



Vineyard Team Tailgate @Cal Poly SLO April 25, 2025

9:45-10:30 “New tools for integrated powdery mildew management in winegrapes” Introduction & facilitation by Jenny Broome, Ph.D., UC Santa Cruz, Dept of Environmental Studies/Center for Agroecology, with:

Sarah Placella, CEO, Root Applied Sciences, " Knowledge is power: More effective powdery mildew control with fewer applications by spraying at the right time."

Pal From, CEO, Saga Robotics, “Use of nighttime robotic applications of UVC light to control powdery mildew in winegrapes on the Central Coast”

10:30-11:00 Grower panel facilitated by Jenny Broome

- Erin Amaral. Pacific Coast Farming/Cal Poly Vineyard (Edna Valley) - experience farming organic & SIP
- Zach Merkel, J. Lohr Vineyards (Paso Robles AVA) - experience with Root Applied Sciences
- Greg Gonzalez, Miller Family Vineyards (SB County) - experience with Saga Robotics UVC



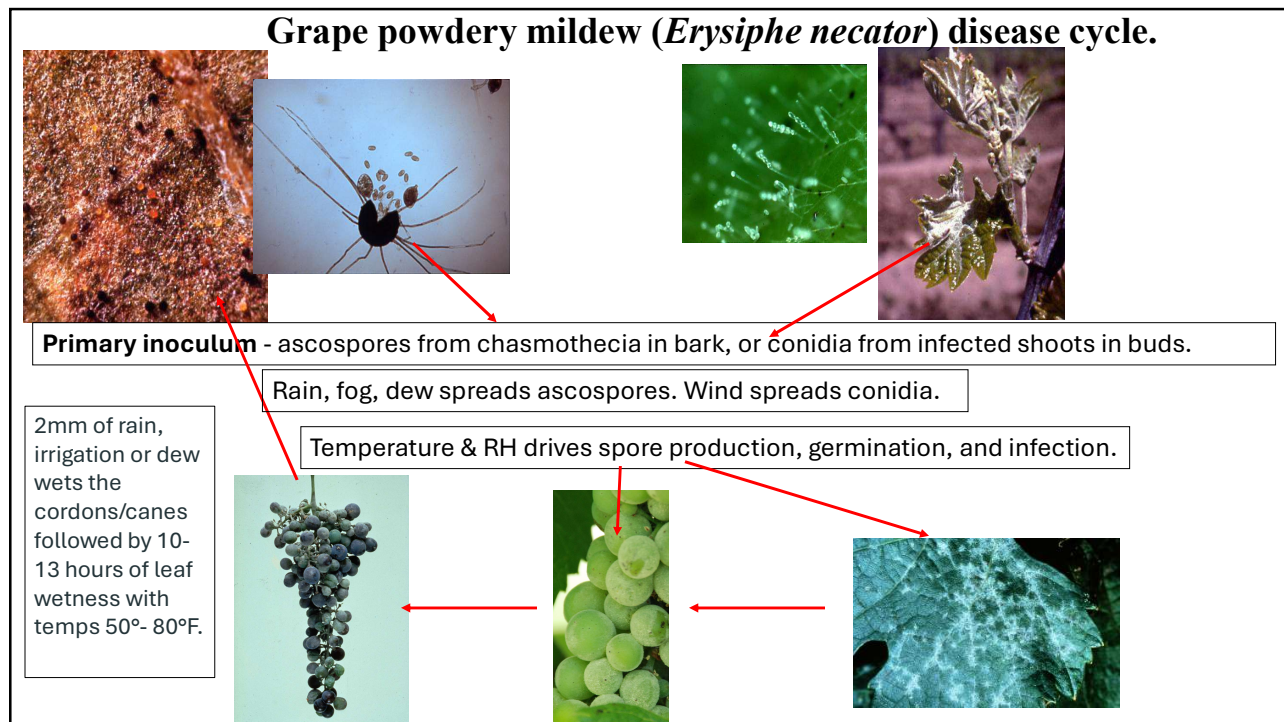
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Vineyard Team 2024-25 priorities for ag tech partnerships

Grower Survey Top 7

Tech Type	# Interested	% Interested
Crop estimation	14	78%
Pest management	14	78%
Smart sensors	12	67%
Farm management software	12	67%
Irrigation	12	67%
Drone technology	9	50%
Aerial imagery	9	50%

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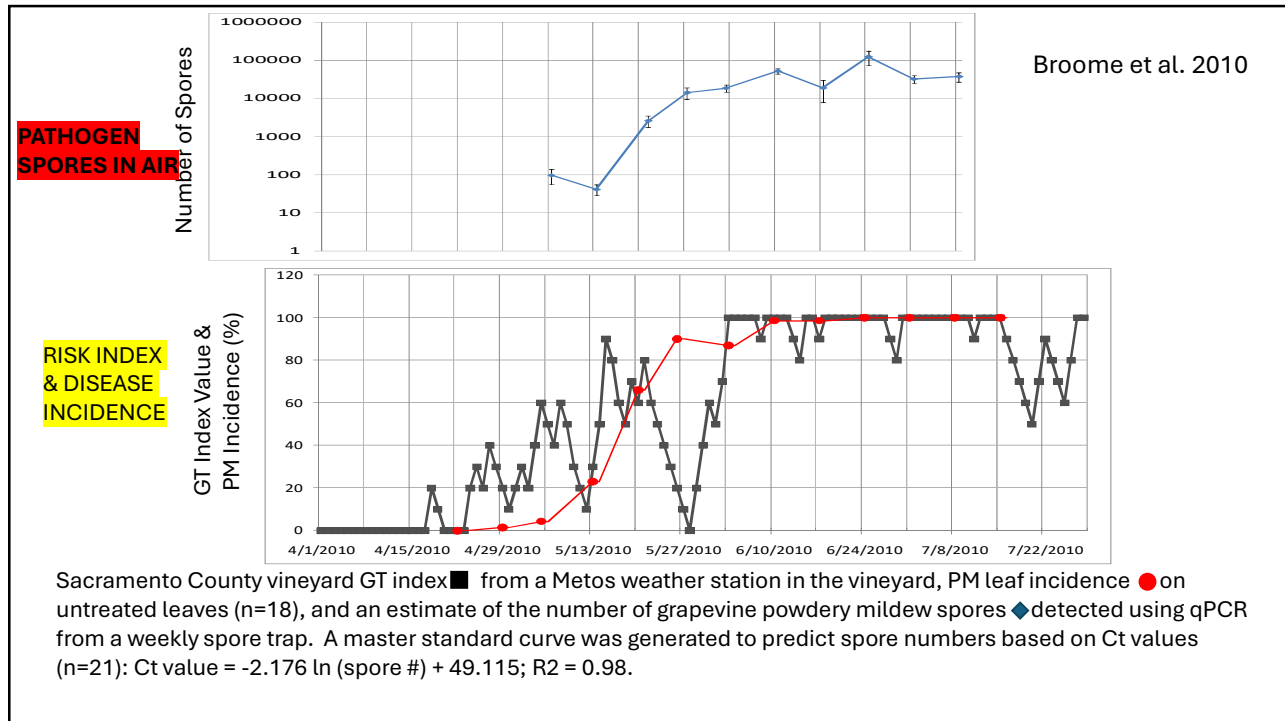


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Monitoring for powdery mildew

- Grape PM epidemics can blow up rapidly when conditions are right and young leaves, flowers and young fruit are present so detecting it early is key.
- Walk vines, collect leaves and look for it directly - yellowing spots on upper side of leaves and sporulating underneath. Collect 10-15 basal leaves from 20 vines at random and look for colonies with a hand lens.
- Monitor indirectly using environmental data and the risk index to time sprays.
- Monitor the pathogen directly by detecting and quantifying spores in the air in the vineyard.

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UC fungicide efficacy report 2025

GRAPEVINE: FUNGICIDE EFFICACY – CONVENTIONAL

Fungicide	Resistance risk (FRAC code) ¹	Powdery mildew	Downy mildew	Rot		Phomopsis cane and leaf spot	Eutypa dieback	Bot canker	Phomopsis dieback
				Botrytis bunch rot	Summer rot				
Pristine	medium (7/11) ²	5	5	5	4	3	NL	0	0
Merivon	medium (7/11)	5	0	5	4	4	NL	NL	NL
Miravis Prime	medium (7/12)	5	0	5	4	4	NL	NL	NL
Aprovia Top	medium (3/7)	5	0	4	3	4	NL	NL	NL
Adament**	high (3/11)	5	0	3	3	0	NL	0	0
Luna Sensation	medium (7/1)	5	0	5	3	0	NL	NL	NL
Quadris (Abound discontinued)	high (11) ²	5	5	2	0	4	NL	0	0
Flint Extra ³	high (11) ²	5	4	3	3	3	NL	0	0
Inspire Super	medium (3/9)	5	0	5	3	0	NL	NL	NL
Kenja	high (7)	5	NL	5	NL	NL	NL	NL	NL
Luna Experience	medium (8/7)	5	0	5	3	0	NL	NL	NL
Fervent	medium (6/7)	5	0	5	3	0	NL	NL	NL
Cevya ⁷	high (3)	5	0	NL	NL	4	NL	NL	NL
Mettle	high (3)	5	0	0	2	0	4	0	0
Orius**; Tebucon, Toledo, Elite**	high (3)	5	0	3	3	0	NL	0	0
Viathon	med. (3, 07/33)	5	0	3	3	0	NL	0	0
Procure, Viticure**	high (3)	5	0	0	0	0	NL	0	0
Quadris Top	high (3/11)	5	2	3	3	3	NL	0	0
Quintec	high (13)	5	0	0	0	0	NL	0	0
Rally	high (3)	5	0	0	0	0	4	3	3
Rally+Topsin-M ¹	high (1+3)	5	0	0	0	5	5 ⁶	5	5
Ranman**	high (21)	0	4	0	0	0	0	0	0
Revus Top	medium (3/10)	5	5	3	3	3	NL	0	0
Rhyme	high (3)	5	0	0	0	0	NL	0	0
Rubigan**; Vintage**	high (3)	5	0	0	0	0	NL	0	0
Sovran	high (11) ²	5	5	3	3	4	0	NL	5
Sulfur	low (M 02)	5	0	0	0	0	NL	0	0
Topsin-M, T-Methyl, Incognito	high (1) ²	5	0	3	3	2	5	5	3
Torono	high (U 6)	5	NL	NL	NL	NL	NL	NL	NL
Aprovia	medium (7)	5	0	3	0	3	NL	NL	NL

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GRAPEVINE: FUNGICIDE EFFICACY – BIOCONTROLS AND NATURAL PRODUCTS

Fungicide	Resistance risk (FRAC code) ¹	Powdery mildew	Downy mildew	Bunch rot		Phomopsis cane and leaf spot	Eutypa dieback	Bot canker	Phomopsis dieback
				Botrytis	Summer				
Bio-Tam 2.0	low (BM 02)	NL	NL	NL	NL	NL	4	4	4
Cinnacure, Seican, Cinnerate	low (BM 03)	4	NL	NL	NL	NL	NL	NL	NL
Armour-Zen	low (NC)	4	ND	ND	ND	ND	ND	NL	NL
ProBlad Verde	low (BM 01)	4	NL	3	NL	NL	NL	NL	NL
JMS Stylet oil ⁴	low	4	NL	4	3	NL	NL	NL	NL
Kaligreen	low (NC)	4	NL	NL	NL	NL	NL	NL	NL
Milstop	low (NC)	4	NL	NL	NL	NL	NL	NL	NL
Purespray	low	4	NL	NL	NL	NL	NL	NL	NL
Regalia	low (P 05)	4	ND	3	2	NL	NL	NL	NL
Serenade	low (BM 02)	4	ND	3	2	4	4	NL (4)	ND
Sonata	low (BM 02)	4	ND	3	2	ND	ND	NL	NL
Taegro 2	low (BM 02)	4	ND	3	2	NL	NL	NL	NL
Mevalone	low (BM 01)	4	ND	5	NL	NL	NL	NL	NL
Actinovate	low (BM 02)	3	NL	2	NL	NL	NL	NL	NL
Prev-am ⁴	low (NC)	3	ND	3	2	NL	3	NL	NL
Sporan EC ²	low (BM 01)	3	ND	ND	NL	NL	NL	NL	NL
Timorex (Act, Gold) ⁴	low (BM 01)	3	ND	3	ND	NL	ND	NL	NL
Double Nickel 55	low (BM 02)	2	ND	2	ND	ND	ND	NL	NL
Sporatec	low (BM 01)	2	ND	ND	NL	NL	NL	NL	NL
B-Lock	low	NL	NL	NL	NL	NL	5	3	NR
Vitiseal	low (BM 01)	NL	NL	NL	NL	NL	5	NL	NL
Botector	low (BM 02)	NL	NL	2	ND	NL	NL	NL	NL
Vintec ⁸	low (BM 02)	NL	NL	NL	NL	NL	4	4	4
Procidic	low (NC)	ND	ND	ND	ND	NL	NL	NL	NL
Rango	low (BM 01)	ND	NL	ND	ND	NL	NL	NL	NL

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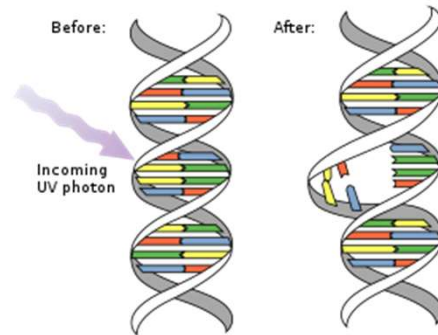
Summary of integrated control of grape powdery mildew

- Follow vine physiological development and understand vulnerable stages for powdery mildew.
- Aim for a balanced vine, use leaf removal and two wire vertical trellis with shoot positioning wires to improve spray coverage, control Botrytis and leaf hoppers, and reduce powdery mildew.
- Monitor for symptoms and signs of the pathogen, measure the environmental conditions (temperature, rain, relative humidity/leaf wetness) and use risk assessment model and spore traps to detect pathogen and time fungicides.
- Start fungicide program based on bud break and variety susceptibility, rotate active ingredients using FRAC codes and risk of resistance, use appropriate spray intervals based on the fungicides, integrate biologicals and natural products and salts with conventional fungicides.
- Consider a winter dormant application of lime sulfur if bad PM previous season (10-15 gal lime sulfur per acre in 100+ gal water).

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Use of nighttime UVC to control Powdery Mildew - Background

- Powdery mildews are favored by shade and repressed by direct sunlight.
- UV-C induces the formation of breaks in the DNA of fungi. The UV-C wave lengths of 250-285 nm have the greatest fungicidal efficacy because thymine dimers in the fungal DNA are formed thereby preventing the DNA from replication and transcription.
- Shortwave visible light (violet and blue) present naturally in the daytime will reverse this damage because of up-regulation of a fungal photolyase DNA repair system that cleaves the thymine dimers.
- A dark period following UV-C treatment (>4 hours) disrupts the pathogen's ability to repair DNA damage (Janisiewicz et al. 2016).
- Plants can easily withstand higher levels of UV-C; strawberry and grapes are quite tolerant.



UVC photon causes two consecutive bases on one strand of DNA to bind together, destroying the normal base-pairing double-strand structure in that area.

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Nighttime UVC applied in NY vineyards by Cornell researchers

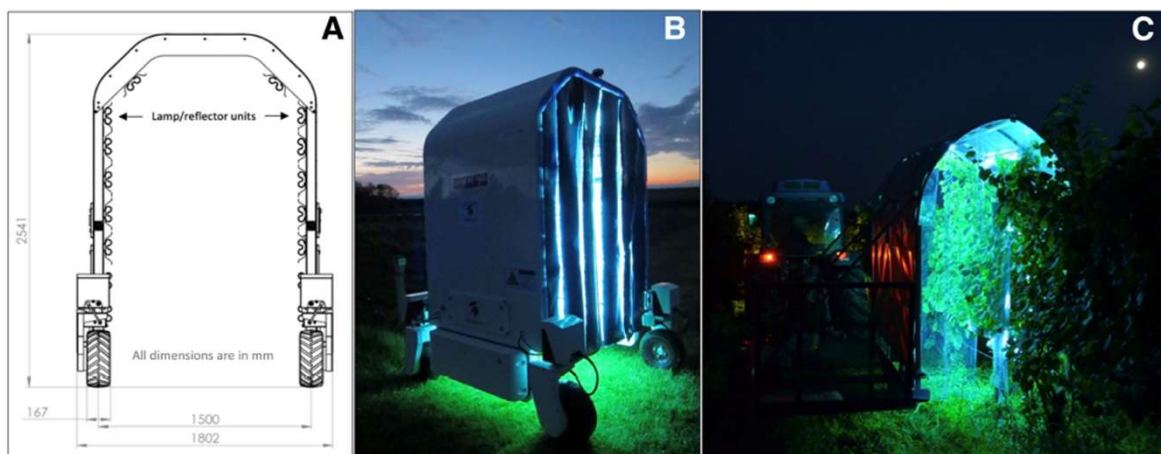


Fig. 1. Robotic and tractor-drawn UV lamp arrays. **A,** Diagrammatic end view of SAGA Robotics "Thorvald" autonomous robotic carriage showing dimensions in mm and positions of lamp/reflector units. **B,** Quartering view of "Thorvald" with reflective end curtains in place at the beginning of nighttime UV applications at the vineyard site. **C,** Tractor-drawn lamp array during nighttime UV application.

Units are 8.34 ft tall x 5.91 ft wide

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Summary of nighttime UVC in NY on grapes to control PM

- UV-C controlled powdery mildew as well as fungicides.
- Nighttime UV-C applications did **NOT** produce detectable indications of grapevine metabolic abnormalities, phytotoxicity, growth reduction, or reductions of fruit yield or quality parameters, even at the highest doses and most frequent intervals used.
- Saga Robotics offers nighttime UVC applications as a service in California vineyards.
- Or build your own tractor drawn unit “The Dragon” with plans available online:
<https://drive.google.com/file/d/1qAHrtxWaen1bAlkxRSTFyI4hU5fZtGff/view>

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THANK YOU, contact: jabroome@ucsc.edu, 831 254 8962

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- Root Applied Sciences [Root Applied Sciences](#)
- UC IPM 2025. Adaskaveg et al. 2025 FUNGICIDES, BACTERICIDES, BIOCONTROLS, AND NATURAL PRODUCTS FOR DECIDUOUS TREE FRUIT AND NUT, CITRUS, STRAWBERRY, AND VINE CROPS IN CALIFORNIA [fungicideefficacytiming.pdf](#)
- <https://www.cornell.edu/video/uv-light-vs-powdery-mildew>
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