

Chlorothalonil MRL updates and reduced use in cranberries

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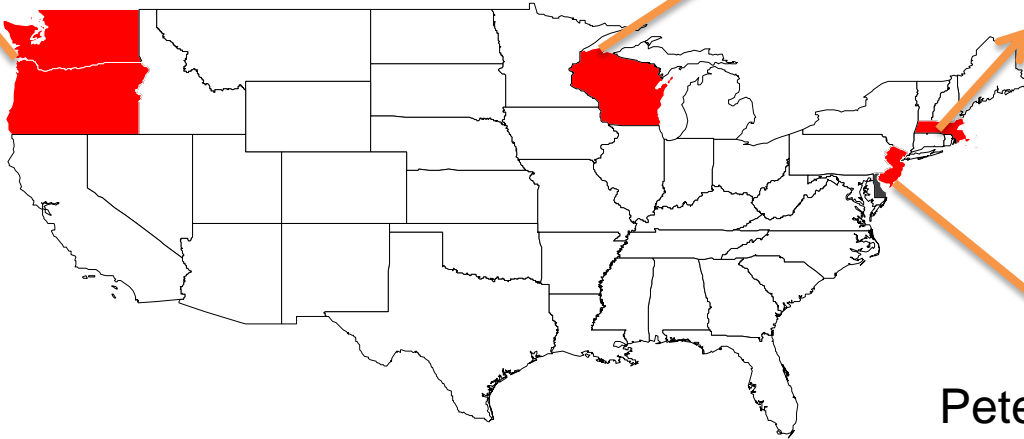
North American Cranberry Fruit Rot Working Group

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Cranberry Fruit Rot Working Group

Northeastern IPM Center –
IPM Partnership Grant
Program 2015

Objectives

- (1) Catalyze increased networking among growers and other key players in the cranberry industry
- (2) Identify knowledge gaps and set research priorities
- (3) Increase collaboration among members of the working group
- (4) Develop and share resources among internal and external network individuals
- North American Cranberry Research and Extension Workers' Conference (NACREW) to be held in Bandon in August 2015 will be one of the key starting points

Cranberry Fruit Rot Control Scenarios

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Rationale

The European Union (EU) has imposed regulations that will reduce the Bravo (chlorothalonil, a broad-spectrum fungicide) MRL from 2 ppm to 0.01 ppm. The EU market for cranberries is about 1.23 million barrels that includes fruit from Chile, Canada and the US.

This presentation is to provide growers assistance in finding optimal fruit rot control strategies under this changing landscape of labels, MRL's and regulations.

Characteristics used to compare fungicides for fruit rot control

- Mode of action – the mechanism by which a chemical or class of chemicals are toxic to fungi
- Resistance – genetic change in the fungal population rendering the fungicide ineffective
- FRAC Group – are groups based on mode of action. Each group is assigned a risk for resistance.
- Spectrum of action – the range of fungal species whose growth is inhibited by a particular fungicide
- Phytotoxicity – damage to the plant caused by a fungicide
- Efficacy – The overall effect of a particular fungicide on the level of disease
- Persistence – the ability of a fungicide to remain on the surface of a plant despite weathering

Fungicides Available

DMI
FRAC Code 3

Indar
Proline
Quadris Top
Orbit

QoI
FRAC Code 11

Abound
Evito

polyoxins
FRAC Code 19

Tavano

chloronitriles
FRAC Code M5

Bravo (and many others)

dithiocarbamates
FRAC Code M3

Mancozeb
Ferbam

Each box represents one mode of action.

Fungicide Resistance Risk

DMI FRAC Code 3
Indar Proline Quadris Top Orbit
QoI FRAC Code 11
Abound Evito
polyoxins FRAC Code 19
Tavano

chloronitriles FRAC Code M5
Bravo (and many others)
dithiocarbamates FRAC Code M3
Mancozeb Ferbam

High risk
Medium risk
Low risk

Characteristics of Fungicide Groups

Group	FRAC	R	Spectrum	Phyto	Efficacy	Persist
DMI	3	M	Gaps	0	H	M
Qol	11	H	Gaps	0	H	M
Polyoxins	19	M	Unk	0	L	Unk
chloronitriles	M5	L	Broad	1	H	H
dithiocarbamates	M3	L	Broad	2	H/M	M

FRAC: Fungicide Action Committee Code to help classify fungicides according to their risk of developing resistance

R: Resistance. H= High, M= Medium, L= Low

Spectrum: Impact on assortment of fruit rot pathogens. Broad= affects most pathogens, Gaps= affects some pathogens, Unk= impact unknown

Phyto: Phytotoxicity. 0= no phytotoxicity reported, 1= moderate phytotoxicity, 2= phytotoxicity likely under certain conditions

Efficacy: rating of fruit rot control. H= High, M= Medium, L= Low

Persist: Persistence on plant surfaces. H= High, M= Medium, L= Low

Fungicide Label Restrictions

Fungicide (FRAC Group)	REI (hrs)	PHI (days)	Rate/acre	Max Amt/ season
Indar (3)	12	30	6-12 fl.oz.	48 fl.oz.
Proline (3)	12	45	5 fl.oz.	10 fl.oz.
Abound (11)	4	3	6-15.5 fl.oz	92.3 fl.oz.
Evito (11)	12	1	2.0-5.7 fl.oz.	22.8 fl.oz.
Dithane* (M3)	24	30	3-6 lb	18 lb
Bravo WS* (M5)	12	50	4-6.5 pt	20 pt
Tavano(19)	4	0	3.75-13 fl.oz.	84 fl.oz

* Numerous formulations available. Read product label for specific instructions

REI: Restricted-Entry Interval after fungicide application

PHI: Pre-Harvest Interval. Minimum # of days between application and harvest date

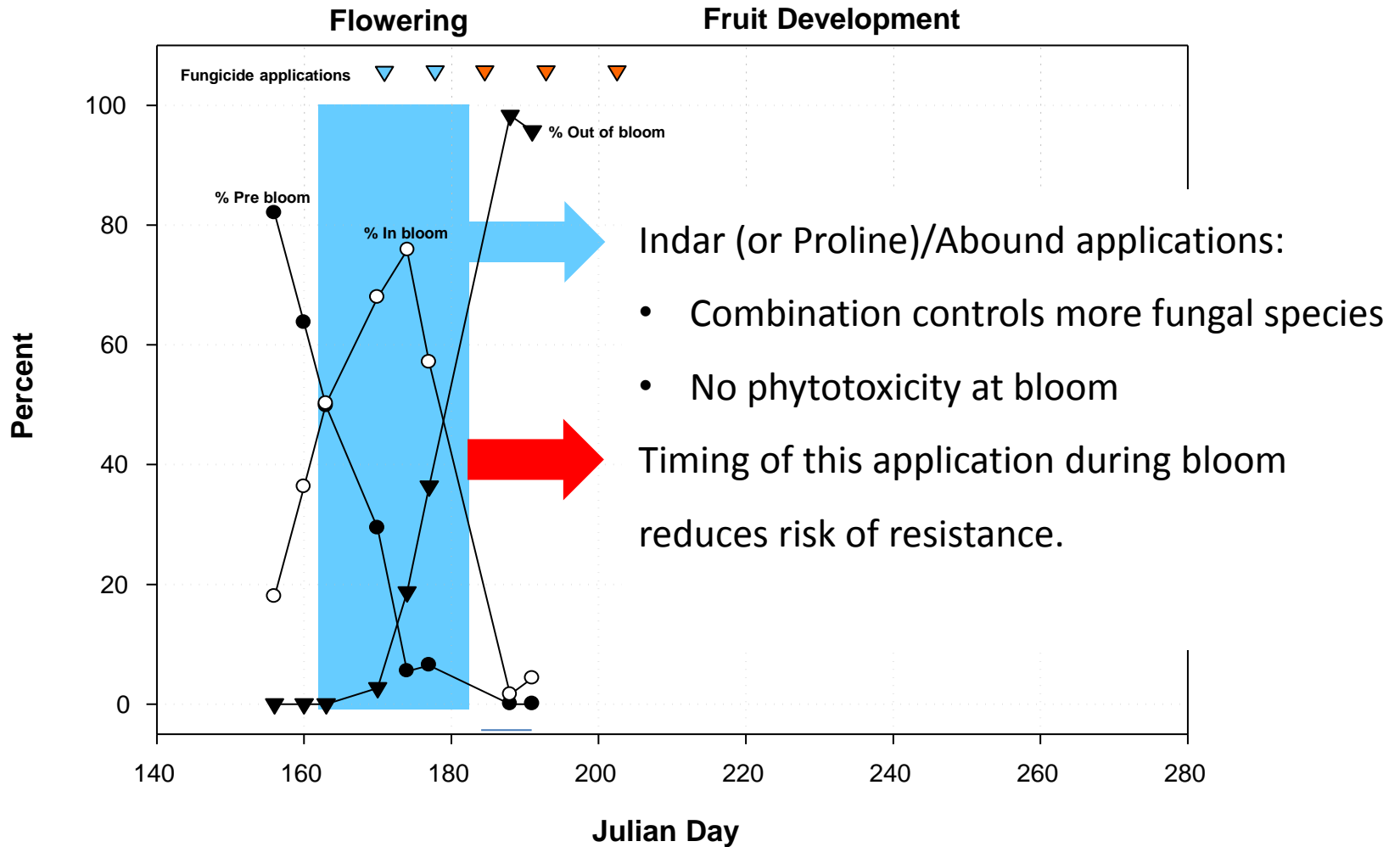
Rate/acre: Fungicide application rate per acre

Max Amt/season: Maximum Amount per season. May also be represented by total # of applications per season.

Characteristics of Fungicide Groups

Group	FRAC	R	Spectrum	Phyto	Efficacy	Persist
DMI	3	M	Gaps	0	H	M
QoI	11	H	Gaps	0	H	M
Polyoxins	19	M	Unk	0	L	Unk
chloronitriles	M5	L	Broad	1	H	H
dithiocarbamates	M3	L	Broad	2	H/M	M

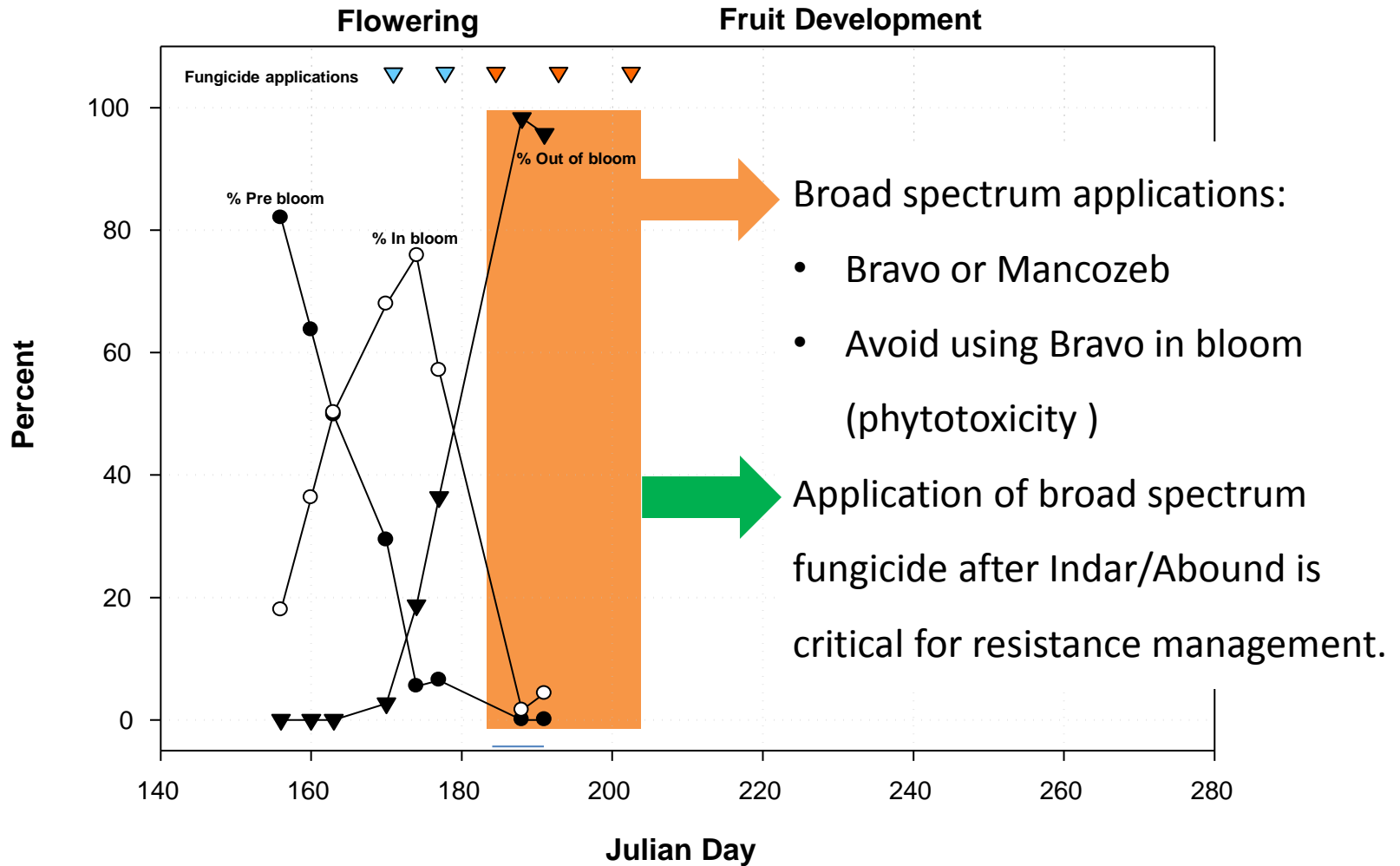
Impact of timing fungicide applications



Characteristics of Fungicide Groups

Group	FRAC	R	Spectrum	Phyto	Efficacy	Persist
DMI	3	M	Gaps	0	H	M
QoI	11	H	Gaps	0	H	M
Polyoxins	19	M	Unk	0	L	Unk
chloronitriles	M5	L	Broad	1	H	H
dithiocarbamates	M3	L	Broad	2	H/M	M

Impact of timing fungicide applications



Characteristics of Fungicide Groups

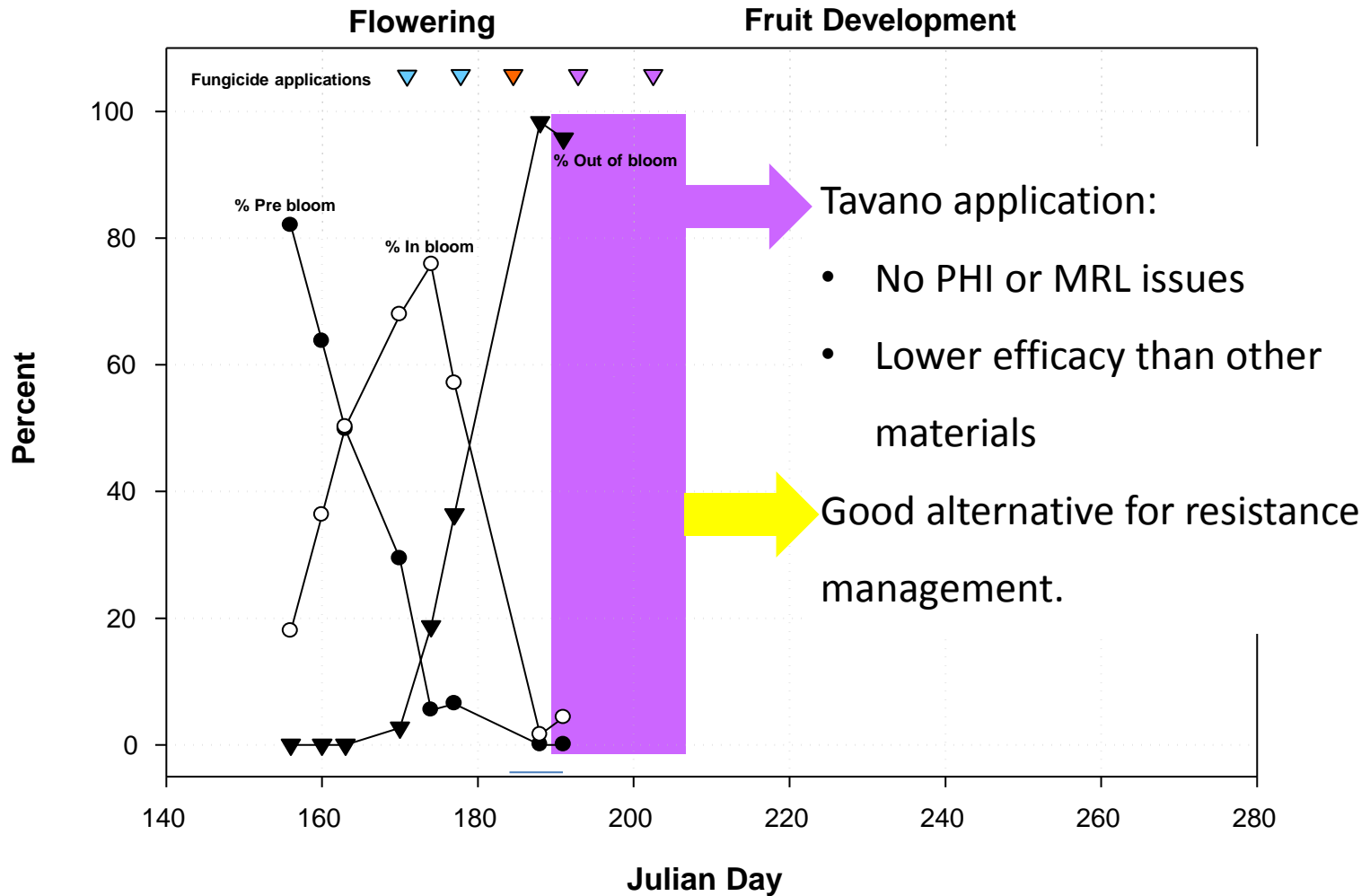
Group	FRAC	R	Spectrum	Phyto	Efficacy	Persist
DMI	3	M	Gaps	0	H	M
QoI	11	H	Gaps	0	H	M
Polyoxins	19	M	Unk	0	L	Unk
chloronitriles	M5	L	Broad	1	H	H
dithiocarbamates	M3	L	Broad	2	H/M	M

The trade name for polyoxins labeled for cranberry use is Tavano[®]

Efficacy data for Tavano is currently unavailable for MA.

Fungicide trials will be carried out during the 2015 growing season.

Impact of timing fungicide applications



For areas with **moderate** to **high** fruit rot pressure

Standard Approach

- Indar/Abound combination – make two applications at 7-10 day intervals ending before termination of bloom
- Substitute Indar with Proline if applications are not made via aerial application
- Apply 1-3 applications of Bravo or Mancozeb at 10 -14 day intervals (start counting after the final Indar/Abound treatment)

Standard Approach

In bloom 1	In bloom 2	Out of bloom 1	Out of bloom 2	Out of bloom 3
Indar/Abound	Indar/Abound	Bravo	Bravo	Bravo
Indar/Abound	Indar/Abound	Bravo	Bravo	
Indar/Abound	Indar/Abound	Bravo		

This is the preferred regime for areas with moderate to high fruit rot. Some yield reductions are experienced with Bravo due to slight phytotoxicity.

The number of out-of-bloom applications depends on the cultivar. Early Black, Howes and Mullica Queen are more resistant and generally require fewer applications.

Standard - No Bravo

In bloom 1	In bloom 2	Out of bloom 1	Out of bloom 2	Out of bloom 3
Indar/Abound	Indar/Abound	Dithane	Dithane	Dithane
Indar/Abound	Indar/Abound	Dithane	Dithane	
Indar/Abound	Indar/Abound	Dithane		

This is the preferred regime for areas with moderate to high fruit rot. Mancozeb (e.g., Dithane and Manzate) can affect fruit color and fruit size (long-term).

The number of out-of-bloom applications depends on the cultivar. Early Black, Howes and Mullica Queen are more resistant and generally require fewer applications.

For areas with **moderate** to **high** fruit rot pressure Increased PHI

- Can be used to reduce residues at harvest if this is a problem.
- Indar/Abound combination – make two applications at 7-10 day intervals ending before termination of bloom
- Apply 1 application of Bravo or Mancozeb 7-10 days after the final Indar/Abound treatment.
- Utilize Tavano in the final 1-2 applications

Increased PHI

In bloom 1	In bloom 2	Out of bloom 1	Out of bloom 2	Out of bloom 3
Indar/Abound	Indar/Abound	Bravo	Bravo	Tavano
Indar/Abound	Indar/Abound	Bravo	Tavano	Tavano

This is the first Bravo/Dithane replacement strategy using Tavano.

The number of out-of-bloom applications depends on the cultivar. Early Black, Howes and Mullica Queen are more resistant and generally require fewer applications.

Increased PHI (No Bravo)

In bloom 1	In bloom 2	Out of bloom 1	Out of bloom 2	Out of bloom 3
Indar/Abound	Indar/Abound	Dithane	Dithane	Tavano
Indar/Abound	Indar/Abound	Dithane	Tavano	Tavano

This is the first Bravo/Dithane replacement strategy using Tavano.

The number of out-of-bloom applications depends on the cultivar. Early Black, Howes and Mullica Queen are more resistant and generally require fewer applications.

Used in areas with **low** to **moderate** fruit rot pressure
Program relying on FRAC Group 3 and 11 fungicides

- Indar/Abound combination – make two applications at 7-10 day intervals ending before termination of bloom
- Substitute Indar with Proline if applications are not made via aerial application

FRAC Group 3 and 11 fungicides only

In bloom 1	In bloom 2	Out of bloom 1	Out of bloom 2	Out of bloom 3
Indar/Abound	Indar/Abound	None	None	None
Proline/ Abound	Proline/Abound	None	None	None
Indar/ Evito	Indar/ Evito	None	None	None
Proline/Evito	Proline/Evito	None	None	None

Organic Only

Can only be used in areas with **low** fruit rot pressure. Expect severe losses in other areas.

- May be acceptable in some areas however early season climate will likely dictate risk.
- Use same timing as previous scenario (shorter application intervals may provide higher efficacy).

No Fungicides

Can only be used in areas with **low** fruit rot pressure.

Expect severe losses in other areas.

- May be acceptable in some areas however early season climate will likely dictate risk.

Summary

Scenario	Expected Impact
Standard	This program is what everything else is compared to
Standard - no Bravo	Mancozeb is an equal substitute to Bravo
Increased PHI	Impact will be less for resistant varieties such as Early Black, Howes and Mullica Queen. More susceptible varieties will experience greater losses with increasing PHI
Increased PHI – No Bravo	Same as above
FRAC Group 3 and 11	*Expect fruit rot control to decrease by 50%
Organic	*Expect fruit rot control to decrease by 75%
No Fungicides	*Expect fruit rot control to decrease by 100%

*In comparison to a standard fungicide regime when using Bravo, Mancozeb alone, or in combination with Indar/Abound and/or Tavano

Fungicide scenarios for 2015

In bloom 1	In bloom 2	Out of bloom 1	Out of bloom 2	Out of bloom 3	
Indar/Abound or Proline/Abound	Indar/Abound or Proline/Abound	Dithane	Dithane	Dithane	Fruit rot plus severe twig blight
Indar/Abound or Proline/Abound	Indar/Abound or Proline/Abound	Dithane	Dithane		Fruit rot plus mild to moderate twig blight
Indar/Abound or Proline/Abound	Indar/Abound or Proline/Abound	Dithane			Fruit rot plus resistance management

