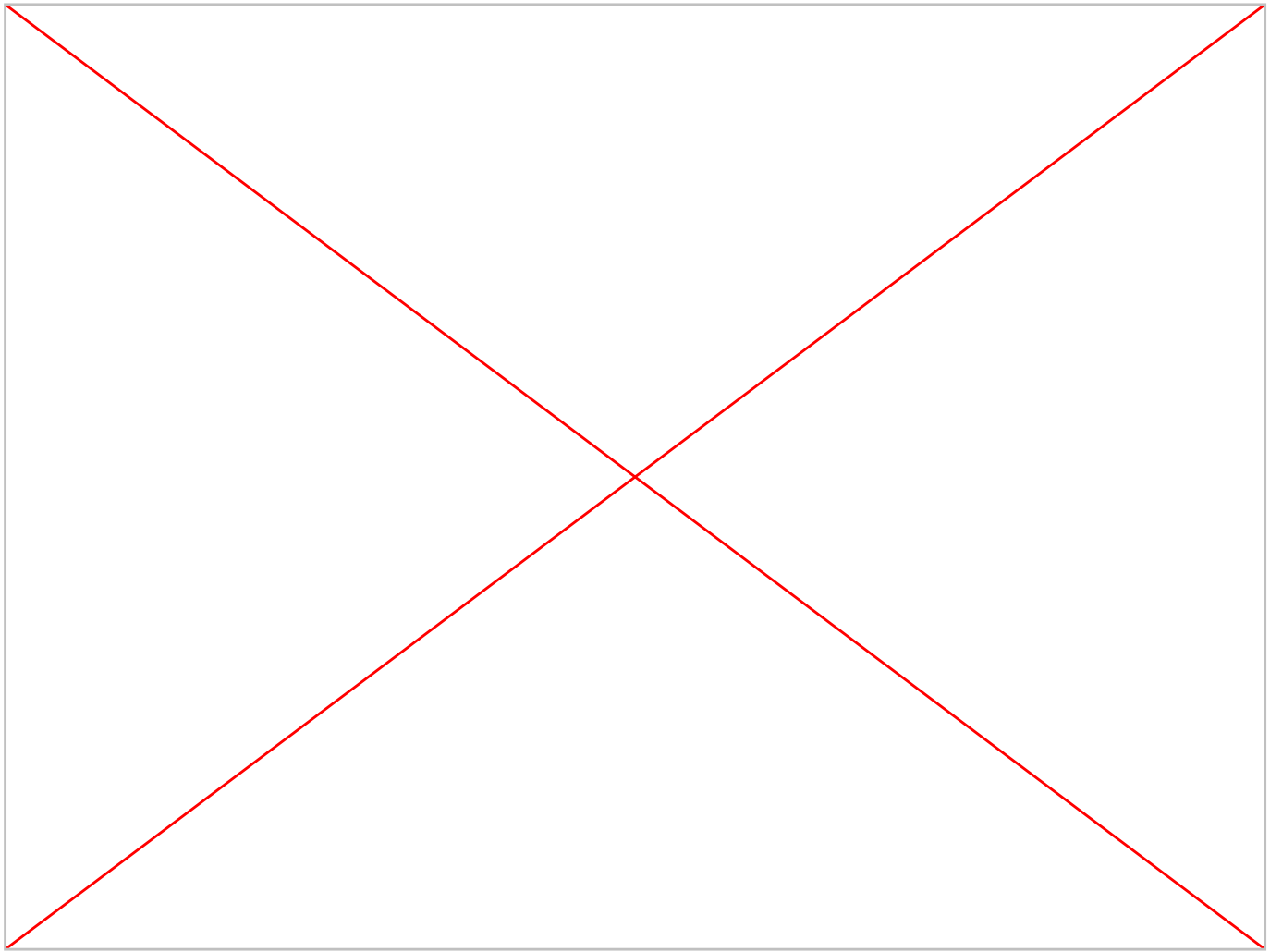
- Lesson study goal:
  - How can we pitch lessons to engage people with prior knowledge as well as those without as much disciplinary knowledge?
  - How do we provide opportunities to see out onto a new world that may not be familiar, stretch yourself; connect with others?
  - How do we provide opportunities to be affirmed, see yourself in the curriculum; reconnect with self?
- **Meaningful Meals**:
  - Students shared about a dish that has personal, cultural, familial or historical significance in their lives

Individual Reflection: A Meaningful Meal

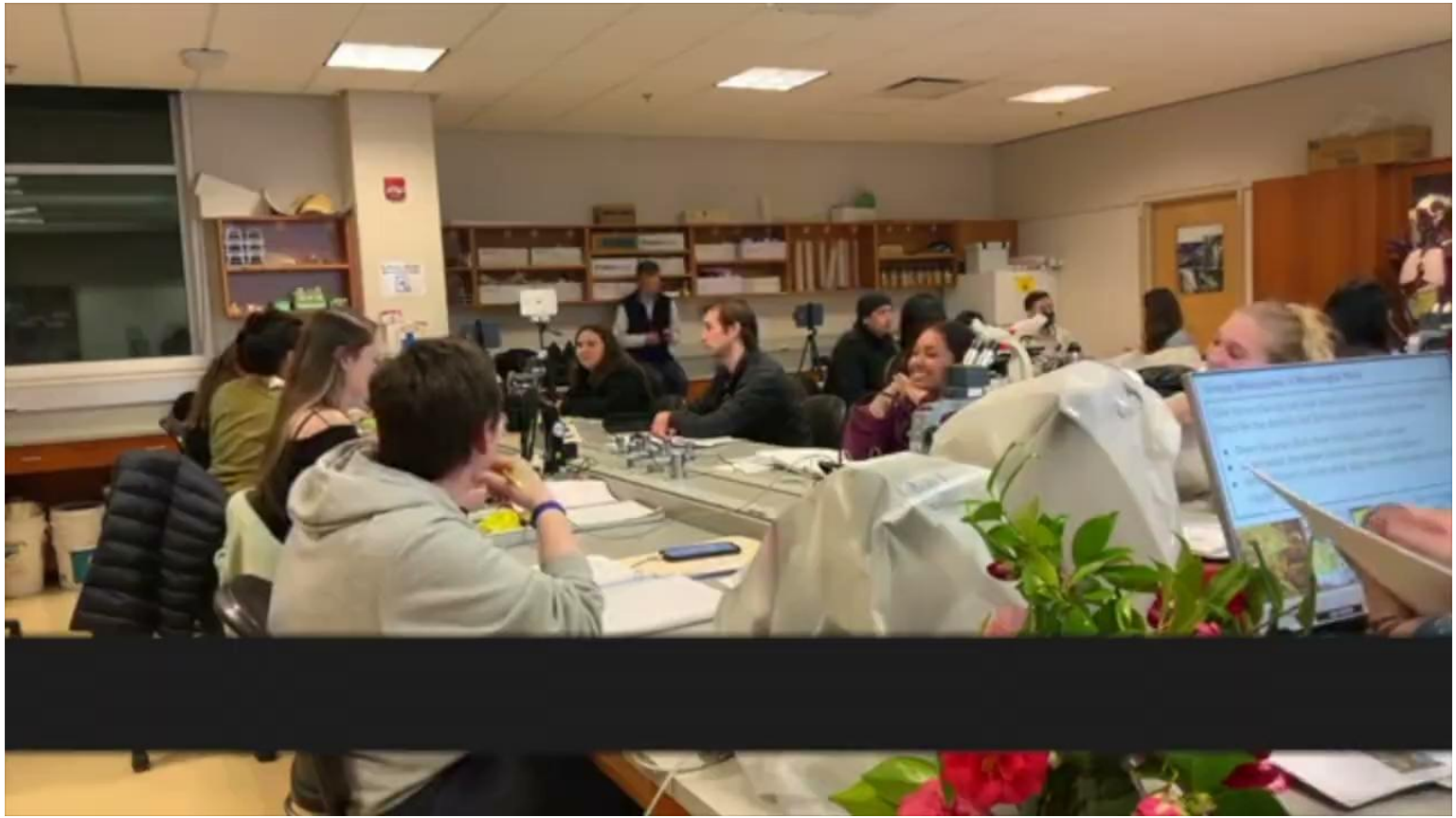
Close your eyes and think of a favorite dish in your life, connected to your family or your culture.

- Imagine the dish –how it looks, smells, & tastes.
- Write what you know about key ingredients:
  - Type of organism (plant, animal, fungus)?
  - Where do some of the ingredients come from?

Miso Soup



Vegetarian Nachos



Cilantro/Coriander + Pozole

Ourstories/Theirstories: “Meaningful Meals”

- **Matt:** Students bonded over similarities across cultures: importance of family; shared ingredients; commonalities in components (grain, protein, herbs and spices). Heightened engagement for the rest of the lesson.

- **Adrienne:** different cohorts/subsets of students responded differently, partly based on different “chemistry”; helped to ask them to close eyes & think of smells, textures, tastes, experiences; several groups continued making connections over food while researching; last lab of semester, so students already familiar with each other but very active!

- **Wendy:** “Meaningful Meals” was incredibly engaging, in small groups and as a whole-class discussion
  - Worked well in Week 5 for student connection, and might be a good activity to kick-start forming relationships even earlier in the semester.

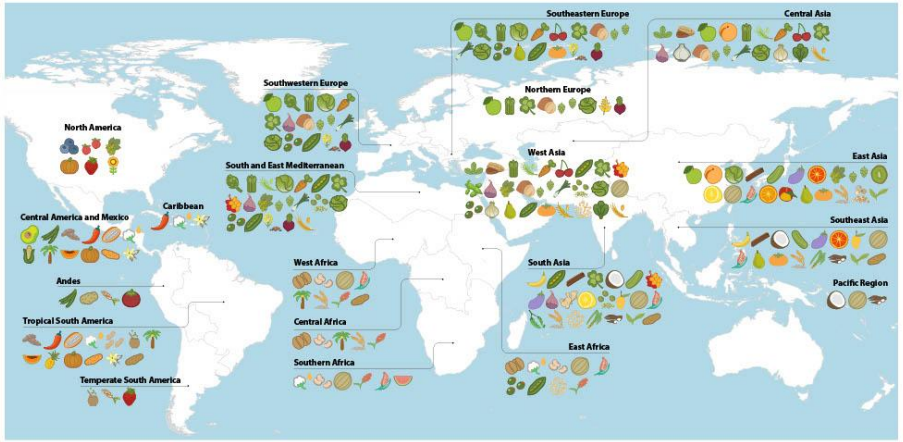
Wendy's Meaningful Meal

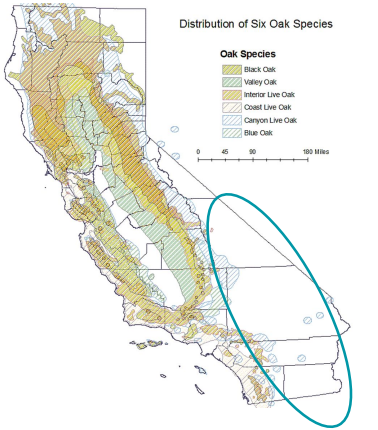
- Pierogies (from Poland)
  - Potato* dough dumplings
  - Filled with cabbage or shredded beef
  - Boiled, then pan-fried in butter and breadcrumbs
  - Served with sour cream

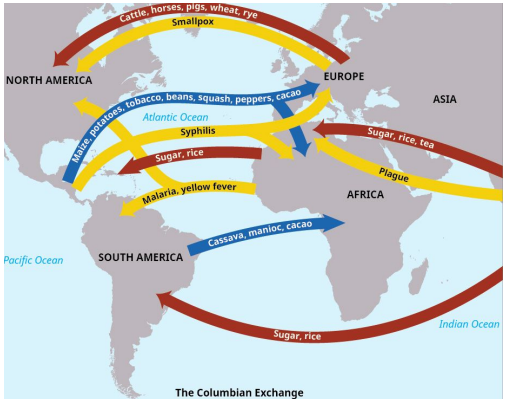
*Native to Andes; arrived in Poland late 17th c

Rehumanizing Dimensions: Windows and Mirrors

- Introduce ecological concepts via Crop Origins and the Columbian Exchange/ European Colonialism
- Compare staple crop production with Indigenous food production
  - California native plants and ecosystems; regional differences
  - Local food production, particularly oak trees/acorns as a staple food
  - Recognizing place-based knowledge

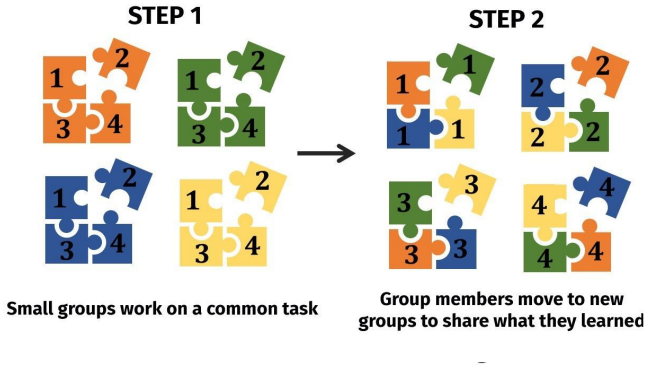






Staple Crops Jigsaw Activity

Students performed a “Jigsaw” activity to learn about each of 5 staple crops: Potatoes, Rice, Acorns, Wheat, and Corn



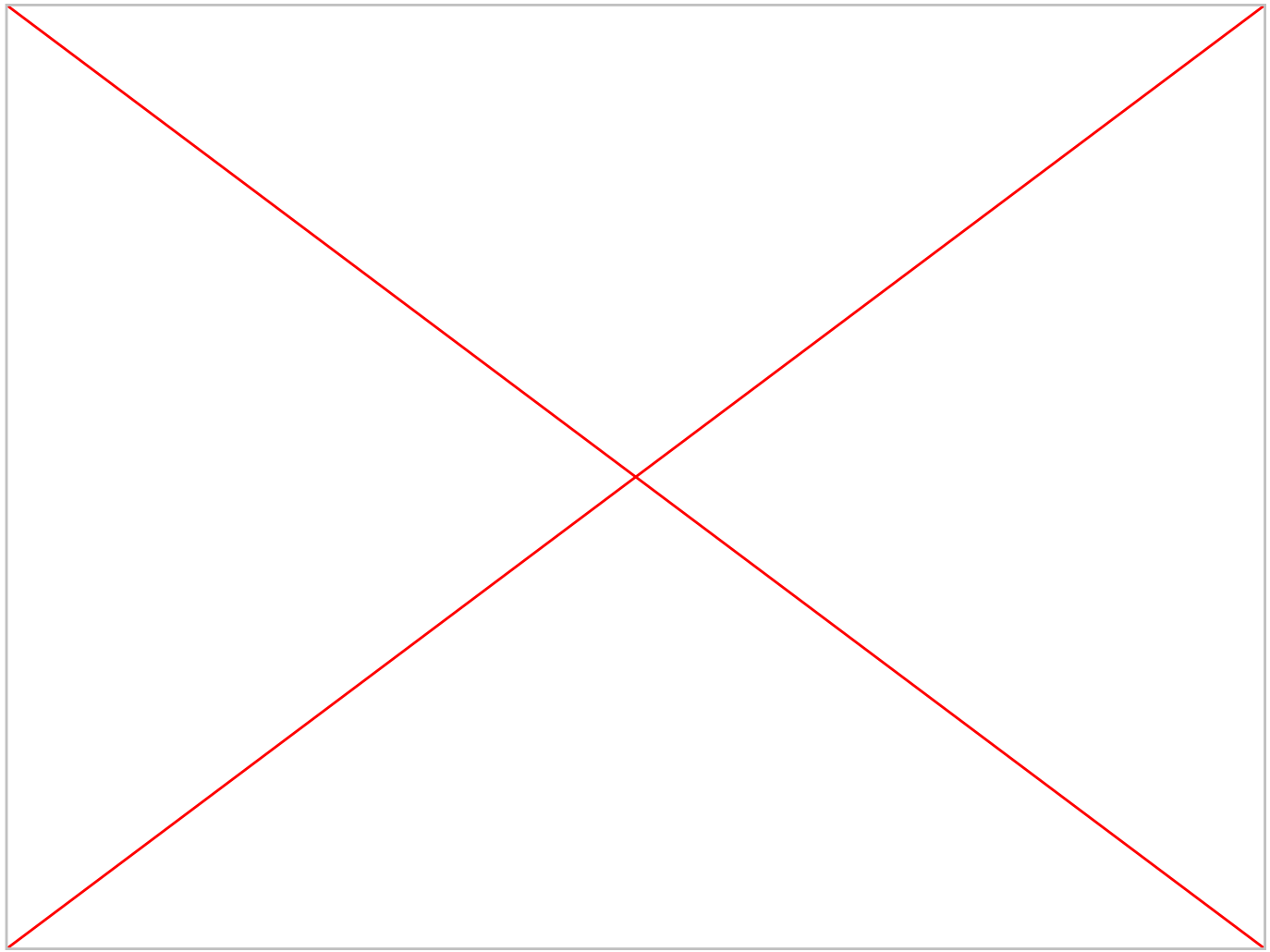
Potatoes (*Solanum tuberosum*)

- **Native geographic region & climate:**
  -
- **Grown today:**
  -
- **Human-cultivation:**
  - Andean farmers traditionally grow dozens to hundreds of potato landraces at once on terraced fields, using “chuño” processing (freeze-drying in the open air) to store potatoes for years.
- **Ecological interactions:**
  - Are all potatoes from the Andes edible? Why or why not?
  - What is the relationship between how potatoes are mostly propagated and the Irish Potato Famine?





“This is culturally significant to me . . .”

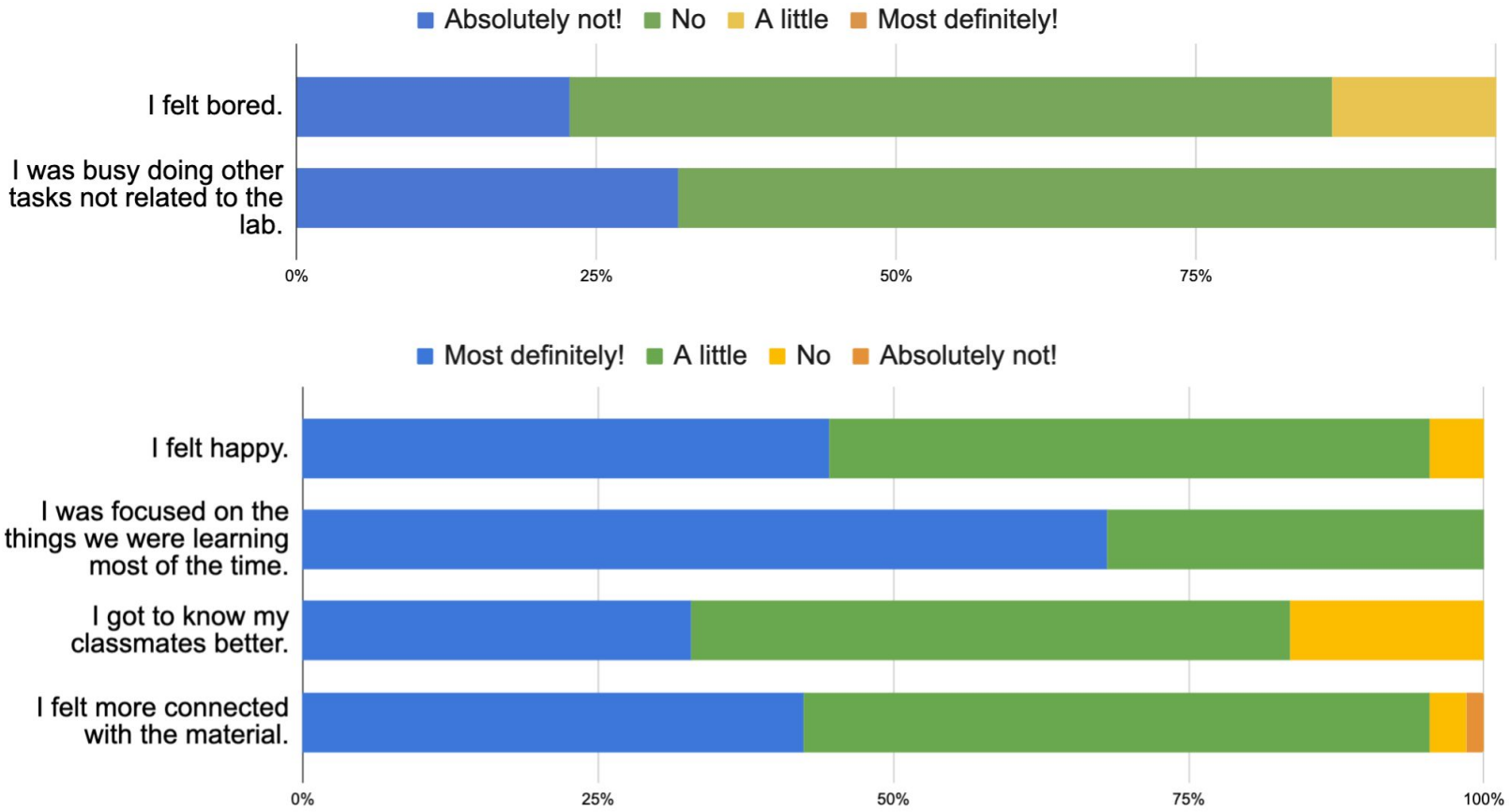


Windows and Mirrors

What crop:	Corn	Wheat	Potatoes	Rice	Acorns
Where did the plant evolve/where was it first domesticated (most crops have been *artificially selected* to be different from wild)					
Where is it grown today?					
Under what conditions? Do we have to alter the places where it is grown? In what ways?					
Ecological interactions (with wildlife, etc)					

- **Adrienne:** Jigsaw was a little cumbersome (uneven student numbers) some copying; Alternative: poster presentations great within groups but maybe learning about other crops.
- **Matt:** when presented with a data table, students are inclined to fill it out completely with the “right answers”. The analysis and synthesis step in the expert group had more fruitful conversations.
- **Wendy**: Jigsaw activity wasn’t as engaging.
    - Expert groups did have some thoughtful discussion, but during home groups, focus on copying information into the matrix

Post Survey: “During the lab . . .”



Post Survey: Free Response

"Anything else you want to comment about today's lab?"

College of Marin students (BIOL majors):

- *Very interesting! I liked that we learned about something that affects all of us on an everyday basis and relating it to plant biology.*
- *Fun - slightly limited to what your partners put in (amount of effort)*
- *I think this is a great unit to explore deeper. I love the idea of bringing in Native food and practices as part of Environmental Justice and Sovereignty.*

Chico State students (non-BIOL majors):

- *I'm exhausted, but it's a great lab. I had fun!*
- *I learned from it, and the material is very digestible!*

Focal Student Interviews Prior to Activity

Stan State: Several students who took part in the Focal Student Interviews (and who also completed the in-class activity) reached out in the weeks and months after the activity to follow up.

Hi Dr.Cover!

This is [redacted] from the Bio II course in the fall of 2025. You will remember me as the student who offered to take you dried crickets for you to try. That offer is still there! I have been so busy with school, and I have been meaning to reach out to you. I was wondering when your office hours are, so I can come by whenever I have the crickets for you to try, and obviously to just have a quick chat. I have not forgotten!

Have a great day.

Another student has come to office hours to share updates on her goat.
The focal interviews (small group) increased belonging and agency.

Chico State: Two Focal students chatted with me after the activity to teach me more about the dishes they reminisced about (recipes), including the importance of using Epazote in black beans.

Conclusions

- Students enjoyed activities, and self-reported as having gotten to know their classmates (and instructor) better, especially when activity was earlier in semester.
- Students were interested in the origins of crops vs where they are currently grown; expressed interest in looking at patterns for livestock.
- Activity took between 1.5 and 2 hours, and as just part of a 3-hour lab, some students seemed fatigued.
- Could we link back to the Meaningful Meals at the end of the lesson?
    - Some reflection and empowerment to wrap it up at the end?
    - Perhaps guiding Meaningful Meals to include a staple crop to begin with, then students could connect what they shared out to what they learned more about?

Final Takeaway?

- Some type of dumpling is a food that appears in pretty much every culture
  - Staple crop wrapped around (usually) protein