

Fungicide use considerations: optimizing grower outcomes



Dave Jones, Agricultural Scientist – WI, MI, MN

Lindsay Wells-Hansen, Sr. Agricultural Scientist - NJ

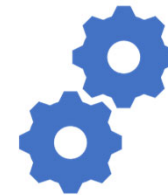
Overview of today's discussion



Product selection
considerations

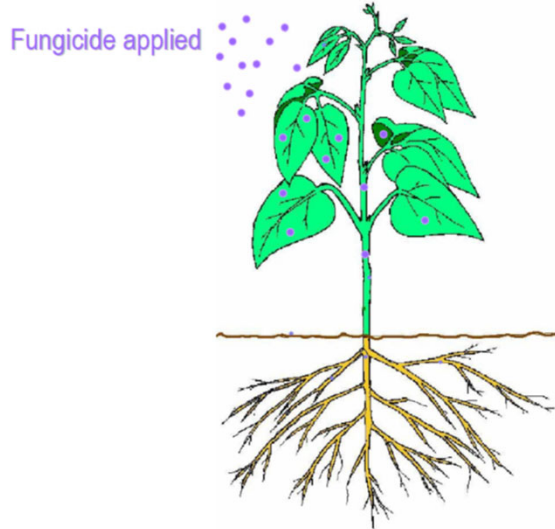


Expectations for
performance by AI



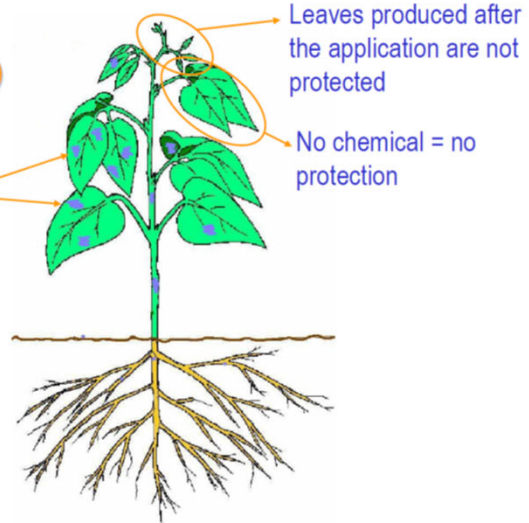
Optimizing other key
variables

Fungicide Movement within the plant



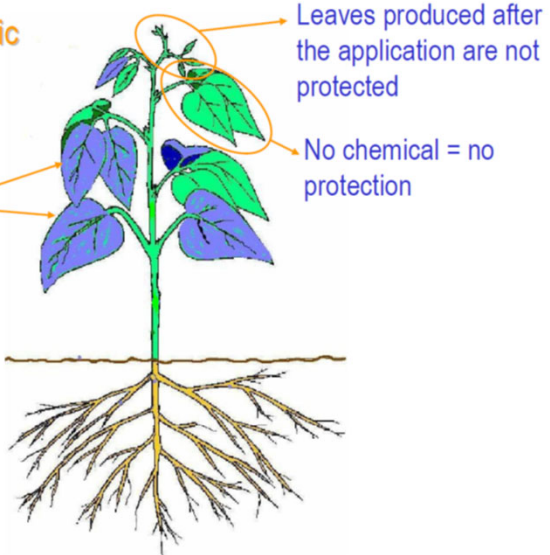
Contact (protectant)

Droplets spread out on the surface where deposited; do not move inside



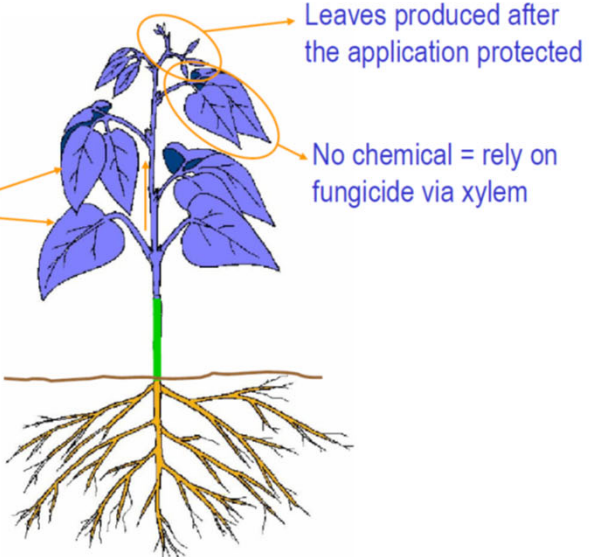
Locally systemic (translaminar)

Droplets spread out on and move inside leaf tissue = external and internal protection



Systemic (acropetal)

Droplets spread out on and move inside leaf tissue = external and internal protection; Fungicide on the stem moves upwards in the xylem to new growth



Strobilurins – FRAC 11 – QoI

(Abound in USA, Quadris in CAN)

- **Protectant**

- **Translaminar/Locally systemic:**

- absorbed into the leaf tissues
- move locally through vascular system



Things you CAN expect from strobilurins (Abound, Quadris)

- Activity on both the outside and inside of a leaf/plant part
- Provide some security against wash-off
- Provide translaminar protection when applied preventatively

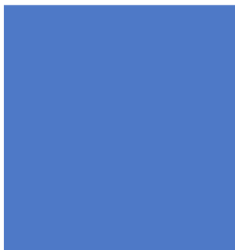


Triazoles - FRAC 3- DMI (Proline, Indar)

- **Translaminar/Locally systemic:**
 - rapidly penetrate young tissues
 - move locally through the vascular system
- **Protectant and curative** (limited)



Things you CAN expect from DMI fungicides (Proline, Indar)



- Strong contact and systemic control when applied preventatively
- Resilience against wash-off when applied well-ahead of rain events
- Some 'back-action' control of existing infections
 - 'Back-action' should **NEVER** be a first resort

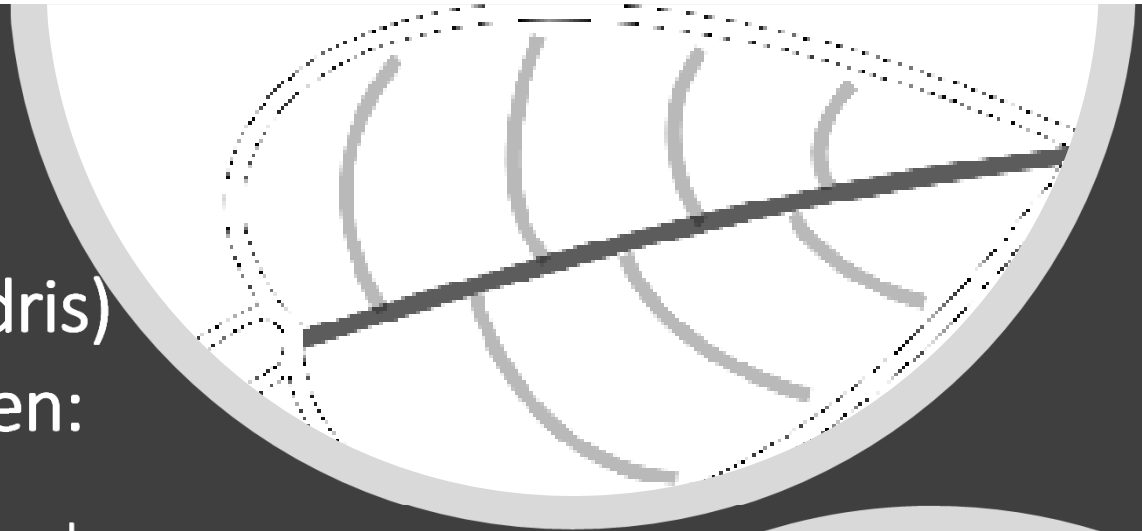
Things you should NOT expect from QoI or DMI fungicides

- Will NOT compensate for poor coverage
- NOT effective as a translaminar/systemic product if ample drying time is not achieved prior to adverse weather
- Will NOT achieve strong 'back-action' control against existing infections
- Will NOT maintain high level of efficacy if over-used or used alone; **prone to resistance**

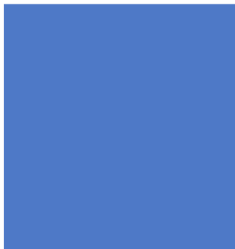


DIMs (Proline, Indar)
&
Strobilurins (Abound, Quadris)
are particularly useful when:

- Incoming adverse weather during a key management window is a potential factor (prolonged periods of rain)
- Plant tissues are rapidly growing/expanding
- You suspect you should have gotten out with a fungicide a day or two sooner than you did



Copper formulations (FRAC M01)




- **Protectant ONLY**
- Many formulations are available, not all created equal
- Grower must factor in solubility of material in water, quantity of metallic copper in a product, compatibility of material with others in close proximity, and various environmental factors.


Less soluble forms/ "fixed" copper: copper hydroxide, oxychloride sulfate (COCS), tribasic copper





Copper product considerations

More soluble forms: sulfate pentahydrate/sulfate without gypsum

 What formulation of copper?

 How soluble?

 How much metallic copper per unit of the product?

 What else am I spraying today?

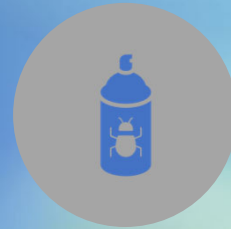
Product	Copper form	Amount of formulation	Metallic copper equivalent	Unit type	Metallic copper per unit
Copper sulfate = bluestone = blue vitriol	Copper sulfate pentahydrate*	99%	25%	1 lb	0.25 lb
Kocide 101	Copper hydroxide	77.0%	50%	1 lb	0.50 lb
Champ WP	Copper hydroxide	77.0%	50%	1 lb	0.50 lb
Nu-Cop 50DF	Copper hydroxide	77.0%	50%	1 lb	0.50 lb
Kocide 2000	Copper hydroxide	53.8%	35%	1 lb	0.35 lb
Kocide DF	Copper hydroxide	61.4%	40%	1 lb	0.40 lb
Kocide 3000	Copper hydroxide	46.1%	30%	1 lb	0.30 lb
Basic Copper 53	Basic copper sulfate	95%	53%	1 lb	0.53 lb

NOT a list of copper products for cranberry

Cautions with Copper



Be wary of wash-off, particularly when using copper sulfate/sulfate pentahydrate, which are generally more soluble. **Copper is a contact protectant ONLY.** In other perennial fruit crops, a cumulative total of >3" of rain has been shown to remove virtually all copper residue of any type from a leaf surface. This includes irrigation water!



Many copper formulations are **not compatible either as a tank mix or in close application proximity with fungicides and insecticides that require acidification of application water.** Always consult product label for incompatibilities and warnings.

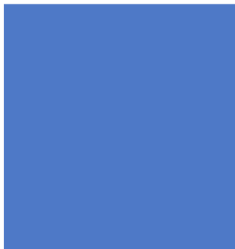


Am I using a formulation that has **sufficient rate of metallic copper?** If you want long-term efficacy from a single application, a low rate of metallic copper is highly unlikely to deliver disease control.



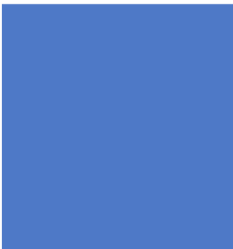
Hot weather (80F+/26.5C+) following an application of any copper product, but particularly the more soluble copper materials. Penetrating oils or foliar nutrient formulations with penetrating properties can worsen phytotoxicity.

FRAC M03 and M05 (Mancozeb, Manzate, etc. and Bravo)



- **Protectant**
- No systemic or translaminar properties

Things to expect from Mancozeb, Manzate, etc. and Bravo



- Strong **broad spectrum disease control**
- Will control fungal isolates resistant to FRAC 3 and FRAC 11 fungicides

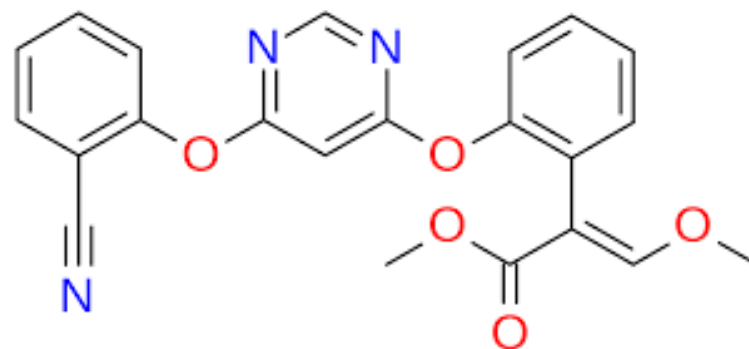
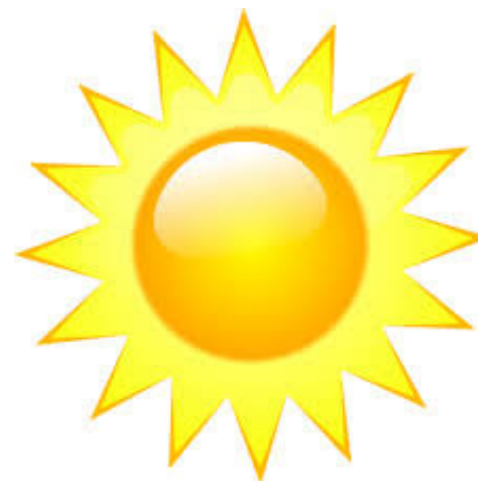
Things you should not expect from Mancozeb, Manzate, etc. and Bravo

- The materials **do not tend to redistribute very well on surfaces**, and they do not move inside of leaves.
- **No back-action control.** If a pathogen is already established these materials will not manage it.



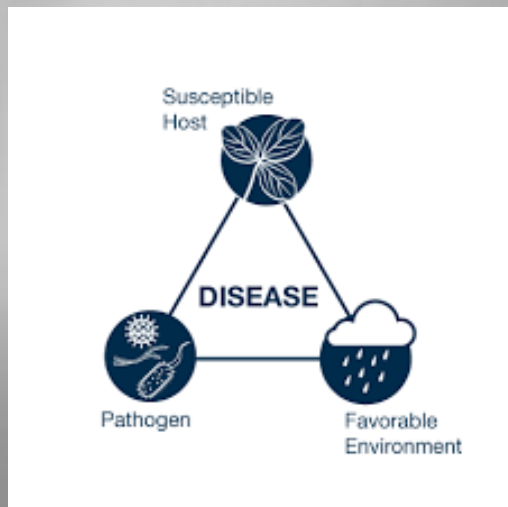
These materials are particularly useful when

- Wash-off from heavy, prolonged rain systems is not a significant concern
- You suspect that you may have resistance to FRAC 3 or FRAC 11, or you have used these two classes heavily for several years





Why can fungicides fail?



Poor coverage

- Gaps in coverage during chemigation run
- Wash-off via irrigation, weather events
- Too much or too little water

Incorrect timing

- Wrong phenological stage
- Missed infection event

Incorrect product

- AI not effective against target pathogen

Resistance

- Chemistries not rotated
- Highest labelled rates not used