Briefing: Strategic and Tactical Uses of the Broomrape Phenology Model

Neil McRoberts, Plant Pathology Department, UC Davis

December 10th 2025

Strategic use

The broomrape degree-day phenology model offers the industry a way to move from reactive, field-by-field responses to a coordinated, predictable, and potentially less contentious system. Rather than functioning solely as a biological forecast for scheduling management responses in high-risk fields, the model could also be deployed strategically to provide a seasonal clock that all parties—growers, PCAs, processors, inspectors, and regulators—could use to align expectations and actions. The motivation for this comes from the widely known phenomenon from operations research and game theory in which programs fail, not from a lack of technical information or operational efficacy but, because strategic choices, baked into the structure of the decision, lead people to opt for self-defeating or sub-optimal actions.

By running regional model projections publicly each season, the industry could create a shared clock for each district that would help to stabilize performance-based compliance. Inspectors would gain a consistent basis for timing mitigation requirements, growers would gain predictability, transparency and objectivity about risk, and voluntary participation would (hopefully) become easier to justify and maintain.

Many growers and PCAs already have experience with degree days models; for example the UC thrips degree-day model used to coordinate TSWV suppression, which should make adoption easier.

Used this way, the broomrape phenology model would serve as a biological tool that helps individual businesses, and also a coordinating framework for making compliance more predictable, less adversarial, and ultimately more effective.

Tactical use

Growers with known infestations, or elevated risk because of nearby detections, will be able to anchor their management plans in clear, temperature-driven windows for emergence and flowering. This will allow scouting and roguing schedules to be built around the parts of the season when the biology matters most. While the most obvious value here might be in knowing when to start scouting and how long it will likely have to be maintained, the phenology response contains a more subtle and potentially more economically useful property.

By focusing attention on the periods when the greatest proportion of stems are flowering, growers can maximize detection while reducing unnecessary field passes. This approach might help in managing long, variable flowering periods and mitigate the difficulties posed by within-field heterogeneity. Targeting at least one scouting pass to the period of maximum simultaneous flowering will also increase the probability of detection, which may additionally feed into improved efficacy of destruction of broomrape.

Using tactical advantage for strategic gains

While the model has clear advantages to growers in offering an objective, evidence-based, approach to building a management plan it requires them, or their PCAs, to invest time in interacting with the software and developing the plan. These disincentives could potentially be used to the program's strategic advantage under a service model for use of the forecaster. Under this approach the University (or some other 3rd party) would offer to run the model on behalf of individual growers, generate scouting schedules, and issue updates when heat waves or cold fronts shift projections. That way, in exchange for site specific information, which would be held securely by UC (or some other 3rd party) , the model can be deployed in a way that reduces the burden on time-pressed growers and PCAs.

This convenience provides a transparent, non-coercive way to improve the Board's understanding of phenology across production districts. With a modest share of assessment funds supporting staffing and continuity, the 3rd party service could operate as a neutral, trusted facilitator whose **long-term goal is to make itself unnecessary** as the problem comes under control. Growers who did not want to share their location data and receive the service would still have the option of using the model to develop their own management plans.

Training

Irrespective of how the model is eventually used, training for growers, PCAs, and county and state regulatory staff is crucial to the success of the model as a basis for developing management plans. All actors need to understand how the model works, what its limitations are, how to interpret its projections, and how, for example, inspectors might use it in evaluating management plans and negotiating with individual growers about what is necessary to achieve an acceptable intensity of intervention.