

Almond Bloom Fungicide Efficacy Trial

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Introduction

There are several fungal diseases that can infect almond trees during bloom, infecting and killing blossoms and ultimately reducing yield. Fungicides are commonly sprayed on almond trees, and other stone fruits, during bloom to prevent disease. In some instances fungicide resistance has developed in pathogen populations. Resistance to single site-specific fungicides (Strobilurins) have been reported. These new fungicides have low residual activity and are environmentally safe, but since they are single-site specific, resistance can also develop to them. Thus, it is important that growers practice a fungicide rotation program where different classes of fungicides are used so that pathogen resistance will not build up in response to the over use of any one fungicide or class of fungicides. It is also important that these new and previously registered fungicides are evaluated for disease efficacy by unbiased personnel that can extend such information to growers and PCAs.

Objective: To evaluate 'sequential treatments' of Fontelis (penthiopyrad), Bumper (propiconazole), Tebuconazole, Abound (azoxystrobin), Gem (trifloxystrobin), a DuPont experimental fungicide, Merivon (fluxapyroxad + pyraclostrobin), Bravo Weather Stick (chlorothalonil), Quadris Top (difenoconazole + azoxystrobin), Inspire EC (difenoconazole), Quash (metaconazole), Rovral (iprodione) + oil, Luna Sensation (flupropram + trifloxystrobin), Luna Experience (flupropram + tebuconazole), Indar (fenbuconazole), Serenade Optimum (Bacillus subtilis), Microthiol Disperse (micronized wettable sulfur), and Regalia (extract of Reynoutria sachalinensis) in tank-mixtures and in various combinations and timings for the control of common almond bloom diseases: brown rot, shot-hole, scab, and rust.

Target Pathogens: Brown Rot (*Monilinia laxa* and *M. fructicola*) and Scab (*Cladosporium carpophilum*), Shot Hole (*Wilsonomyces carpophilus*), and Rust (*Tranzschelia discolor*).

Method

Replicated and randomized block experiment was placed in an experimental Almond orchard at the Kearney Research and Extension Center in order to evaluate the efficacy of the fungicides tested. Single tree replications are usually used since crop destruct is necessary when unregistered materials are studied. Different almond varieties are chosen for specific studies because some varieties are more resistant to certain diseases than others. Fungicide trials are rated for disease when symptoms are visible. Fungicides are grouped into their respective chemical classes and rated against each other for their efficacy to control certain diseases at a particular stage in almond development.

Application Timing and sampling: The trials first spray application of treatments was applied at 100% full bloom (FB) to the Carmel variety on February 18th. The Butte variety was treated at the same time at 70% full bloom. The full bloom spray is primarily directed towards controlling brown rot. Early petal fall (PF) was recorded to occur on February 25th while leaf out was observed. The second spray application was made on March 5th, one week after petal fall (1WPF). The third spray application was made on April 2nd, five weeks after petal fall (5WPF). The second and third applications were primarily directed at controlling scab. Carmel trees were rated for scab on July 15, 100 nuts per tree were randomly sampled and taken back to the laboratory in order to determine incidence and severity.

Application Methods: Treatments were applied by ground application equipment, 100 gallon spray tanks, 300 gallon per acre rate, at approximately 2.5 gallons per tree, 200 psi, hand-held spray gun. Approximately 1.5 gallons of water is in the spray hose and was considered in our calculations. Calculations were based on 10 trees per treatment (8 trees were sprayed, 4 Carmel and 4 Butte), 1 tree was considered extra and one tree spray volume was determined to be contained in the hose. Nozzle orifice was 45. Overhead micro-sprinklers were run for 6 hours for 2 days after each application.

Results

Incidence

Carmel Variety

Treatment	Rates per acre	Incidence ^a
1 Fontelis 1.67 SC ^{1,2,3} , 20 fl oz		2.75 a
10 Quadris Top ¹ 14 fl oz + DA, Bravo ² 4 pt, Inspire EC ³ 7 fl oz + DA		2.75 a
11 Fontelis 1.67 SC ¹ 16 fl oz, Inspire EC ^{2,3} 7 fl oz + DA		3.50 a
14 Indar 6 fl oz + DA 0.25% ¹ , Indar 6 fl oz + Abound 15 fl oz + DA 0.25% ^{2,3}		4.00 a
17 Pristine ¹ , 14.5 oz + DA, Luna Experience ^{2,3} , 8 fl oz + DA		4.25 a
9 Merivon SC ^{1,2,3} 5.5 fl oz + DA 0.25%		4.50 a
3 Fontelis + Tebucon 45DF ^{1,2,3} , 20 fl oz + 8 oz		4.75 a
18 Microthiol Disperse ^{1,2,3} 20 lbs		5.75 a
15 Luna Sensation SC ^{1,2,3} , 5 fl oz + DA 0.25%		6.00 a
2 Fontelis + Bumper 3.6EC ^{1,2,3} , 20 fl oz + 8 fl oz		7.25 a
13 Rovral + oil ¹ , 16 fl oz + 1% v/v, Luna Sensation SC + DA ^{2,3} , 7 fl oz + 0.25%		10.25 a
5 Fontelis + Gem 4.05SC ^{1,2,3} , 20 fl oz + 2.9 fl oz		11.00 a
12 Quash 3.5 oz + Dyne-Amic 0.25% ^{1,2,3}		12.00 a
4 Fontelis + Abound 2.0 8F ^{1,2,3} , 20 fl oz + 12 fl oz		12.00 a
8 DuPont Experimental + DA ^{1,2,3} , 57.8 fl oz + 0.25%		13.00 a
16 Serenade Optimum 16.0 oz + DA 0.25% ¹ , Luna Experience ^{2,3} 6 fl oz + DA		14.25 a
7 DuPont Experimental + DA ^{1,2,3} , 43.4 fl oz + 0.25%		16.50 a
6 DuPont Experimental + DA ^{1,2,3} , 28.9 fl oz + 0.25%		36.25 b
19 Regalia ^{1,2,3} 1.0% v/v dilution		37.75 b
20 Untreated Control		51.00 b
21 Untreated Control		80.25 c

Incidence = number of nuts that have scab lesions on 100 nuts randomly sampled per tree. 100 nuts per Carmel tree/replication were randomly sampled on July 15th and taken back to the laboratory to determine incidence and severity. Data was analyzed by ANOVA with means separated by Fisher's Protected LSD ($\alpha = 0.05$) test. Means followed by the same letter are not significantly different. Most treatments significantly reduced the incidence of almond scab when compared to our two untreated controls.

The following trial applications are outlined above:

1 First trial application was performed at 100% full bloom (100 % FB) on February 18th.

2 Second trial application was performed 1 week after petal fall (1WPF) on March 5th.

3 Third trial application was performed 5 weeks after petal fall (5WPF) on April 2nd.

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