

Vegetable Info (August 2024)

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Equipment sanitation to manage risk of spreading broomrape: Research updates, new best management practices

Broomrape doesn't have many effective in-season options for management and is difficult to eradicate once it's established in a field. All can easily be spread between fields on contaminated equipment.

Brad Hanson and Cassandra Swett, weed and fungal pathology specialists at UC Davis, are jointly researching methods for equipment sanitation to help reduce the risks of spreading soilborne problems. In a recent field day sponsored by the California Tomato Research Institute and hosted by Dave Viguie of Viguie & Timothy Farming, they presented new results from their research and an updated sanitation BMP protocol.

[Updated Sanitation Best Management Guidelines](#)



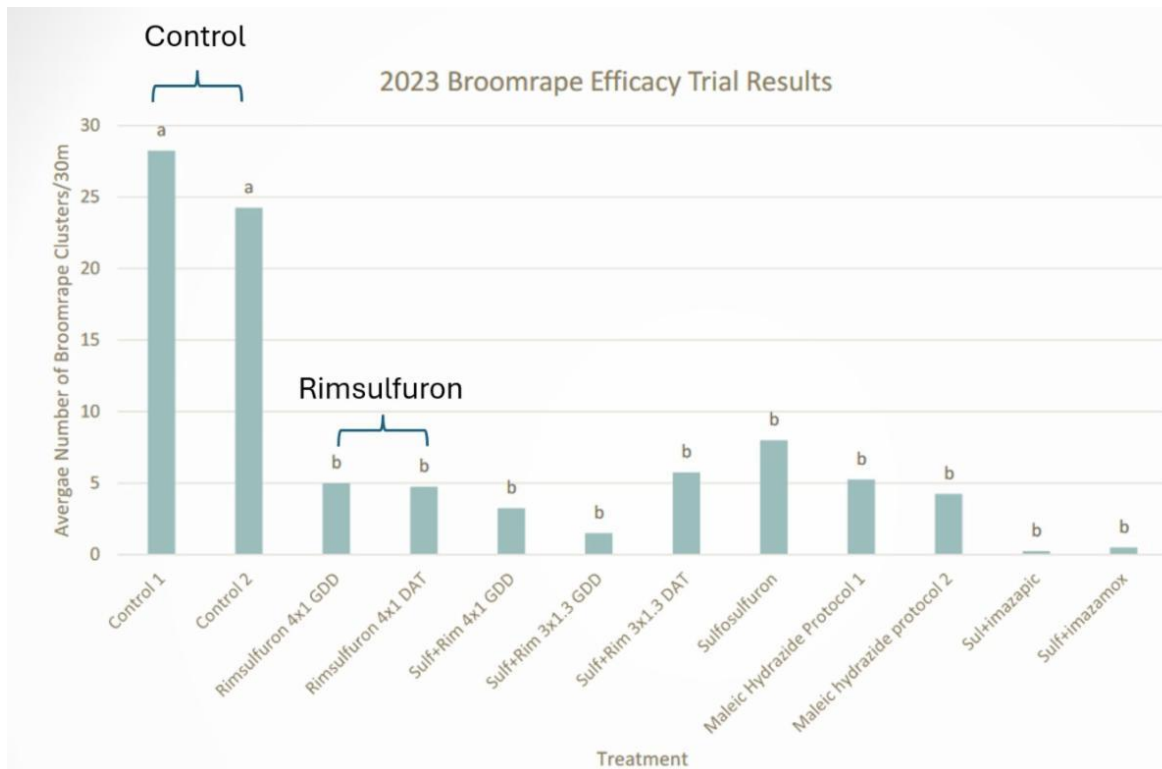
Tomato harvester undercarriage, following the harvest of a broomrape-infested field in Chile.

“Where we DON’T want to be”

“California doesn’t yet have yield-reducing levels of broomrape, and we don’t want them,” says Brad Hanson. A [visit to the processing tomato harvest in Chile](#), where broomrape is already widespread, dramatically demonstrated the risk of moving weeds and pathogens on complex farm equipment. A harvester can accumulate hundreds to thousands of pounds of soil and debris during operation. During that eye-opening visit, he noted broomrape stalks and seed pods were obvious to the naked eye on the harvester and even in the flumes and rinse tanks at the cannery. One plant can produce 100,000 seeds, giving an idea of how much seed can be spread in contaminated equipment. “One of the Chilean growers I spoke to said that they can have a field go from low broomrape infestation to extremely high infestation in only four years and they have to avoid those fields in the future for tomato production - this is what we should try to avoid in CA and why equipment sanitation is so important while our broomrape populations are still relatively low and not spread through the whole industry.”

Drip-applying Matrix—is sanitation still necessary?

Based on field trials by Matt Fatino, a student in Brad’s group, CTRI requested and obtained a 24c Special Local Needs label for Matrix (rimsulfuron) via chemigation as a treatment for fields in which broomrape may be a risk. This label was approved in time for the 2023 season and, in the past two years tens of thousands of acres in California have been treated. Their [research from 2023](#) confirms that of previous years: subsurface drip-applied Matrix reduces broomrape emergence and establishment, which reduces the amount of new seed that is produced. However, it doesn’t directly affect the seed already in the soil and should not be considered an eradication treatment. Sanitation of field equipment is still a good idea to help reduce the risk of spreading broomrape seed field to field, or among farming operations.



Results from 2023 chemigation field trials (average broomrape clusters per 120 ft plot)

Strategically targeting sanitation efforts

Not every piece of equipment can be 100% cleaned between every field. Cassandra Swett's equipment sanitation research has found that thoroughly cleaning a harvester can take upwards of four hours, which isn't a practical option for everything all the time. Previous research has showed that just compressed air and a pressure wash can reduce pathogen loads on a harvester by 90% simply by removing the majority of the soil and plant debris. When is a more rigorous cleaning warranted?

- **Give special attention to equipment moving from high-risk fields to low-risk areas.** For example, equipment lent to someone in a county in which broomrape hasn't yet been reported should be given a rigorous cleaning before the equipment is moved. Rigorous = remove all debris even from high-load and hard to access areas (like the front axle) with physical cleaning, and then also use a sanitizer.
- **Target wettest, muddiest locations on equipment.** Broomrape seeds can move in both soil and plant material, so it makes sense to pay special attention to cleaning areas that accumulate a lot of caked-on debris. Cassandra's team's research suggests wheels, mudflaps on trailers and harvester undersides are good candidates. Additionally, consider extra cleaning efforts on equipment that's in the field in spring when the soil is moist.
- **You haven't seen broomrape in the field, but there's reason to think the field could be at risk.** [Chemigate Matrix prophylactically](#). Sanitize everything that comes in or out, from boots to harvester.

Dave Viguie, who cleans and sanitizes all the equipment on his 5,000 acres all year round, notes that cleaning his equipment every 40 acres has had the added benefit of reducing maintenance issues.

WHAT'S NEW, WHAT'S NEXT: Recent research, ongoing questions

Quaternary ammonium is deactivated by debris (at low rates) Tests by Pershang Hosseini, a postdoc working with Brad Hanson, show the presence of soil or plant debris deactivates QACs and makes them ineffective at killing broomrape seed. 1% quat solutions only work on contact, so it's important to pre-clean equipment before sanitizing. Her recent work suggests that higher concentrations can "saturate the system" and may overcome this. This work is ongoing.

What's an effective rate if debris is present? Can I physically clean with QACs? Probably a good physical cleaning will be more effective than lightly sanitizing a dirty machine. The team is currently testing the best ways to combine the physical cleaning and sanitation steps, such as whether it's more effective to increase the quat concentration in the cleaning solution, the solution volume, or the pressure. We're working with an agricultural engineer to explore ways to mechanize cleaning hard-to-reach areas.

What sanitizers don't work for broomrape? Bleach and paracetic acid aren't effective at killing broomrape seed. Newer generation QACs (such as DDAB) can kill broomrape seed at lower concentrations than older products (such as ADAC).

Are other sanitizers effective against broomrape, that aren't deactivated by debris? Led by postdoc Justine Beaulieu, Cassandra Swett's lab is testing several other alternatives to QACs. However, none have yet been identified.

Can anything be added to QAC solutions to increase their effectiveness? Adding a foamer increases the contact time between the quat solution and machine surfaces. Some preliminary work suggests this makes them more effective when applied to cleaned surfaces, especially in areas like ducts

and suction fans. Adding surfactants probably won't help, since it's deactivation by soil that's reducing efficacy.

Want more information or a private consultation for your operation? Contact Brad Hanson (bhanson@ucdavis.edu) or Cassandra Swett (clswett@ucdavis.edu)

CTRI dedicated broomrape resource page

The CTRI website now includes a page dedicated to collecting broomrape resources and information. These include general background information, past research presentations, news and blogs, and useful links.

[CTRI Broomrape Resources Page](#)

