UPDATE ON BRANCHED BROOMRAPE

BIOLOGY, MANAGEMENT AND HOST STUDIES

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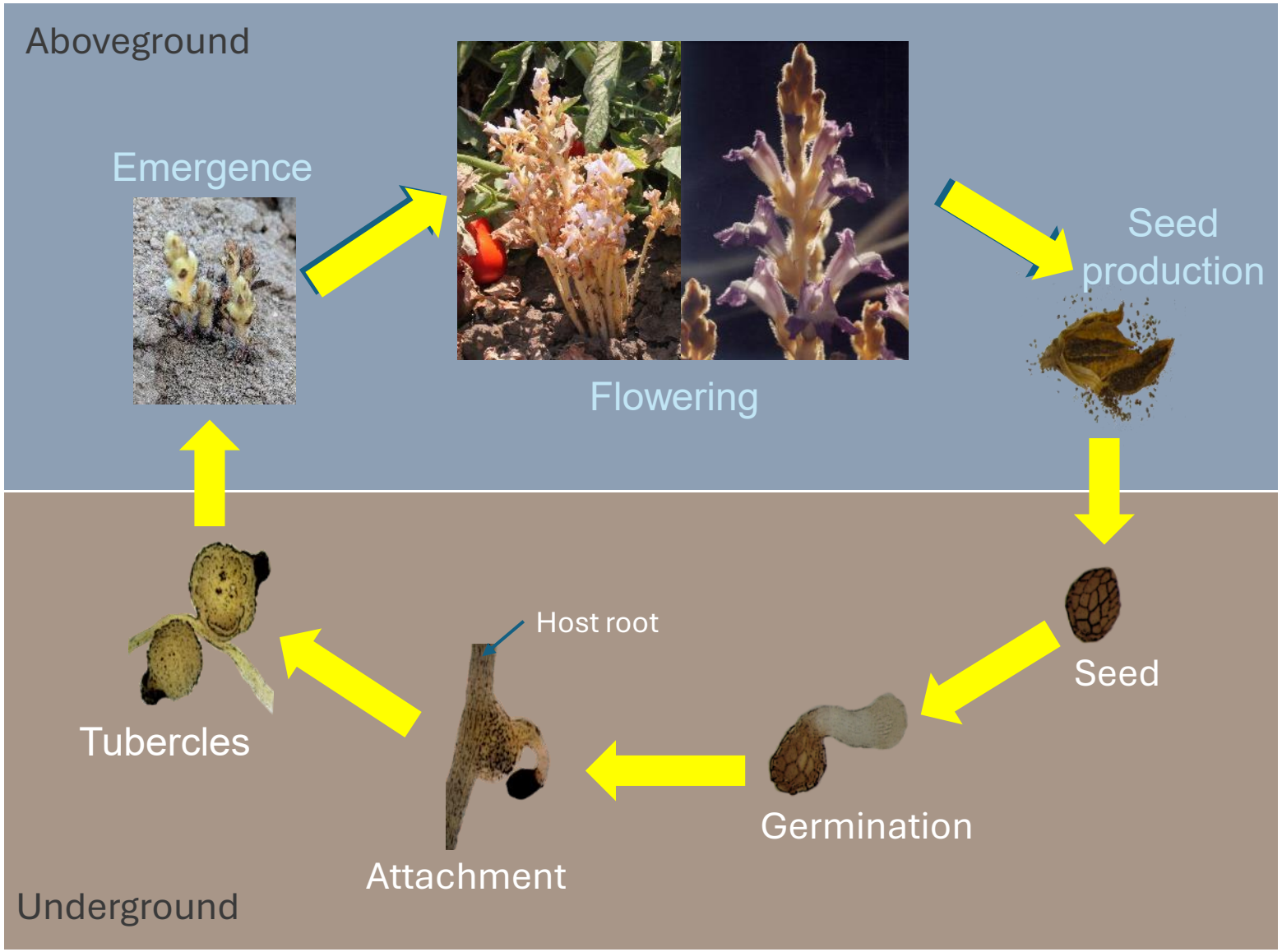
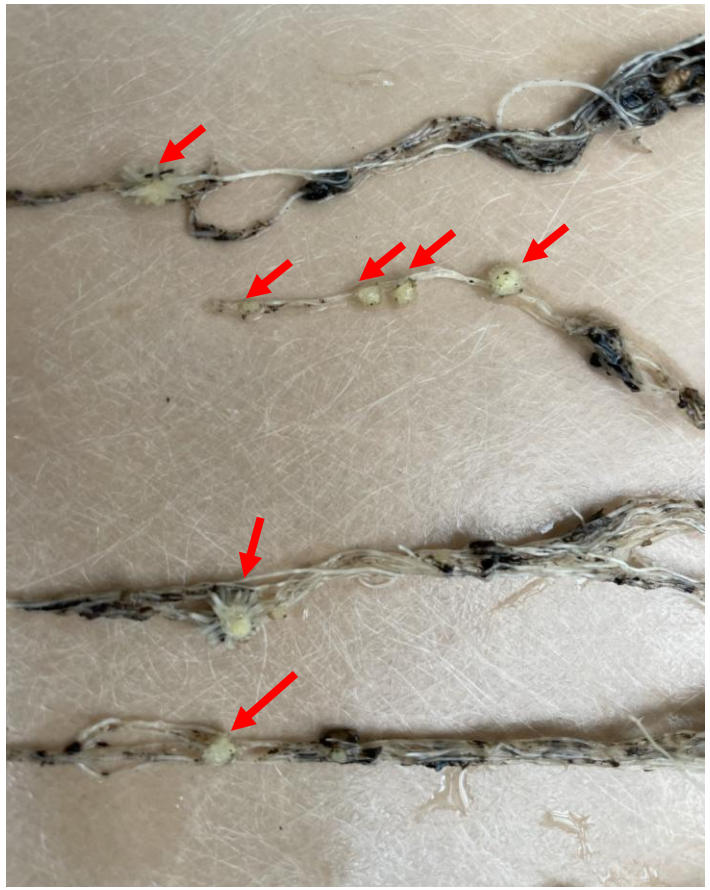
BRANCHED BROOMRAPE | RISK OF INFESTATION | LIFE CYCLE

- Obligate parasitic plants that attach to host roots.
- At least two species have been detected in CA tomato fields.
  - Branched broomrape (*Orobanche ramosa*) - "A-listed"
  - Egyptian broomrape (*Orobanche aegyptiaca*) – "Q-listed"
- Branched broomrape has been reported on-and-off for decades.
- Egyptian broomrape has a wider host range (~23 crops grown in CA!) and may be an even more serious risk.
  - First report in North America – Solano Co. in 2014, 2017 (and in 2025).

Interesting sidenote: *Orobanche cumana* reported in Washington in August 2025. First in North America.

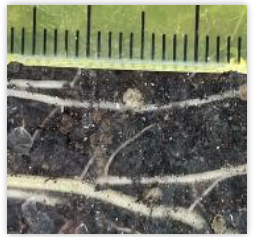
BRANCHED BROOMRAPE | RISK OF INFESTATION | LIFE CYCLE





Aboveground

Underground



WHAT ARE WE DOING ABOUT IT?

- Since ~ 2020, about half Brad's program's effort has been focused on broomrape in processing tomato.
- Currently, staff focused on:
  - **Vulchi/Fatino** – project lead for field chemigation and variety testing.
  - **Hossieni** – project lead for lab, greenhouse, CRF projects; especially QAC sanitizer evaluations and biology/modeling work.
  - **Bhusal** – chemical management with foliar products.

FIELD STUDIES | GREENHOUSE AND CRF | LAB STUDIES

FIELD STUDIES

- Herbicide, chemigation and PGR testing
- Resistant tomato varieties (grafted varieties also)
- Tomato planting date trials
- One fumigation trial (failed in 2021, planning reboot in 2026)

GREENHOUSE AND CRF

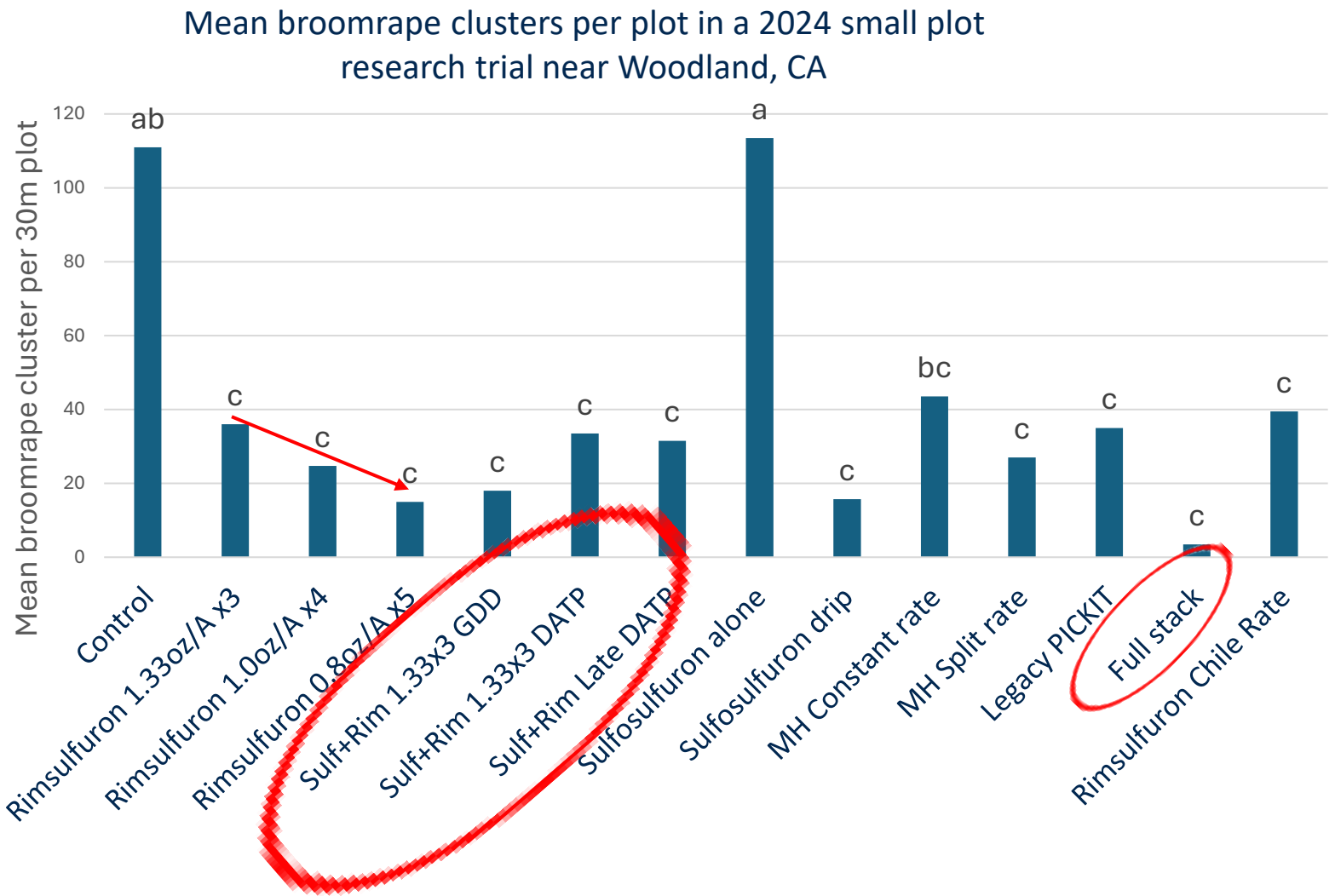
- Tomato cultivars, alternate hosts
- Biology, phenology, GDD
- Germination stimulants

LAB STUDIES

- Sanitizer efficacy on seed
  - (closely coordinated with Swett lab "Team Clean Machine" and CTRI)
- Germination stimulants
- Flooding, fertilizer impacts

FIELD STUDIES | GREENHOUSE AND CRF | LAB STUDIES

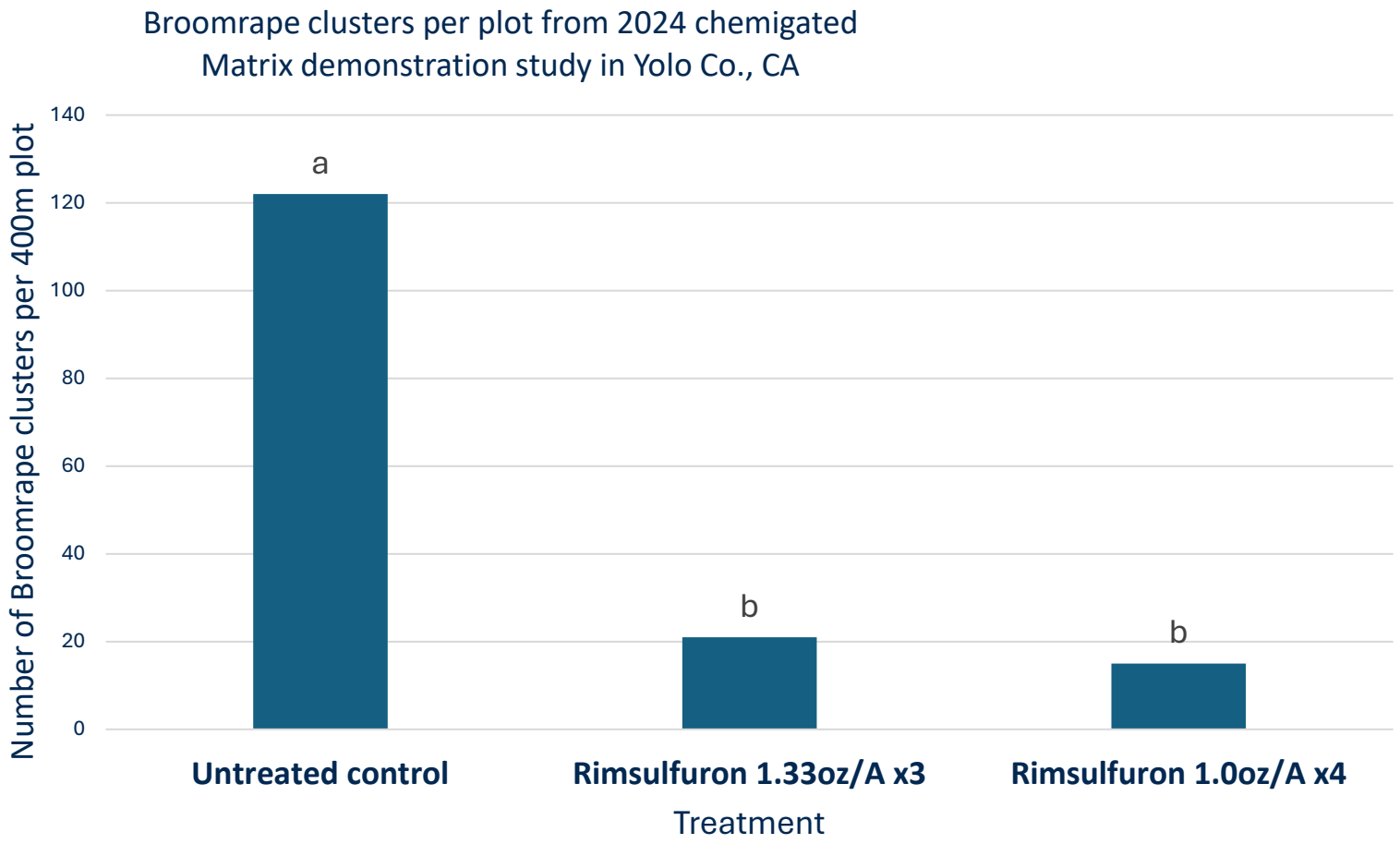
CHEMIGATION | PGR TRIALS | RESISTANT VARIETIES | DELAYED PLANTING DATE



- In most of our small plot research, rimsulfuron chemigation at US rates reduces broomrape emergence by ~70-86%
- However, in 2025 all treatments except MH performed poorly (not shown)
  - Need to understand what happened in the 2025 chemigation treatments
- MH was extremely effective in the 2025 “stacked” treatment
  - Working with manufacturer and IR4 to pursue MH further.

FIELD STUDIES | GREENHOUSE AND CRF | LAB STUDIES

CHEMIGATION | PGR TRIALS | RESISTANT VARIETIES | DELAYED PLANTING DATE



Fatino and Hanson

FIELD STUDIES | GREENHOUSE AND CRF | LAB STUDIES

CHEMIGATION | PGR TRIALS | RESISTANT VARIETIES | DELAYED PLANTING DATE

No.	Treatment	Cumulative broomrape counts per plot[i]	
		Trial 1	Trial 2
1	Untreated control	41.25 a[ii]	0.25 a
2	Matrix® (1.33 oz/A ×3)	33.25 a	0 a
3	Sprout-Stop® (28 fl oz/A ×6)	0.5 b	0 a
4	Sprout-Stop® (21 fl oz/A ×2 + 28 fl oz/A ×4)	0.25 b	0 a
5	Sprout-Stop® (32 fl oz/A ×6)	0.5 b	0 a
6	Sprout-Stop® (28 fl oz/A ×2 + 32 fl oz/A ×4)	0 b	0 a
7	Sprout-Stop® (28 fl oz/A ×8)	0 b	0 a
8	Outrider® (1.75 oz/A, PPI) + Matrix® (1.33 oz/A ×3) + Sprout-Stop® (32 fl oz/A ×6)	0.25 b	0 a
P value		0.0003	0.459

Trial 1 transplanted April 9, Trial 2 planted May 13

Bhusal and Hanson

FIELD STUDIES | GREENHOUSE AND CRF | LAB STUDIES

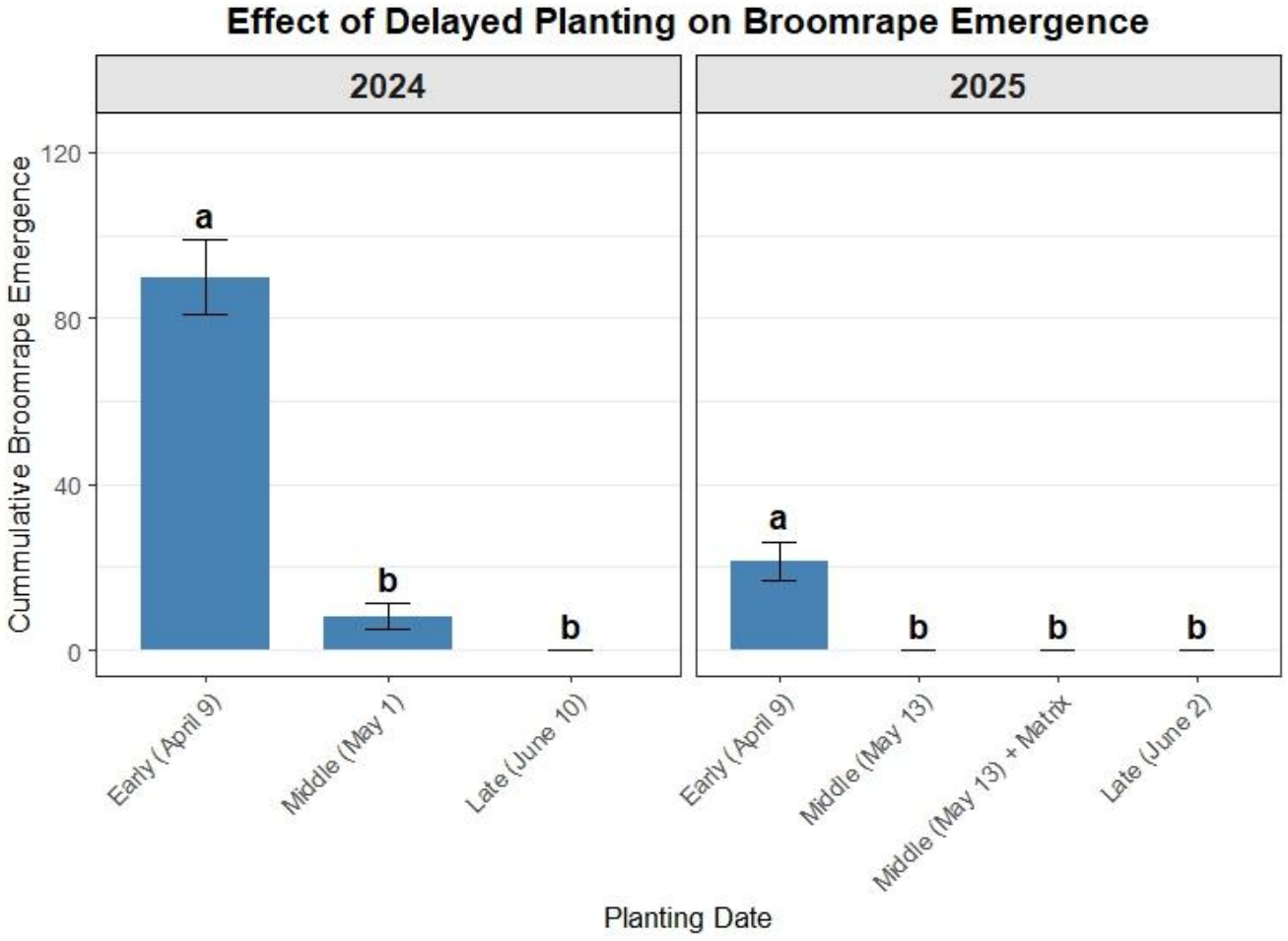
CHEMIGATION | PGR TRIALS | RESISTANT VARIETIES | DELAYED PLANTING DATE

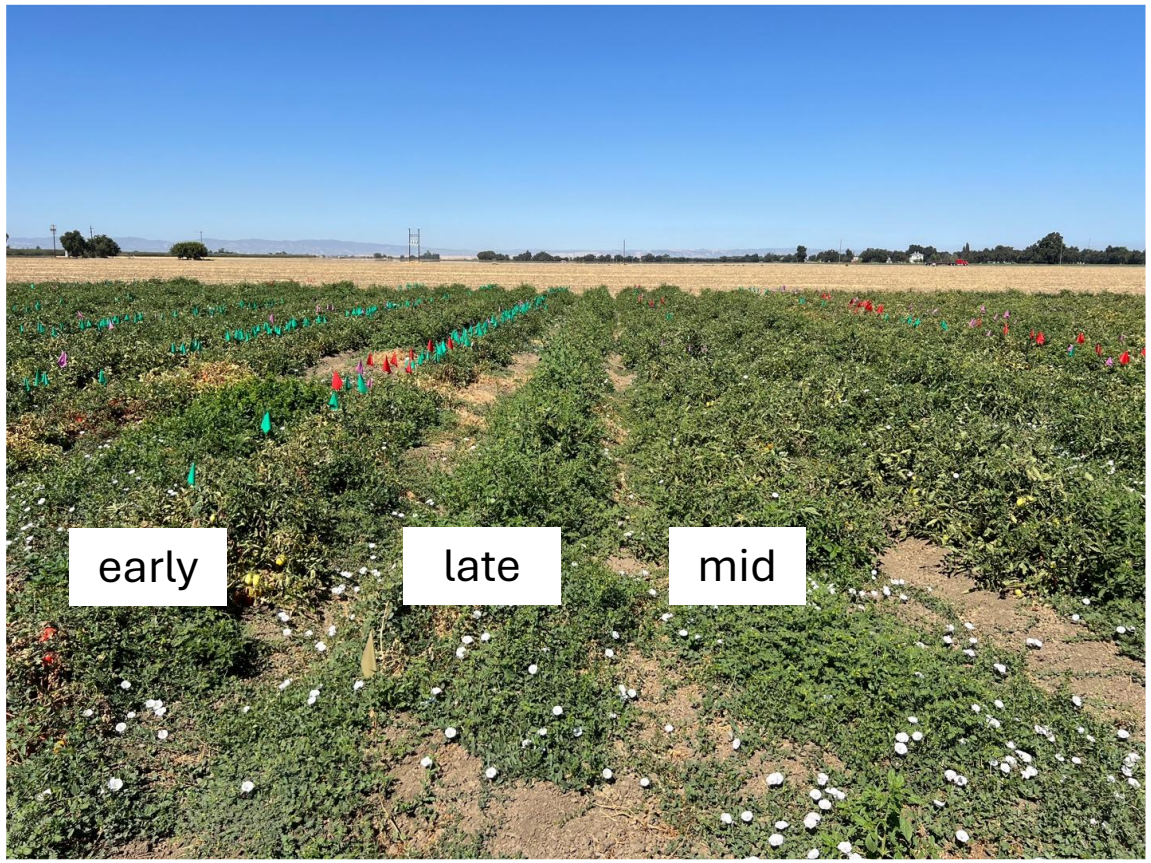
- **FIELD**
  - Thus far, no clear differences among commercial cultivars in larger scale demo or replicated plots
  - Have tested some research materials (cultivars and/or grafted); thus far, data have mostly been negative or inconclusive due to planting date challenges

- **GREENHOUSE**
  - Two GH runs of top ~20 PTAB varieties
    - Minimal differences in total parasitism
  - Have some small studies with research materials ongoing in GH

FIELD STUDIES | GREENHOUSE AND CRF | LAB STUDIES

CHEMIGATION | PGR TRIALS | RESISTANT VARIETIES | DELAYED PLANTING DATE

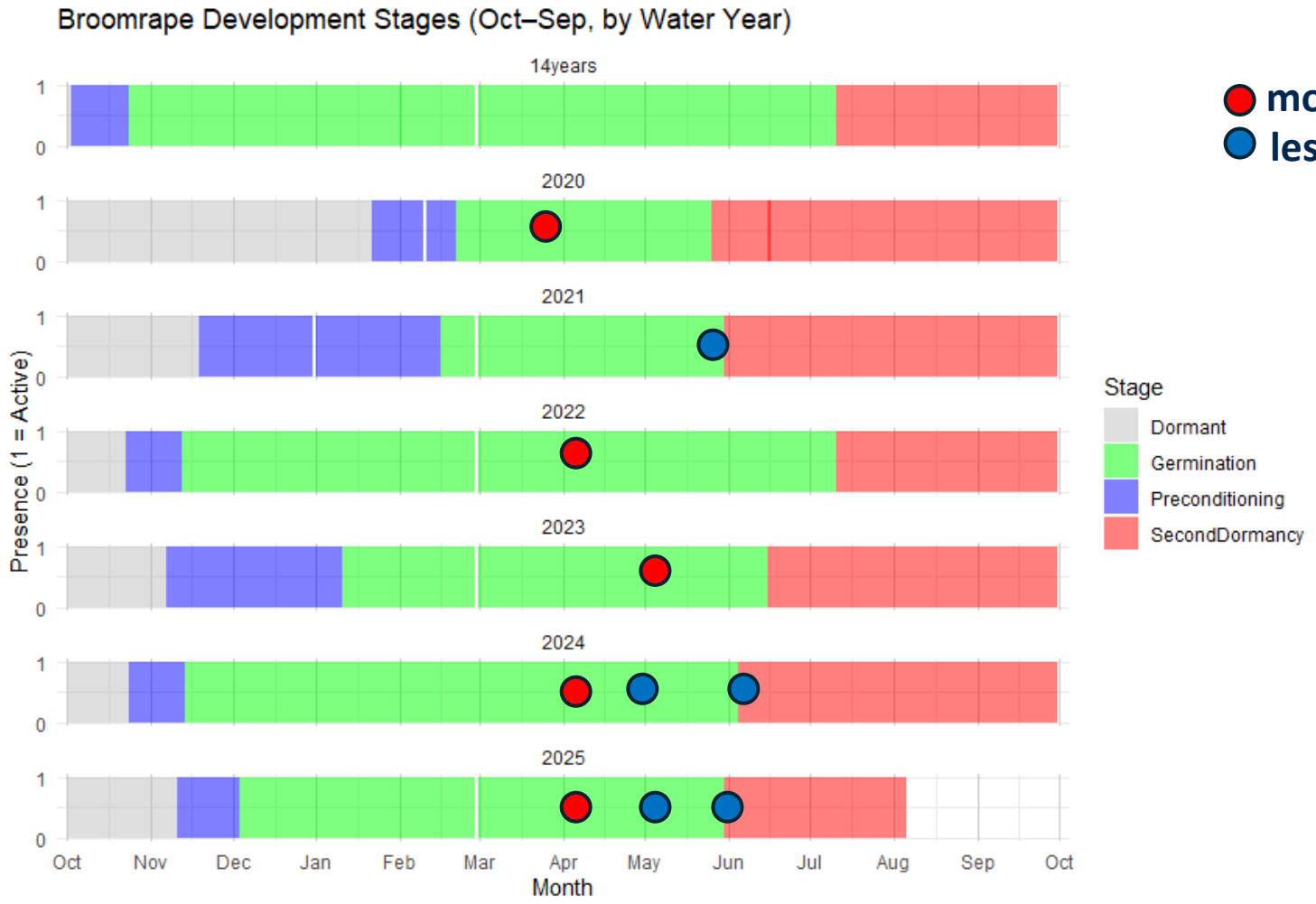




2024

FIELD STUDIES | GREENHOUSE AND CRF | LAB STUDIES

CHEMIGATION | PGR TRIALS | RESISTANT VARIETIES | DELAYED PLANTING DATE



more broomrape
less broomrape

Hosseini, Mesgaran, Hanson (analyses in process)

ALTERNATE HOSTS | GERMINATION STIMULANTS | BIOLOGY AND PHENOLOGY

- Small-scale in broomrape greenhouse
  - So far, 34 crops from 11 families evaluated
  - Double-cup system (1 Liter pots) and potting media with ~50 broomrape seed at planting/transplanting
  - Data are categorical (high/med/low/non) based on number of replicate pots with attachments or emergence observed
- Goal: ID “hosts”, “non-hosts”, “false hosts”

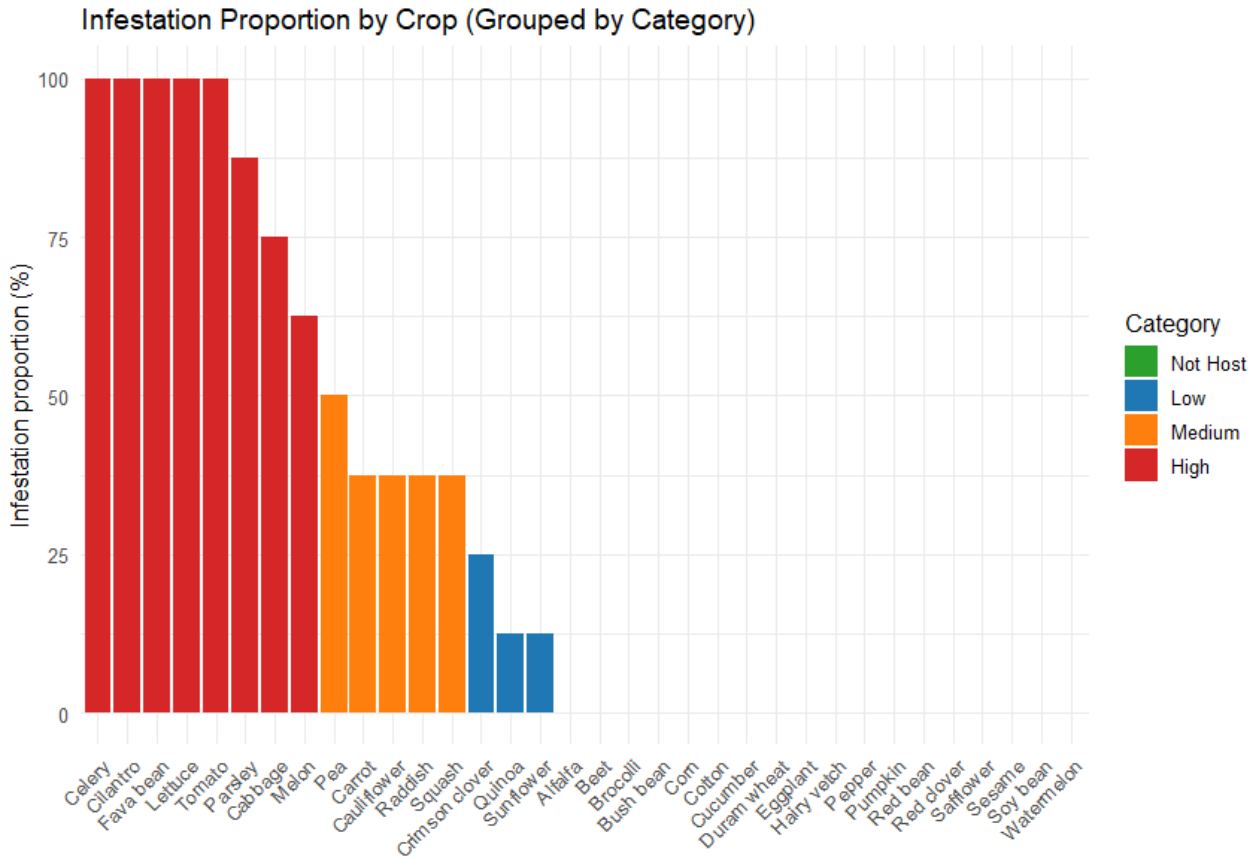
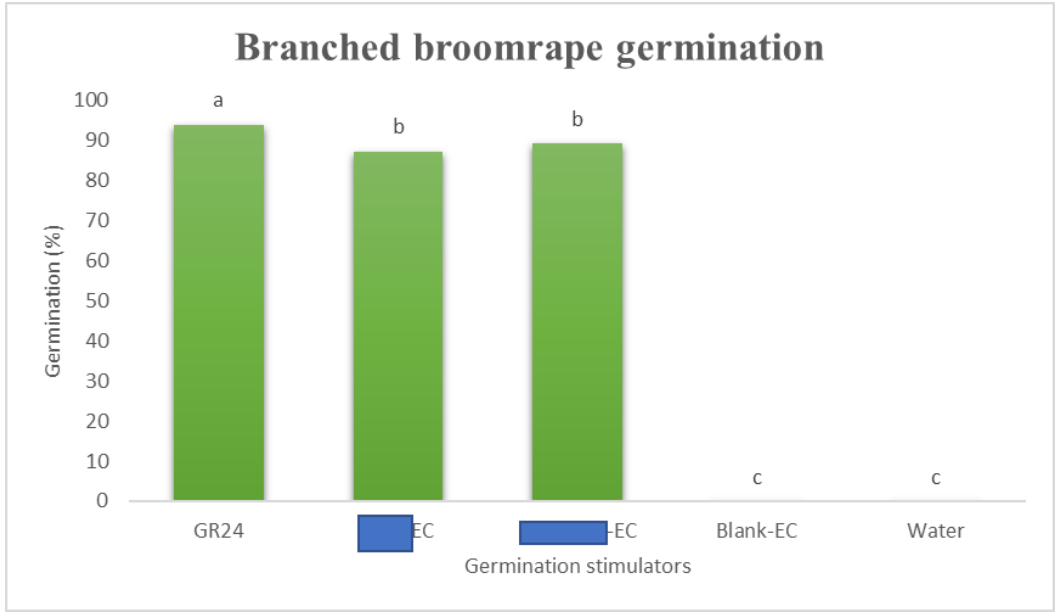


Figure 1. Infestation outcomes of 34 crops in host screening (8 replicates per crop). Number of crops classified based on infestation proportion: *Not Host* (0%), *Low* (1–25%), *Medium* (26–50%), and *High* (>50%).

Collaborations with Striga researchers in Saudi Arabia (KAUST)

- Tested in field in 2025
  - Inconclusive results due to planting date
  - Will regroup in 2026
- New GH and lab work underway



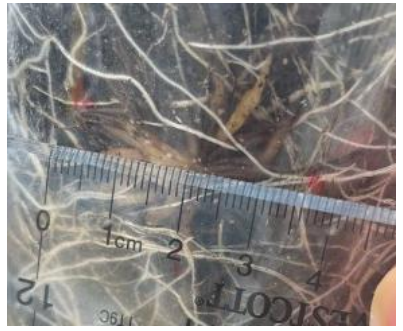
CHEMIGATION DISCUSSION

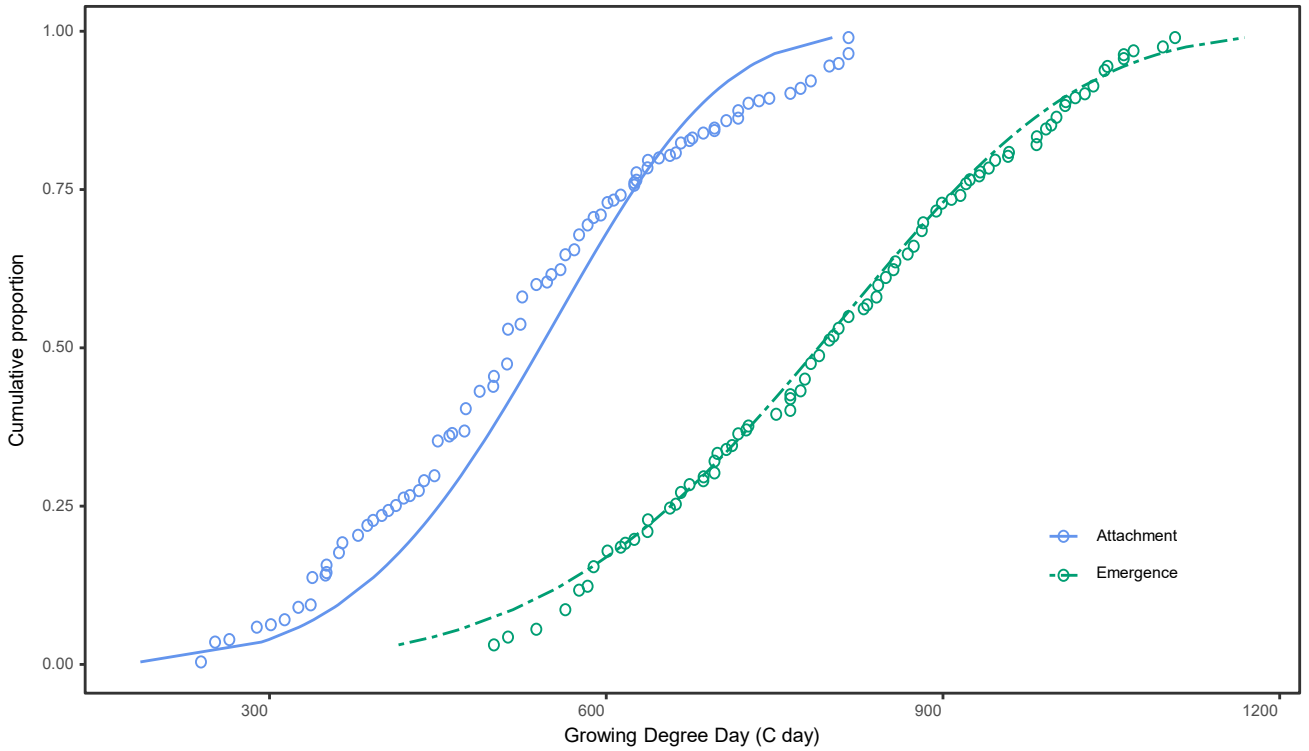
- The Matrix chemigation protocol
  - Three applications via buried drip irrigation
    - (Note: spraying Matrix was not effective for broomrape management)
  - Each application 1.33 oz product per acre. = 4oz product per acre per yr.

- The 24c label indicates 30, 50, and 70 days after transplant.
  - My current rec is to start earlier, more like 20, 30, and 40 DATP
  - However, it will be better to base on GDD models

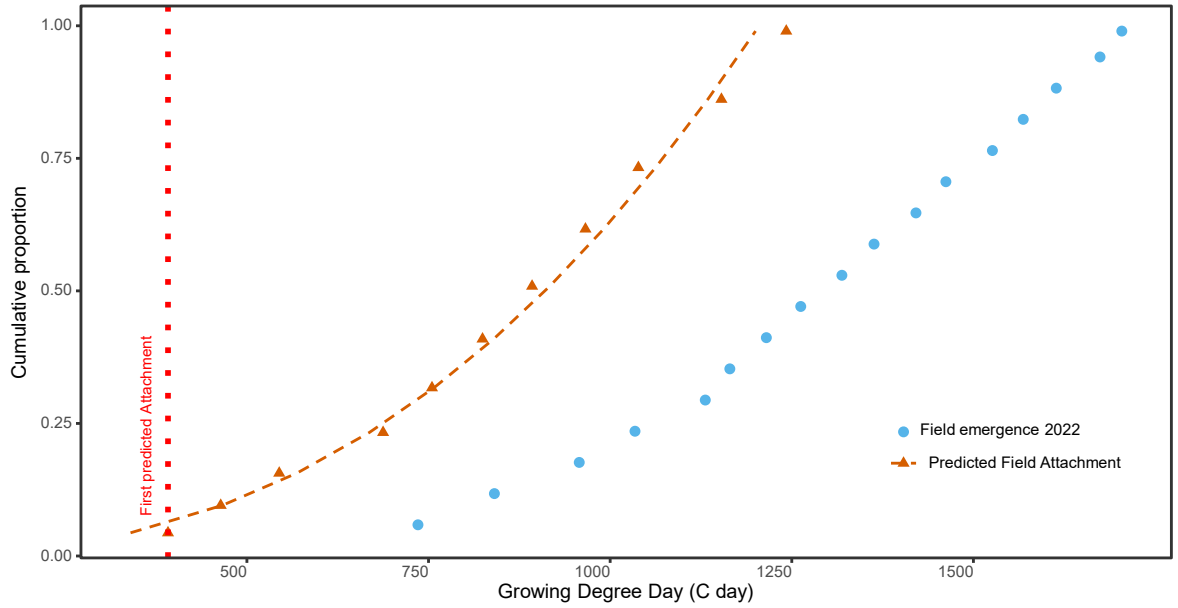
- Why? What are we trying to achieve? Balance:
  - starting early enough to control early broomrape
  - Spacing the treatments to accommodate relatively short half life
  - Get treatment efficacy for long enough to control late broomrape (but not longer than necessary after germination stops)
  - The phenological stages depend on temp, not days. This is a challenge for using DATP models in a crop like tomato

RIMSULFURON EFFICACY AT DIFFERENT BROOMRAPE STAGES

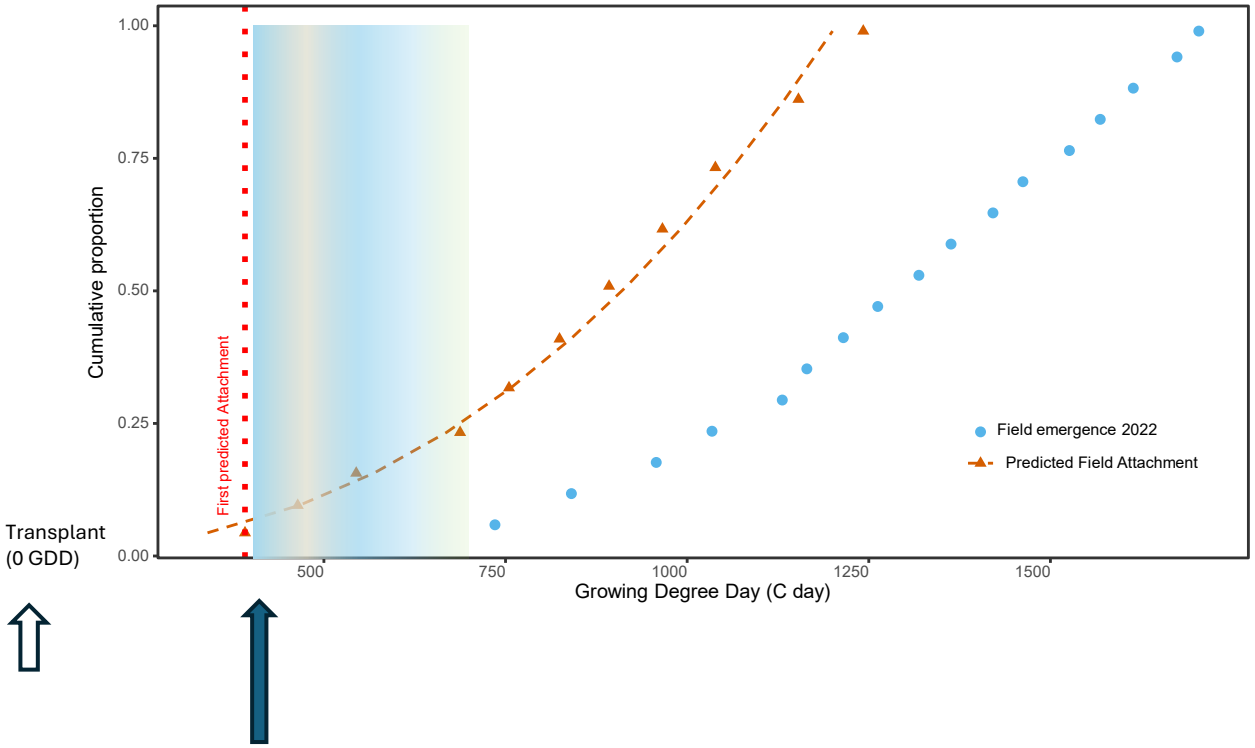
	Day 1 First herbicide application	**Day 7** Second herbicide application	**Day 14** Third herbicide application	**Day 29**
Matrix drench applied 3x, beginning early attachment (visible small turbucle)				
Matrix drench applied 3x, beginning later attachment (turbucle dia up to1 inch but but no shoot elongation)				
Matrix drench applied 3x, beginning at early shoot elongation)				



Branched broomrape attachment and emergence stages in a greenhouse experiment (data from 2021-22).



Branched broomrape emergence in field (data from 2022) and predicted attachments (calculated based on GH relationship).



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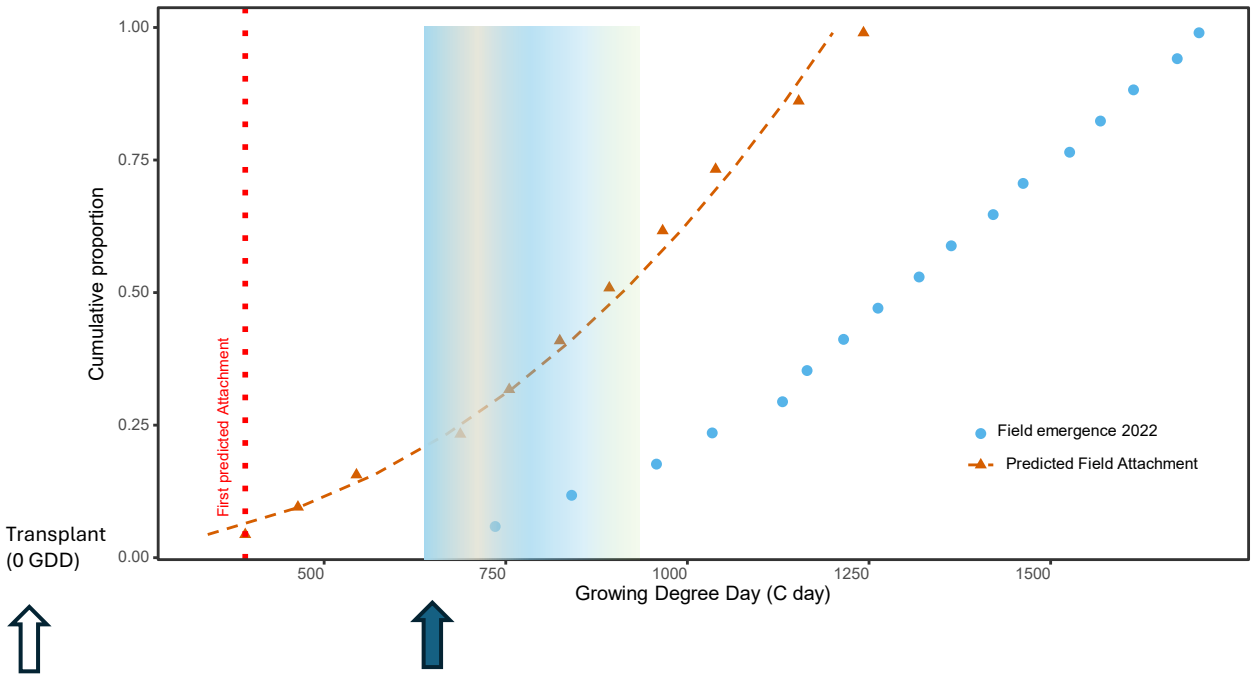
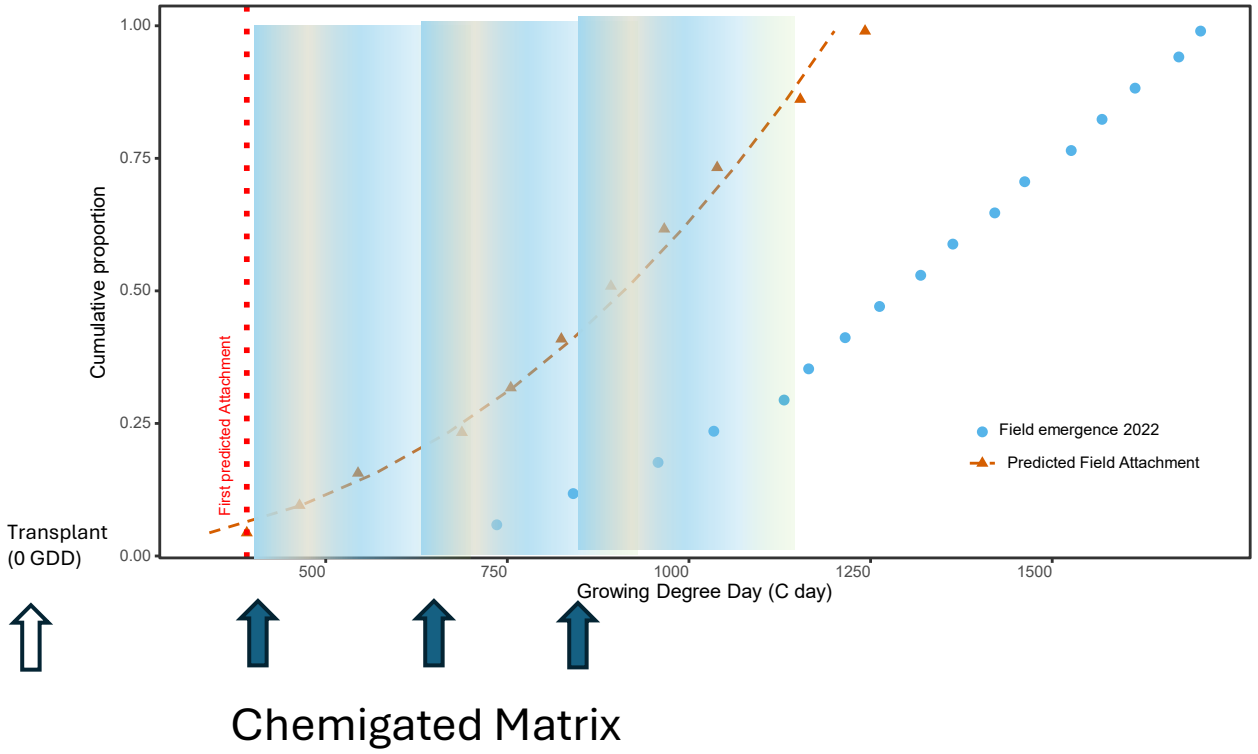


Chemigated Matrix

Branched broomrape emergence in field (data from 2022) and predicted attachments (calculated based on GH relationship).

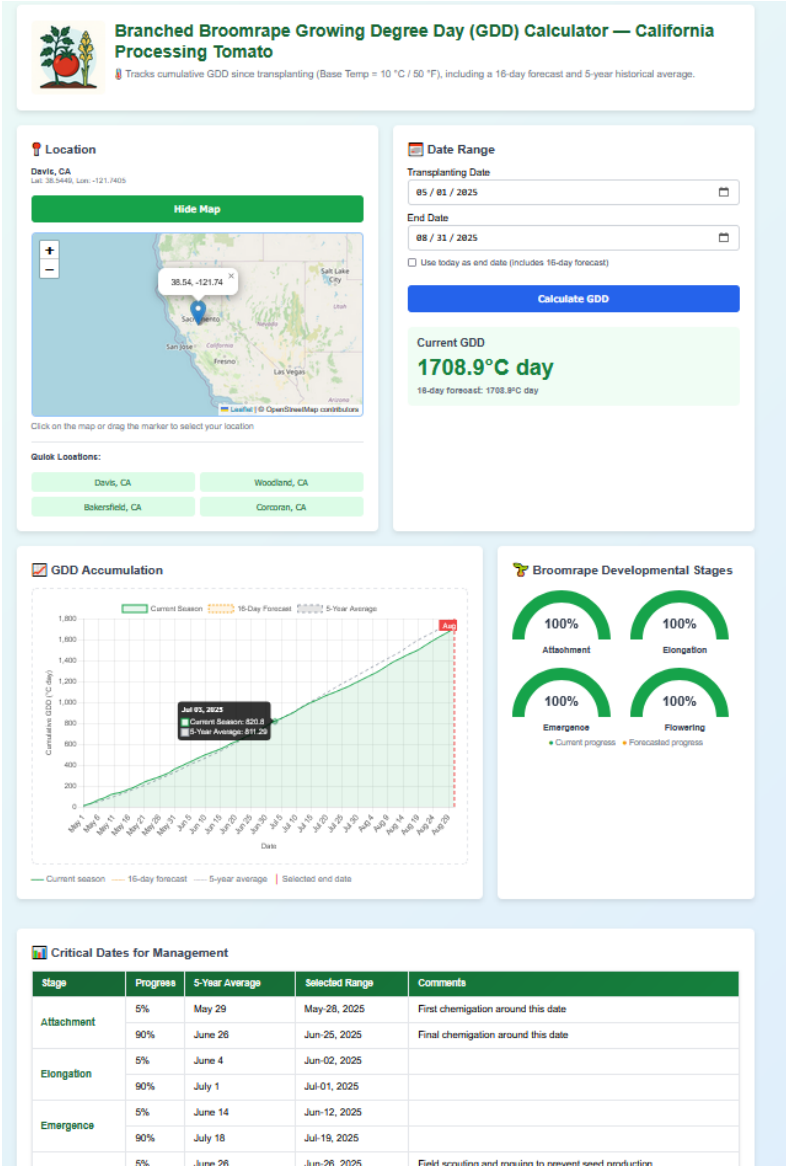


Branched broomrape emergence in field (data from 2022) and predicted attachments (calculated based on GH relationship).

BROOMRAPE PREDICTION TOOLS

Mesgaran team developed 1st pass GDD calculator tool based on earlier GH work.
Will validate during 2026

Site still in development, will be on UC broomrape website by spring



RECOMMENDATIONS

Follow Compliance Agreement recommendations

- Guidelines for producing tomatoes under broomrape risk. Allows harvest while reducing risk to the industry

1. Know what BR is and train field staff to ID and report

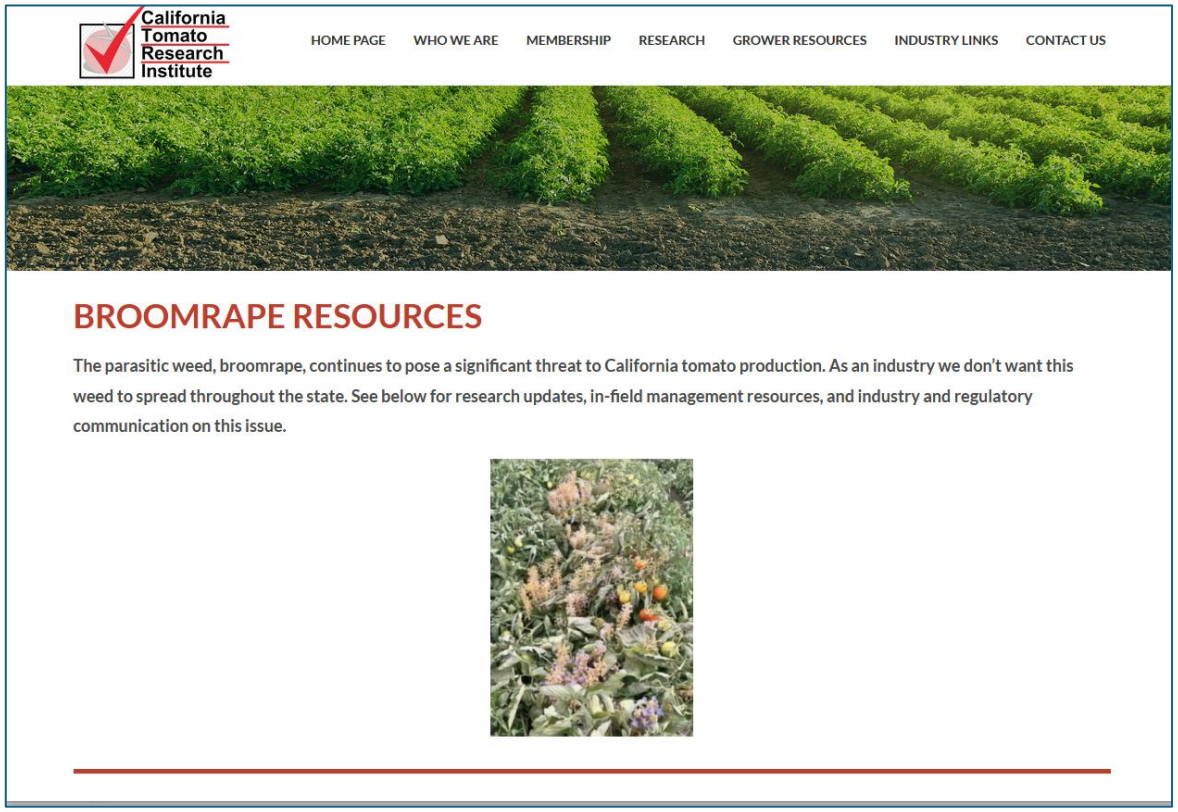
2. Take steps to clean equipment between fields to reduce spreading seed to new sites/regions

3. Consider the Matrix chemigation protocol at recommended rates and timings. Risk reduction and/or management

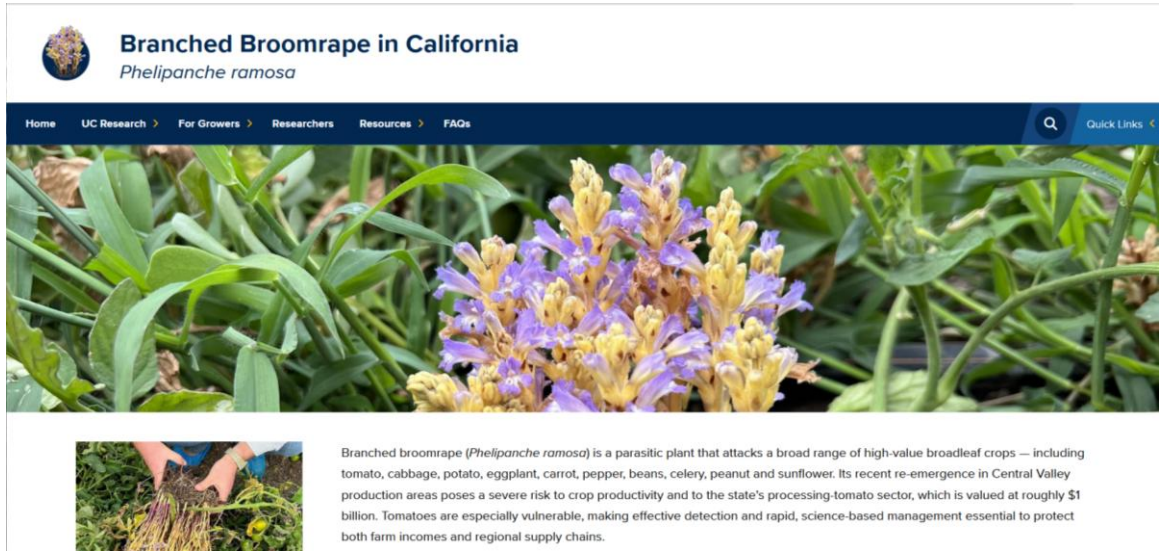
4. Plant known-infested or high-risk fields as late as feasible within your planting window

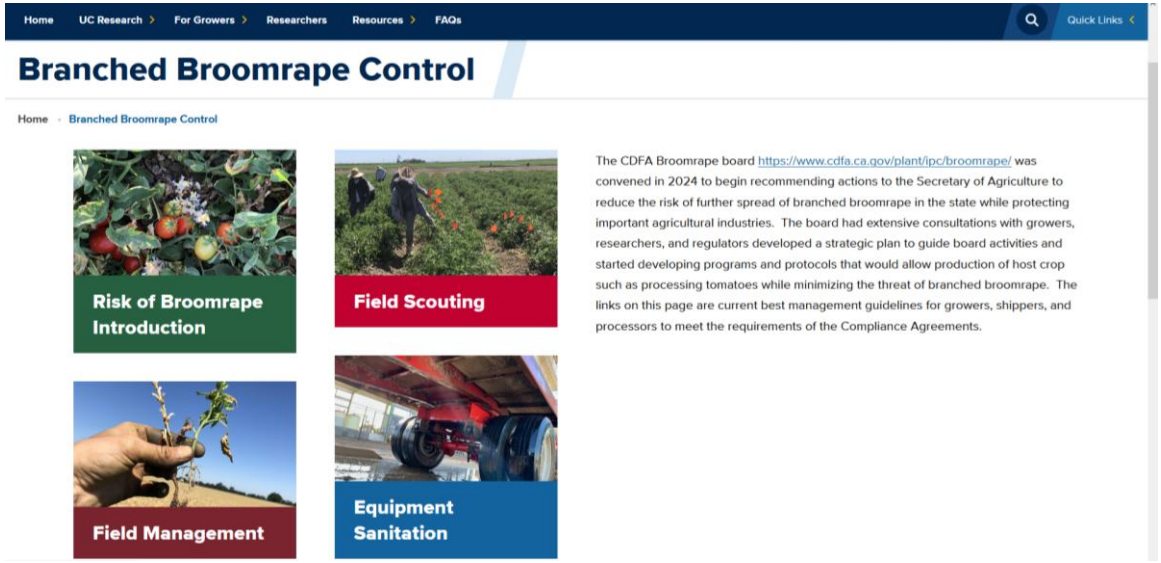
5. Scout and rogue fields to remove broomrape plants by early-flowering stage to reduce seed production. Remove broomrape debris from field and dispose in landfill (do not compost)

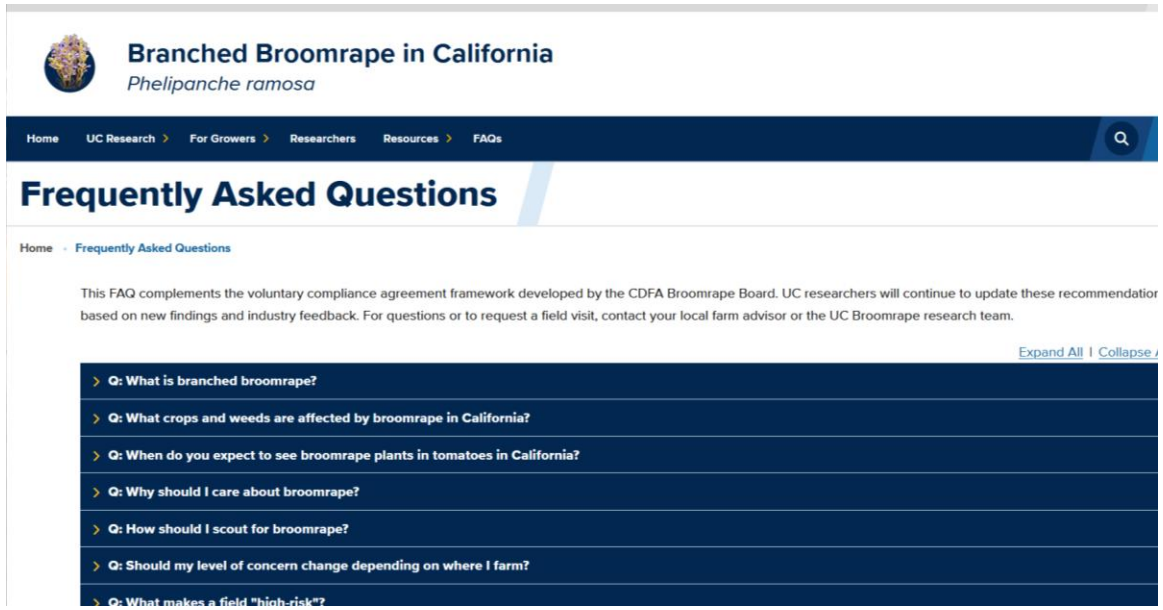
INDUSTRY COORDINATED OUTREACH



Industry coordination and engagement via California Tomato Research Institute


Branched Broomrape in California
Phelipanche ramosa
Home
UC Research
For Growers
Researchers
Resources
FAQs
Quick Links
Branched broomrape (Phelipanche ramosa) is a parasitic plant that attacks a broad range of high-value broadleaf crops — including tomato, cabbage, potato, eggplant, carrot, pepper, beans, celery, peanut and sunflower. Its recent re-emergence in Central Valley production areas poses a severe risk to crop productivity and to the state's processing-tomato sector, which is valued at roughly $1 billion. Tomatoes are especially vulnerable, making effective detection and rapid, science-based management essential to protect both farm incomes and regional supply chains.


Home
UC Research
For Growers
Researchers
Resources
FAQs
Quick Links
Branched Broomrape Control
Home
Branched Broomrape Control
Risk of Broomrape Introduction
Field Scouting
Field Management
Equipment Sanitation
The CDFA Broomrape board https://www.cdfa.ca.gov/plant/ipc/broomrape/ was convened in 2024 to begin recommending actions to the Secretary of Agriculture to reduce the risk of further spread of branched broomrape in the state while protecting important agricultural industries. The board had extensive consultations with growers, researchers, and regulators developed a strategic plan to guide board activities and started developing programs and protocols that would allow production of host crop such as processing tomatoes while minimizing the threat of branched broomrape. The links on this page are current best management guidelines for growers, shippers, and processors to meet the requirements of the Compliance Agreements.


Branched Broomrape in California
Phelipanche ramosa
Home
UC Research
For Growers
Researchers
Resources
FAQs
Frequently Asked Questions
Home
Frequently Asked Questions
This FAQ complements the voluntary compliance agreement framework developed by the CDFA Broomrape Board. UC researchers will continue to update these recommendatior
based on new findings and industry feedback. For questions or to request a field visit, contact your local farm advisor or the UC Broomrape research team.
Expand All | Collapse
Q: What is branched broomrape?
Q: What crops and weeds are affected by broomrape in California?
Q: When do you expect to see broomrape plants in tomatoes in California?
Q: Why should I care about broomrape?
Q: How should I scout for broomrape?
Q: Should my level of concern change depending on where I farm?
Q: What makes a field "high-risk"?

ACKNOWLEDGEMENTS

Acknowledgements:

- Hanson lab group, Swett lab group
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  - Schreiner Bros., Viguie, PCP, other growers and processors
- Patricia Lazicki, Gene Miyao, Coby Goldwasser

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