

# Creating Effective Fungicide Programs

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## Topics covered

- Why Choose a New Product?
- Determine the Real Cost
- Choosing the Best Product
- Creating and Effective Rotation
- Review Most Effective Products

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## Making a Change

- What is your rotation now?
- What FRAC is the new product?
- Does it offer something special?
  - broader spectrum
  - safer to people, environment or plants
  - easier to apply
  - less costly
  - lower REI
  - better control
  - resistance management



## Fine-tuning your choices

- Level of control desired - do you want to wipe it out or accept loss of quality = loss of crop value
- Cost of prevention vs. cure - interval and rate and type of product - want to wait for disaster to strike?
- What does a 14 day interval of lower efficacy product cost for a year vs. an "expensive" product on a 4-10 day interval once disease starts.

## Interval is important

Interval	Advantages	Disadvantages
Short	<ul style="list-style-type: none"> <li>⚙ More control usually</li> <li>⚙ Can use lower efficacy product</li> </ul>	<ul style="list-style-type: none"> <li>⚙ More frequent water is more disease</li> <li>⚙ REI concerns</li> <li>⚙ More residue</li> <li>⚙ Higher labor costs</li> </ul>
Long	<ul style="list-style-type: none"> <li>⚙ Less frequent water is more control</li> <li>⚙ Fewer REI concerns</li> <li>⚙ Less residue</li> <li>⚙ Lower labor costs</li> </ul>	<ul style="list-style-type: none"> <li>⚙ Less control usually</li> <li>⚙ Must use high efficacy product for best effect</li> </ul>

## Other Costs of Disease Prevention

- ⚙ Heat/vent - energy \$\$\$ and labor \$
- ⚙ Spacing - less product on bench is less \$\$
- ⚙ Fans for humidity reduction is equipment \$ (one time expenditure)
- ⚙ Time of day for irrigation is management decision - can be the key to downy control
- ⚙ Eliminate overhead irrigation - equipment and labor \$\$\$

It is not all about fungicides!!!

## Additional info to Consider

### Other non-targets controlled

- ⚙ Limited with Aliette, FenStop, Subdue MAXX and Stature - Phytophthora, downy mildew and Pythium (in some cases)
- ⚙ Broad with strobilurins - most foliar diseases.

### Potential for crop damage

- ⚙ Low with most products
- ⚙ Higher with copper and some DMIs

### Residue

- ⚙ Low with many newer products
- ⚙ High with mancozeb and chlorothalonil

## Determine the real cost of use per month

## Step 1. Cost of the product

Camelot 0 \$124/gal (\$1/oz)  
 Compass 0 \$263/8 oz (\$33/oz)  
 Daconil Ultrex \$88/6.5 lb (88¢/oz)  
 Decree \$271/2.5 lb (\$7/oz)  
 Heritage \$525/16 oz (\$33/oz)  
 Pageant \$80/16 oz (\$5/oz)  
 Protect DF \$80/6 lb (83¢/oz)  
 Spectro 90WDG \$124/5 lb (\$1.55/oz)

## Step 2. Use rate per 100 gal and interval

Camelot 0 48 oz (7 days)  
 Compass 0 1-4 oz (7-14 days)  
 Daconil Ultrex 1.4 lb (7-14 days)  
 Decree 12-24 oz (7-10 days)  
 Heritage 1-4 oz (7-14 days)  
 Pageant 12-18 oz (7-14 days)  
 Protect DF 16-24 oz (7 days)  
 Spectro 90WDG 1-2 lbs (7-14 days)

## Step 3. Cost per month

Daconil Ultrex \$57  
 Protect DF \$53  
 Spectro 90WDG \$100  
 Camelot \$192  
 Compass 0 \$198  
 Heritage \$198  
 Pageant \$240  
 Decree \$336

Expensive is  
determined by  
the wallet of  
the owner

## Step 4. Other benefits

Daconil Ultrex \$57 broad-spectrum, moderate to high efficacy  
 Protect DF \$53 broad-spectrum, moderate efficacy  
 Spectro 90WDG \$100 broad-spectrum, moderate efficacy  
 Camelot \$192 very broad-spectrum, moderate efficacy  
 Compass 0 \$198 broad-spectrum, high efficacy  
 Heritage \$198 broad-spectrum, high efficacy  
 Pageant \$240 broad-spectrum, high efficacy  
 Decree \$336 very narrow-spectrum, high efficacy

## Basic Facts for Making the Best Choices

- **ROTATION** - this means FRAC group - (NOT the same as for insects/mites)
- Highest efficacy
- Legal use sites
- Prevention vs. eradication
- Cost of use

## Matching the Fungicide to the Disease

- where is the infection? vascular - like Fusarium wilt, stem, root or leaves
- treat the right part of the plant
- use a systemic product if the infection is internal (fusarium or verticillium wilt and some downy mildews)
- use a contact product if the infection is superficial (like Botrytis)
- use the right rate at the right interval

## Bactericide Rotation

- **Copper** (MI-Camelot O, Kocide and Phyton 27) (effective on most bacteria)
- **Cease** (nc-Bacillus subtilis) (best for Pseudomonas and Xanthomonas)
- **Triathlon BA** (Bacillus amyloliquifaciens) (effective on most bacteria)
- **Agri-Mycin** (antibiotic-streptomycin sulfate) (best for Erwinia)
- **KleenGrow** (nc-quaternary ammonium) (effective on most bacteria)

## Bactericide Rotation

- **Erwinia soft rot or fireblight**
  - AgriStrep
  - KleenGrow
  - Copper
- **Xanthomonas leaf spot**
  - KleenGrow
  - Copper
  - Triathlon BA/Cease



## Botrytis/Sclerotinia Rotation

- Decree (17-fenhexamid)
- Daconil Ultrex (M5-chlorothalonil)
- Medallion or Emblem (12-fludioxonil) or Palladium (12 and 9-cyprodinil)
- Chipco 26019, 26GT (2-iprodione)
- Pageant Intrinsic (11-pyraclostrobin and 7-boscalid) OR Astun (7-isofetamid)



## Botrytis/ Sclerotinia Rotation

- Botrytis Blight
  - Palladium
  - Pageant Intrinsic
  - Decree
  - Chipco 26019 or GT
- Sclerotinia Blight
  - Pageant Intrinsic
  - Palladium
  - Chipco 26109 or GT



## Alternaria Rotation

- Daconil Ultrex (M5-chlorothalonil)
- Medallion or Emblem (12-fludioxinil) or Palladium (12 and 9-cyprodinil)
- Heritage or Pageant Intrinsic (11-strobilurins)
- Terraguard, Trigo, Banner MAXX (3-triflumizole)
- Chipco 26019 or 26GT (2-iprodione)



## Alternaria Rotation - GH vs. Nursery

- Greenhouse
  - Pageant Intrinsic
  - Palladium
  - Chipco 26109
- Nursery
  - Daconil WeatherStik
  - Banner MAXX
  - mancozeb



## Cercospora Rotation

- **3336, Fungo, OHP6672** (1-thiophanate methyl)
- **Palladium** (1 2 and 9 – fludioxonil and cyprodinil)
- **Heritage, or Pageant Intrinsic** (1 1-strobilurins)
- **Daconil Ultrex** (M5-chlorothalonil)



## Colletotrichum Rotation

- **Phyton 27** (M1-copper)
- **Dithane, Protect, Pentathlon** (M3-mancozeb)
- **Daconil Ultrex and Spectro** (M5-chlorothalonil)
- **Pageant Intrinsic** (1 1-pyraclostrobin and 7-boscalid)



## Myrothecium Rotation

- **Medallion or Emblem** (1 2-fludioxonil) or **Palladium** (1 2-fludioxonil and 9-cyprodinil)
- **Heritage and Pageant Intrinsic** (1 1-strobilurins)
- **Daconil Ultrex** (M5-chlorothalonil)



## Powdery Mildew Rotation

- **Heritage or Pageant Intrinsic** (all contain a 1 1-strobilurins)
- **Terraguard, Trigo (=Strike Plus), Banner MAXX, Eagle, Tourney, Trinity, Torque** (3-sterol inhibitors)
- **Camelot O, Kocide, Phyton 27** (M1-copper)
- **MilStop** (nc-K bicarbonate)
- **Palladium** (1 2 and 9)





## Rust Rotation

- **Banner MAXX, Trigo (=Strike Plus), Trinity, Torque, Tourney, Eagle or Terraguard (3-sterol inhibitor)**
- **Heritage or Pageant Intrinsic (1 1-strobilurins)**
- **Camelot O or Phyton 27 (M1-copper)**
- **Dithane, Pentathlon or Protect (M3-mancozeb) (most effective at preventing rust)**



## Downy Mildew Rotation

- **Heritage or Pageant Intrinsic (1 1-strobilurins) OR FenStop (1 1-fenamidone)**
- **Subdue MAXX (4-mefenoxam/tank-mix as directed)**
- **Adorn (43-fluopicolide/tank-mix as directed)**
- **Aliette (33-phosphonate)**
- **Segway O (21-cyazofamid)**
- **Micora (40-mandipropamid), Stature or Orvego (40-dimethomorph and 45-ametoctradin)**



## Phytophthora Rotation

- **Aliette (33-fosetyl aluminum)**
- **Adorn (43-fluopicolide) (tank-mix as directed)**
- **Subdue MAXX (4-mefenoxam)**
- **Micora (40-mandipropamid) or Stature SC (40-dimethomorph)**
- **Terrazole or Truban (1 4-etridiazole)**
- **FenStop (1 1-fenamidone)**
- **Segway O (21-cyazofamid)**



## Pythium Rotation

- **Empress Intrinsic (1 1-pyraclostrobin)**
- **RootShield Plus (nc-Trichoderma harzianum T-22 and Trichoderma virens G-41)**
- **Segway O (21-cyazofamid)**
- **Subdue MAXX (4-mefenoxam)**
- **Terrazole or Truban (1 4-etridiazole)**



## Rhizoctonia Rotation

- **Medallion or Emblem (1 2-fludioxinil - crown and root) or Palladium (1 2 and 9- fludioxinil and cyprodinil - foliar)**
- **Heritage (1 1-strobilurin) or Empress Intrinsic or Pageant Intrinsic (1 1 and 7-pyraclostrobin and boscalid)**
- **3336, Fungo, OHP-6672 (1-tmethyl)**
- **RootShield Plus (nc-Trichoderma harzianum T-22 and T. virens G-41) root rot only and preventative**
- **Affirm (1 9 - polyoxin D)**
- **Chipco 26019 or GT (2-iprodione)**



## Thielaviopsis Rotation

- **OHP-6672, 3336 (1-thiophanate methyl)**
- **Affirm (1 9-polyoxin D)  
and to a lesser degree**
- **Heritage (1 1- azoxystrobin)**
- **Medallion or Emblem (1 2-fludioxonil) or Palladium (1 2 and 9 - fludioxonil and cyprodinil)**
- **Terraguard (3-triflumizole)**



## Fusarium Rotation

- **Medallion or Emblem Intrinsic (1 2-fludioxonil-for crown and root) or Palladium (1 2-fludioxonil and 9-cyprodinil-for foliar and crown)**
- **Heritage (1 1-azoxystrobin) or Empress Intrinsic (1 1-pyraclostrobin-for roots) or Pageant Intrinsic (1 1-pyraclostrobin and 7-boscalid-foliar)**
- **Terraguard (3-triflumizole)**

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