

# Epidemiology and Management of Major Prune Diseases in California

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## Major fungal diseases of prune



**Blossom blight**  
*Monilinia laxa* and *M. fructicola*

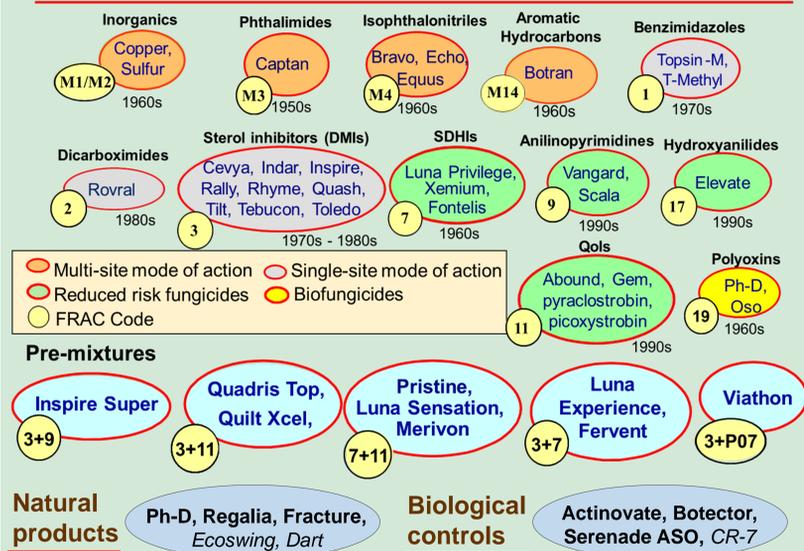


**Brown rot fruit decay**  
*Monilinia laxa* and *M. fructicola*



**Leaf rust**  
*Tranzschelia discolor*

## Conventional fungicides for prune



## Brown Rot Blossom Blight Pre- and post-infection activity of fungicides in laboratory studies 2019

Treatment	Rate(A)	Post-infection	Pre-infection
Control	---	a	a
Cevya	4 fl oz	bc	de
Fontelis	20 fl oz	d	cd
Pyraziflumid	3.1 fl oz	d	cd
V-10424	3 fl oz	d	cde
EXP-19A	21 fl oz	b	b
Quash + Sercadis	2.5 + 3.5 fl oz	d	bc
Quash + V-10484	2.5 + 3.75 fl oz	cd	bc
EXP-AD	13.7 fl oz	bcd	b
EXP-AF	9.1 fl oz	cd	cd
F4406-3	6 fl oz	bcd	e

0 25 50 75 100 Inc. of stamen infections (%)

Detached flowers were inoculated 15 h before or after treatments. Single active ingredient and pre-mixture fungicides all significantly reduced blossom blight from the non-treated control.

## Leaf Rust - Efficacy of field treatments

Applications on 7-31-19 as a preharvest spray and on 9-6-19.

Treatment	Rate(A)	Incidence of rust (%)	Severity (0-4)
Control	---	a	a
Dart	0.0025	ab	bc
EcoSwing	32 fl oz	a	bc
Cevya	4 fl oz	a-d	bc
Fontelis	20 fl oz	abc	cd
Pyraziflumid	3 oz	a-d	c
V-10442	3 fl oz	e	e
Ph-D + EcoSwing	6.2 oz + 16 fl oz	a	ab
Merivon + Serifel	5.5 fl oz + 8 oz	bcd	de
Luna Sensation	7.8 fl oz	cd	de
Luna Experience	8 fl oz	e	e
Quadris Top + DynAmic	14 + 14 fl oz	a	c
Merivon	5.5 fl oz	d	de
Fervent	15 fl oz	e	e
UC-2	7 fl oz	d	de
EXP-AD	13.7 fl oz	a	bc
EXP-AF	9.1 fl oz	ab	c
F-4406-3	6 fl oz	e	e

- Highly effective treatments belonging to FRAC 3 and 11) are available.
- Fungicide treatments applied at first rust detection during spring orchard monitoring, are effective into summer.
- Preharvest treatment for brown rot are also effective into the fall against rust.
- Long lasting effects into the fall (7 weeks or longer) to prevent build-up of inoculum.



Upper leaf surface with angular, chlorotic lesions    Lower leaf surface with sporulating rust pustules

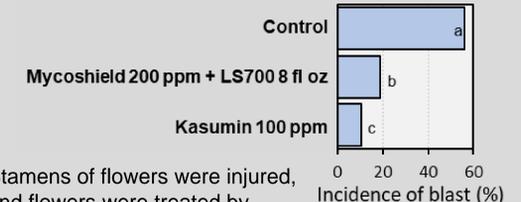
## Bacterial blast/canker of prune – Efficacy of new treatments

Bacterial blast and canker caused by *Pseudomonas syringae* pv. *syringae* are associated with nematode root damage and cold, wet environments during dormancy and bloom. Many populations of the pathogen in CA are resistant to copper – currently no alternatives.



Healthy    Twig canker and blasted bud    Blasted flowers

## Field treatments followed by inoculation in 2019



Stamens of flowers were injured, and flowers were treated by hand spraying. After air-drying, flowers were inoculated with the pathogen and bagged for 2 days.



Inoculated flowers were covered for 12-14 h with a white plastic bag.

Oxytetracycline and kasugamycin were accepted into the IR-4 project as "A" priorities in 2019 for 2020 field studies.

## Brown Rot Fruit Decay

### Efficacy of field treatments after wound- or non-wound inoculation of harvested fruit 2019

#### 15-day PHI treatments (all in combination with 8 fl oz Nu-film P)

Treatment	Rate(A)	Wound-inoculation	Non-wound-inoc.
Control	---	ab	a
Dart	0.25%	abc	cd
EcoSwing	32 fl oz	abc	b
Cevya	4 fl oz	e	de
Fontelis	20 fl oz	abc	c
Pyraziflumid	3 oz	a	fg
V-10442	3 fl oz	e	cde
Ph-D + EcoSwing	6.2 oz 16 fl oz	abc	b
Merivon + Serifel	5.5 fl oz + 8 oz	abc	ef
Luna Sensation	7.8 fl oz	abc	ef
Luna Experience	8 fl oz	e	g
Merivon	5.5 fl oz	bc	fg
Quadris Top + DynAmic	14 + 14 fl oz	bcd	cd
Fervent	15 fl oz	e	ef
EXP-AD	13.7 fl oz	abc	cde
EXP-AF	9.1 fl oz	cd	ef
UC-2	7 fl oz	e	g
F-4406-3	6 fl oz	de	cde

Applications on 7-31-19. Incidence of brown rot (%)

#### 5-day PHI treatments Comparison of additives and rates

Treatment	Additive	Wound-inoc.	Non-wound-inoc.
Control	---	a	a
---	Oil 1%	a	a
---	NuFilm-17 8 fl oz	b	a
Bumper 4 fl oz	Oil 1%	cd	d
Bumper 4 fl oz	NuFilm-P 8 fl oz	cd	d
Bumper 4 fl oz	NuFilm-P 16 fl oz	bc	bc
Bumper 4 fl oz	NuFilm-P 24 fl oz	cd	cd
Cevya 4 fl oz	Oil 1%	d	d
Cevya 4 fl oz	NuFilm-P 8 fl oz	bc	cd
Cevya 4 fl oz	NuFilm-P 16 fl oz	d	cd
Cevya 4 fl oz	NuFilm-P 24 fl oz	cd	b

Applications on 7-31-19. Incidence of brown rot (%)

The addition of a **spray oil** or **stickers** (e.g., Nu-Film P) enhances the efficacy of some fungicides; whereas wetting agent surfactants are less effective.

Application at **higher volumes** (130-160 gal) is beneficial for protecting fruit inside clusters from brown rot (comparative research done previously).

Newly registered fungicides and pre-mixtures are highly effective on non-wounded fruit. They can be used as a resistance management strategy.

Only fungicides containing a DMI (FRAC 3) are effective after wound-inoculation.

## Fungal contamination of prunes after commercial drying

- Aspergillus* spp. contamination was determined to be superficial on re-hydrated fruit and only developed after several weeks of incubation at high relative humidity.
- Surface sterilization of dried fruit helps to reduce contamination.
- Thus, the most important strategies to prevent fungal growth (including *Aspergillus* spp.) from developing on the fruit are: **proper drying (71-85°C or 160-185°F dry heat)** and **dry and well-ventilated storage facilities**.
- Improper storage and non-sanctioned practices of wetting down fruit may lead to un-wanted mold growth.
- Subsequent steam sanitation before processing will further minimize risks from contamination by *Aspergillus* species.



Dried fruit wetted in storage developed mold



Dried fruit surface-sterilized with NaOCl did not develop mold after incubation.

## Summary of research



Healthy crop, healthy food

### Research on flower, foliar, and fruit diseases of prune is providing:

- New insights** on the epidemiology of preharvest brown rot blossom blight, fruit rot, rust, bacterial blast/canker, and postharvest molds.
- New fungicides, biocontrols, and natural products** with distinct modes of action as well as proper postharvest handling practices are being identified for managing each disease.
- Information is summarized in reports, extension presentations, and on-line at the UC ANR Agricultural Pest Management website.**

Visit: <http://ipm.ucanr.edu/PDF/PMG/fungicideefficacytiming.pdf>