Annual Report - 2009

Prepared for the California Cling Peach Advisory Board

Title:	*Management of Brown Rot and Powdery Mildew Diseases of Peach in California*
Status:	Third-Year of Four
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SUMMARY OF RESEARCH ACCOMPLISHMENTS DURING 2009

1. A goal of our field trials in 2009 again was the development of alternative fungicide treatments and we emphasized on the evaluation of new pre-mixtures of different fungicide classes that, in addition to fungicide rotations, can provide an excellent resistant management strategy. This is critical because pathogen populations resistant to SBI fungicides have developed in other stone fruit growing areas and we have detected a low level of anilinopyrimidine resistance in populations of *Monilinia fructicola* and *M. laxa* in our surveys in California. New pre-mixtures evaluated included Adament (trifloxystrobin + tebuconazole), Inspire Super (difenoconazole + cyprodinil), Inspire XT (difenoconazole + propiconazole), Quilt Xcel (azoxystrobin + propiconazole), Luna Sensation (fluopyram + trifloxystrobin), Luna Experience (fluopyram + tebuconazole), and Quadris Top (azoxystrobin + difenoconazole).
2. The new fungicides Luna Privilege (fluopyram, a succinate dehydrogenase inhibitor), Quash (metconazole, a DMI fungicide), and the pre-mixtures Luna Sensation, Luna Experience, Inspire XT, Inspire Super, Quilt Xcel, Quadris Top, as well as the registered pre-mixture Adament were among the most effective treatments for the management of blossom blight. In laboratory tests these fungicides and mixtures demonstrated excellent pre- and post-infection activity, similar to Scala. The natural product Regalia was effective, but not as effective as the fungicides, whereas the biocontrol Actinovate (a fermentation product of the actinomycete *Streptomyces lydicus*) did not reduce the incidence of blossom blight.
3. In studies evaluating the susceptibility of peach genotypes to brown rot blossom blight, we continued to coordinate our research with Dr. Tom Gradziel. Genotypes evaluated included accessions of Bolinha and 31 other genotypes that were compared to cvs. Ross, Dr. Davis, Loadel, 49er, Carson, and White Heath Cling. All genotypes were found to be sensitive to infection by *M. fructicola* in 2009.
4. Promising new single-fungicides in the preharvest studies that reduced fruit decay to low levels included Luna Privilege and Quash. As in the blossom studies, the new pre-mixtures Adament, Luna Sensation, Luna Experience, Inspire XT, Quilt Xcel, and Quadris Top performed very well. Syllit (dodine) was not or only slightly effective. In addition, as in previous years, the anilinopyrimidines Vangard and Scala were not as effective as most of the other fungicides in these summer applications.
5. In a field trial for the evaluation of fungicides against powdery mildew, disease incidence on fruit of non-treated was low in 2009 (3.2%), but disease was significantly reduced by all treatments including eight pre-mixtures and five rotation programs that included Vivando (BAS560, metrafenone) a new unique powdery mildew–specific fungicide that deserves further testing. Additionally, the natural product Regalia also significantly reduced the incidence of disease from that of the control.
6. For peach leaf curl, ziram again was more effective than copper-oil treatments. Similar very low levels of disease were obtained using a single application in late January at a higher (6 lb) rate or two applications (mid-December and late January) at a lower (4 lb) rate. These are off-label rates that may be revised in a supplemental label. Rotation programs with ziram and copper materials were intermediately effective.

INTRODUCTION

In an integrated approach for the management of fungal diseases of peach, fungicide use is currently the most effective control strategy. We are developing new products with new modes of action and new pre-mixtures as well as application strategies (e.g., timing, rotation programs) for the control of brown rot blossom blight and fruit decay, powdery mildew, and peach leaf curl. This will ensure that highly effective materials will always be available to the peach industry and that mixture and rotation programs can be designed to help prevent the selection of resistant populations to any given class of fungicide. This is critical because populations of *Monilinia* spp. resistant to DMI fungicides - that are still among the most effective brown rot materials - have developed in other stone fruit growing areas. Additionally, in 2007, we found isolates of *Monilinia fructicola* resistant to cyprodinil (Vangard) in a prune orchard in Northern California, and in 2009 we identified isolates of *M. laxa* resistant to the same fungicide class in another prune orchard. The, the anilinopyrimidine fungicide class is an important component of management programs, and the spread of resistance and development of field resistance has to be prevented by strictly rotating different classes of materials. Thus, in 2009 we again conducted field and laboratory studies on the management of diseases.

Brown rot caused by *M. fructicola* and *M. laxa* is the most important disease of stone fruit in California. In the spring, primary inoculum consisting of ascospores and conidia from mummified fruit infects blossoms and diseased blossoms supply secondary inoculum for fruit infections in the current growing season. In studies on the management of brown rot, two areas were again emphasized: 1) the efficacy of new fungicides in a short-term strategy; and 2) the evaluation of natural host resistance against blossom blight in F1 progeny from crosses between less susceptible selections (e.g., Bolinha and other genotypes) and California varieties in a long-term strategy. Over the years, we evaluated many promising new genetic lines of cling peach developed by Dr. Tom Gradziel. Many of these lines have been evaluated for their resistance to fruit brown rot, but not to blossom blight. Research using the Bolinha genotypes was initiated by myself and the late Dr. Ogawa in the early 1990s. Because breeding programs are continuously generating promising new selections, host resistance in blossoms has to be continued to be evaluated.

In field trials on peach leaf curl and we evaluated several fungicides and compared selected application timings during dormancy and pre-bloom. The main focus of our powdery mildew field trials was the evaluation of new fungicide pre-mixtures and rotation programs.

Objectives

I. Management of brown rot.

- A) Efficacy and timing of representative compounds from each of five new classes of fungicides (e.g., QoIs, anilinopyrimidines, DMI fungicides (including Quash, Inspire), hydroxyanilides, and other new classes like the SDHIs (Luna Privilege). Selected pre-mixtures of fungicides (Pristine, Adamant, Distinguish, Inspire Super, Luna Sensation, Luna Experience, Luna Tranquility, Inspire XT, Quilt Xcel, Quadris Top) will also be evaluated. Pre- and post-infection efficacy will be studied for both blossoms and fruit.
- B) Persistence of anilinopyrimidine residues under high humidity and temperature.
- C) Baseline sensitivities of brown rot fungi to new classes of fungicides.
- D) Natural host resistance of peach to blossom blight and fruit decay

II. Management of peach leaf curl

- A) Evaluate timing and lower rates of ziram and new copper formulations as treatments for peach leaf curl.

II. Etiology and management of powdery mildew on cling peach and other stone fruits.

- A) Collection of powdery mildew isolates from peach in California and identification of the causal pathogen(s).
- B) Efficacy of new powdery mildew fungicides (e.g., quinoxyfen, triflumizole, Vivando), currently registered products, and their use in anti-resistance rotation and mixture programs.

MATERIALS AND METHODS

Evaluation of fungicides for management of brown rot blossom blight and preharvest fruit decay. Trials were established in two orchards at the Kearney Agricultural Center (KAC) in Parlier, CA, on two peach cultivars (i.e., Elegant Lady and Ryan Sun) to evaluate fungicides for control of brown rot blossom blight. Fungicides that were applied to trees using an air-blast sprayer calibrated for 100 gal/A are indicated in the Figures of the Results. Randomized sub-plots of four single-tree replications for each treatment were used.

Incidence of brown rot blossom blight caused by *M. fructicola* was recorded in April 2009. For this, 200 blossoms were evaluated for blight for each single-tree replication and treatment.

Laboratory studies were done with cvs. Fay Elberta and Ross peach blossoms obtained from the UC Davis, Plant Pathology field station. For this, pink bud blossoms were collected, allowed to open in the laboratory, and either inoculated with a conidial suspension of *M. fructicola* (20K conidia/ml) and then treated after 24 h with fungicides or natural products using a hand sprayer (post-infection activity), or treated and then inoculated after 24 h (pre-infection activity). Three replications of 7 blossoms were used for each fungicide.

For the evaluation of preharvest treatments, two orchards at the Kearney Agricultural Center (KAC), Parlier, CA, were used. Applications were made in the field using an air-blast sprayer (100 gal/A) at 10+3 day PHI and 17+10 day PHI to Elegant Lady, at 7 days PHI to July Flame peach, at 13+4 day or 19+10 day PHI (orchard 1) and at 6 day or 13 day PHI (orchard 2) to Ryan Sun peach. Fungicides evaluated are indicated in Figs. 3 and 4. In the second orchard with July Flame and Ryan Sun peach, trees were treated for 6 h 2 and 4 days after fungicide application with simulated rain to create a more conducive environment for brown rot infection. Four boxes of 48 fruit each were harvested for each treatment (one per single-tree replication). Fruit were packed in commercial boxes and stored for approximately 7 days at 1 C. Fruit were then inoculated with *M. fructicola* by spray-inoculation of non-wounded fruit (15,000 conidia/ml). Fruit were then incubated at 20C, >90% RH, for 7 days and evaluated for incidence of decay. In another trial on Fay Elberta peach at UC Davis, fungicides were applied 7 or 14 days PHI. Twelve fruit from each of four single-tree replications were harvested and incubated for approximately 7 days at 20 C for development of natural incidence of decay.

Host susceptibility of F1- progeny of Bolinha peach and other selections to brown rot blossom blight. Blossoms of parental Bolinha Q, D62-193, and Dr. Davis accessions, additional California varieties, and selected F1 progeny as suggested by Dr. Gradziel were collected at popcorn stage in the spring of 2009. Due to the almost simultaneous bloom of most accessions in 2009, blossoms could only be sampled once. Blossoms were allowed to open in the laboratory, placed in a container with a layer of wet vermiculite, spray-inoculated with a conidial suspension of *M. fructicola* ($2x10^4$ spores/ml) and incubated for 4-5 days at 20 C. The incidence of stamen infections was assessed for 7-8 blossoms per each of four replications.

Evaluation of fungicides for management of peach leaf curl. In a trial on the management of peach leaf curl caused by *Taphrina deformans* on Fay Elberta peach at UC Davis, ziram, copper materials (i.e., Kocide 2000, Kocide 3000, Kentan 40DF, Badge X2), or Bravo were applied at selected rates by themselves or in rotations. In each single-fungicide or rotation program two applications were done either during dormancy (12-12-08, 12-30-08), late dormancy (1-27-09), or at post-bloom (3-18-09) using an air-blast sprayer at 100 gal/A. The high rate of Ziram (6 lb) was also used in a single-spray treatment during early or late dormancy. All copper materials were applied in combination with spray oil (415) at 2%. Trees were evaluated for disease on April 15, 2009. For this, the number of leaf curl infections was counted on 100 shoots for each of the four single-tree replications.

Efficacy of fungicides for management of powdery mildew of cling peach. A trial on the management of powdery mildew caused by *Podosphaera pannosa* was established in a commercial cv. Carson orchard in Butte Co. In addition to Regalia and stylet oil, ten fungicide pre-mixtures and five rotation programs were evaluated (see Fig. 6). Applications were done on 3-5 (full bloom), 3-26 (2 weeks after petal fall), and 5-5-08 (5 weeks after petal fall). Disease was evaluated on June 9. For this, fruit of each of the four single-tree replications were rated for disease.

Statistical analysis of data. Data for disease incidence (percentage data) were arcsin transformed before analysis. Data were analyzed using analysis of variance and least significant difference (LSD) mean separation procedures of SAS 9.1.

RESULTS AND DISCUSSION

Efficacy of fungicides for management of blossom blight. The performance of fungicides was evaluated after single applications at delayed full bloom. Due to very low precipitation in the spring of 2009 at our trial site at Kearney Ag Center (56.5 mm between Feb. 1 and April 1, 2009, as compared to 49.0 mm in 2008, 59.4 mm in 2007 and 133.6 mm in 2006 for the same time period), the incidence of blossom blight was low. The incidence

of blight in the untreated control was 1.4% for Elegant Lady peach and 4 and 1.3% for Ryan Sun peach (two orchards). On Ryan Sun in the first orchard where the highest disease incidence (i.e., 4%) occurred in the non-treated control, blossom blight was reduced to <0.1% by the new fungicide Luna Privilege (USF2015 - fluopyram) and the new pre-mixtures Luna Sensation (USF2016, fluopyram + trifloxystrobin), Inspire XT (= difenoconazole + propiconazole), Quilt Xcel (= azoxystrobin + propiconazole), Quadris Top (= azoxystrobin + difenoconazole), as well as the registered pre-mixture Adament (= tebuconazole + trifloxystrobin) (Fig. 1). These treatments were also very effective in the second Ryan Sun orchard and on Elegant Lady (Fig. 1). Syllit, Vangard, and Scala were among the less effective treatments in the first orchard with Ryan Sun.

Blossoms from the UC Davis Fay Elberta peach plot were used in laboratory tests. Luna Privilege, Luna Sensation, Inspire XT, Quilt Xcel, Quadris Top, Adament, as well as Quash and Inspire Super (=difenoconazole + cyprodinil) demonstrated excellent pre- and post-infection activity, similar to Scala (Fig. 2). The natural product Regalia was effective in this experiment, but not as effective as the fungicides, whereas the biocontrol Actinovate (a preparation of the actinomycete *Streptomyces lydicus*) did not reduce the incidence of blossom blight. Thus, Regalia is a promising alternative blossom blight treatment for organic fruit production. Actinovate should be tested at higher rates.

Efficacy of preharvest fungicides for management of fruit decays. At KAC, the efficacy of selected preharvest fungicides for control of fruit brown rot decay was evaluated under ambient conditions using two preharvest applications and under simulated rain conditions using a single preharvest application. The natural incidence of brown rot ranged between 27.6% and 99% for fruit of the untreated control when incubated at 20C for 5 to 8 days and thus, no fruit inoculations had to be done.

In the first orchard with the two-spray program, treatments were more effective on Elegant Lady than on the late-maturing Ryan Sun peach. Among the new single-fungicides the SBI Quash and the SDHI Luna Privilege provided very good decay control, whereas Syllit was not effective (Fig. 3). As in the blossom studies, the new pre-mixtures Adament, Luna Sensation, and Inspire XT performed very well. On Elegant Lady peach Luna Privilege, Luna Sensation, and Inspire XT resulted in excellent decay control when applied 17 and 10 days before harvest. As in previous years, the anilinopyrimidines Vangard and Scala were not as effective as most of the other fungicides in these summer fruit applications. Temperature and humidity are important factors in determining their performance as preharvest treatments (as demonstrated previously).

In the second orchard with a single preharvest application and where two simulated rain treatments were applied after fungicide application, treatments on Ryan Sun peach closer to harvest (6 days PHI) were generally somewhat effective (Fig. 4). Still, treatments on the later maturing Ryan Sun were again overall less effective than on the earlier maturing July Flame peach. On this latter cultivar, among the new fungicides Luna Privilege, Quash, as well as the pre-mixtures Luna Sensation, Luna Experience, Inspire XT, Quilt Xcel, and Quadris Top performed very well. In addition, the pre-mix fungicide Distinguish was also very effective. This fungicide, however, may not be continued to be developed for use on stone fruit. Syllit, Scala, and Vangard again were not very effective.

In the trial at UC Davis on Fay Elberta, Quash, Luna Privilege, Adament, Luna Sensation, Inspire Super, Inspire XT, Quilt Xcel, and Quadris Top were very effective at the 7- and 14-day PHI application timings. As on Elegant Lady peach (Fig. 3), the efficacy of Adament was rate-depending and was higher at the 6-oz rate (Fig. 5). Scala and Vangard were more effective (and similarly effective as the other fungicides) at the 7-day PHI treatment than at the 14-day PHI application.

Conclusions on blossom blight and preharvest decay management of cling peach. Our data indicate that numerous registered and new fungicides can be used very effectively for managing blossom blight and preharvest diseases, and for reducing postharvest brown rot decay. Currently registered fungicides belong to six different classes, the DMIs (Orbit, Elite, Indar, Rally), the anilinopyrimidines (Vangard, Scala), the dicarboximides (Rovral/Oil), the hydroxyanilides (Elevate), as well as the carboxamides (boscalid) and QoIs (pyraclostrobin) that are contained in the pre-mixture Pristine. Future registrations include two additional DMI fungicides (Inspire and Quash), and the SDHI Luna Privilege, a class that includes the sub-groups benzimides (i.e., fluopyram) and carboxamides (i.e., boscalid). Thus, this FRAC group 7 has the same target

site succinate dehydrogenase but the sub-groups show slightly different affinity to the site. Still, resistance management practices should be followed by rotating between FRAC Group numbers. These fungicides are important to the cling peach industry because of their activity against brown rot, gray mold, and powdery mildews. Preharvest rotational products for the DMIs are still needed that are similarly highly effective and also have some locally systemic activity. Although no new effective fungicide class has been identified in recent years, the registration of several new pre-mixtures, including Inspire XT, Quilt Xcel, and Quadris Top will partially fill this void and provide tools for the implementation of resistance management strategies in brown rot control. For preharvest decay control, single applications are best applied within 8 days of harvest, whereas treatments in a two-spray program should be done at a 7- to 10-day interval within two weeks of harvest.

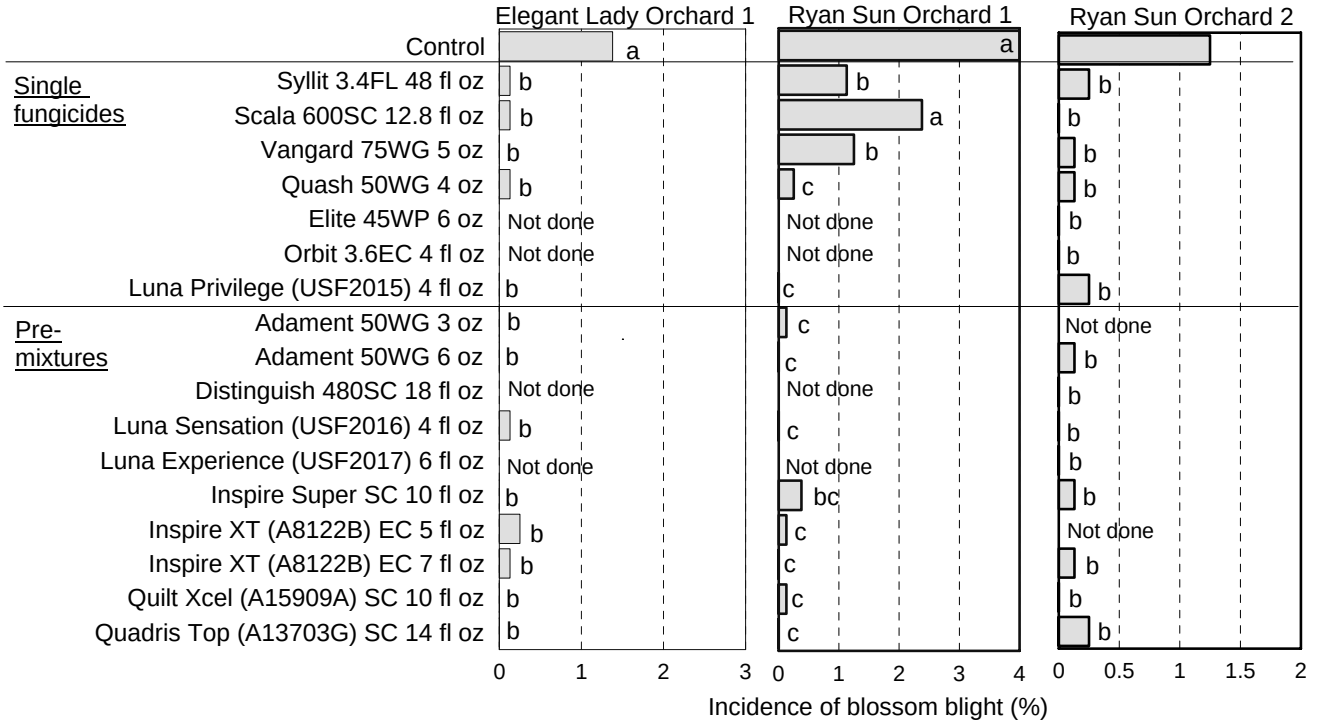
Host susceptibility of F1- progeny of Bolinha peach and other selections to brown rot blossom blight. In studies evaluating the susceptibility of peach genotypes to brown rot blossom blight, we continued to coordinate our research with Dr. Tom Gradziel. Genotypes evaluated included accessions of Bolinha and 31 other genotypes that were compared to cvs. Ross, Dr. Davis, Loadel, 49er, Carson, and White Heath Cling. All genotypes were found to be sensitive to infection by *M. fructicola*. This is in contrast to previous years where genotypes statistically separated using the detached blossom method. Thus, as stated previously, environmental conditions in the orchard, pre-disposition of the host, and cultural practices may have a more profound effect on blossom susceptibility than the genetic background of the host and this could explain differences in results over the years. Although some less susceptible peach genotypes have been identified over the years, breeding of new cling peach varieties is a long-term undertaking and for now, fungicide applications will continue to be critical in the management of blossom blight.

Evaluation of fungicides for management of powdery mildew and peach leaf curl. In the powdery mildew trial, the emphasis was on evaluating the efficacy of recently registered and experimental pre-mix fungicides that are planned for registration and on rotational treatments. A new powdery mildew-specific fungicide (Vivando – metrafenone, BAS560) that was included in three of the rotations and pre-mixtures of registered (e.g., Adamant, Pristine) or new fungicides (Luna Sensation, Luna Experience, Inspire Super, Inspire XT, Quilt Xcel, and Quadris Top) were highly effective in this trial with low disease pressure (3.2% incidence of disease on fruit) (Fig. 6). Additionally, the natural product Regalia also significantly reduced the incidence of disease from that of the control (1% incidence) and was numerically more effective than stylet oil (1.6% incidence). We plan to conduct additional trials in 2010. Although outbreaks of powdery mildew are very sporadic and localized, we hope to be able to obtain data for higher disease pressure conditions.

In a trial on Fay Elberta peach on the management of peach leaf curl, the efficacy of selected fungicides applied alone or in rotation during dormancy, late dormancy, or post-bloom was compared in one- or two-spray application programs. The results in Fig. 7 indicate that Ziram was the most effective material in managing this disease. A single application of Ziram at 6 lb/A applied at early (12-12-08) *or* late (1-27-09) dormancy was similar highly effective as two treatments at 4 or 5 lb/A applied during early *and* late dormancy. Disease was reduced from an incidence of 69.3% in the control to 0.5 to 4.8% among the Ziram treatments. The lower rates of Ziram are off-label rates that may be revised in a supplemental label.

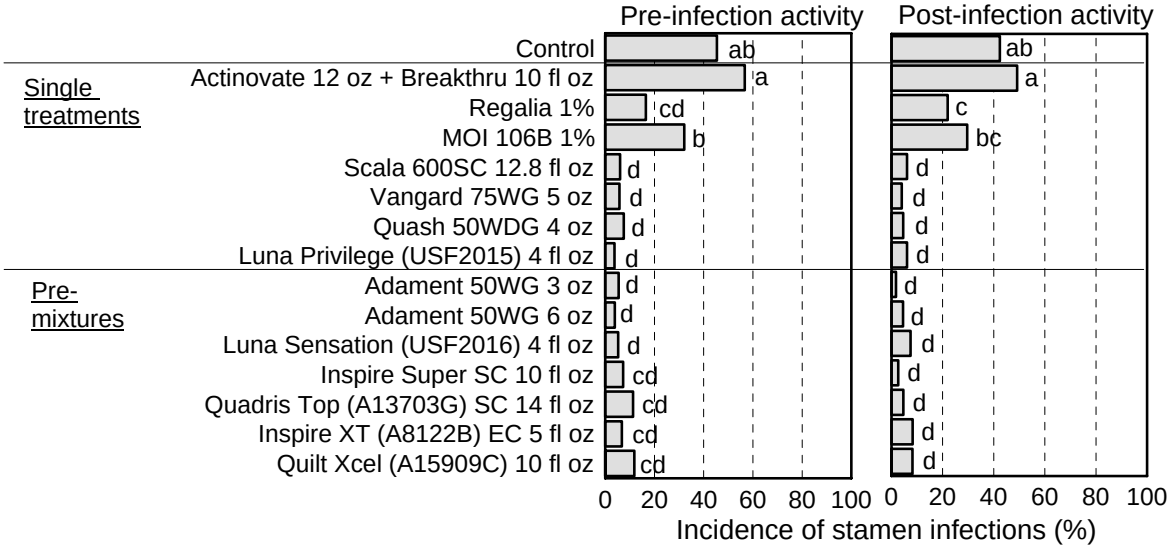
Treatments with several copper products in combination with spray oil were also effective, resulting in an incidence of leaf curl between 20.8 and 26%. Thus, the four copper products evaluated were similarly effective. Rotations that included a Ziram treatment during early, mid (12-30-08) or late dormancy were highly effective, but were not effective when this fungicide was applied post-bloom (3-18-09). Furthermore, a Ziram-Kocide rotation was similarly effective as a Ziram-Bravo rotation. Based on this and previous years' trials, peach leaf curl is most effectively managed by single or two dormant applications with Ziram or a rotation that includes one application of Ziram and a copper product or chlorothalonil. Thus, highly effective treatments are available for the management of peach leaf curl that when properly timed can reduce disease incidence to very low levels.

Fig. 1. Efficacy of fungicide treatments for management of brown rot blossom blight of peach cultivars at the Kearney Agricultural Center



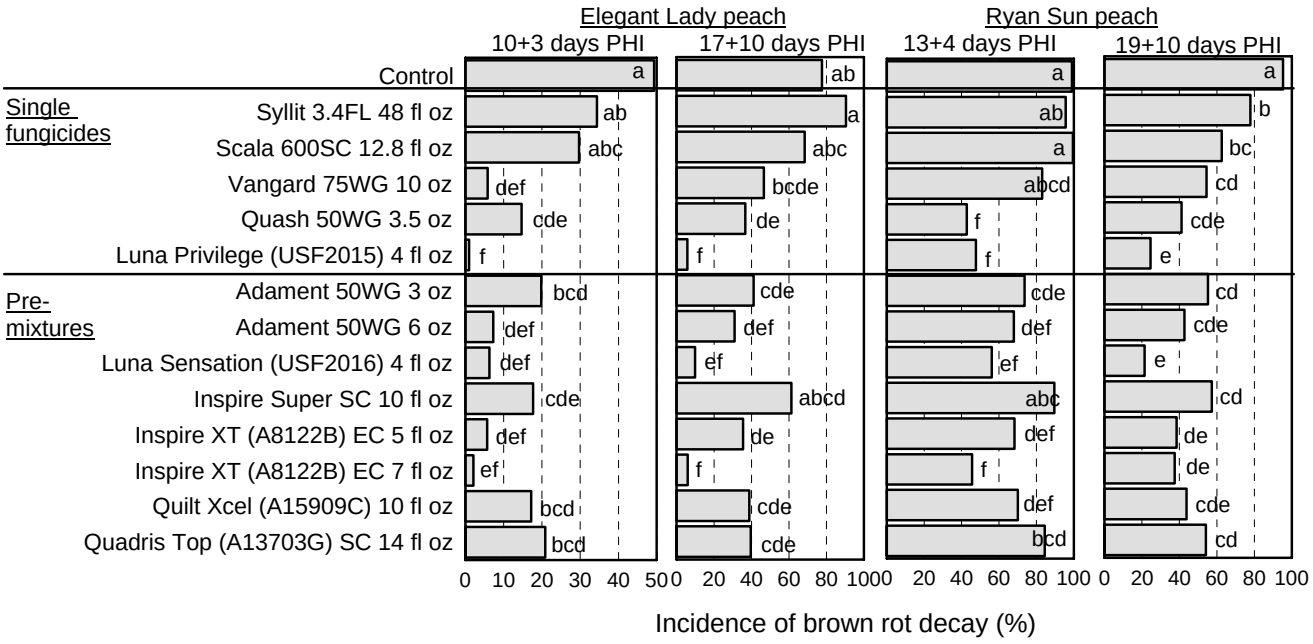
One application of each treatment was made in the field on 2-27-09 at 40-50% bloom using an air-blast sprayer (100 gal/A). Blossoms were evaluated for blossom blight on 4-9-09. There were four single-tree replications for each treatment.

Fig. 2. Evaluation of the pre- and post-infection activity of new fungicides against brown rot blossom blight of Fay Elberta peach - Laboratory assays



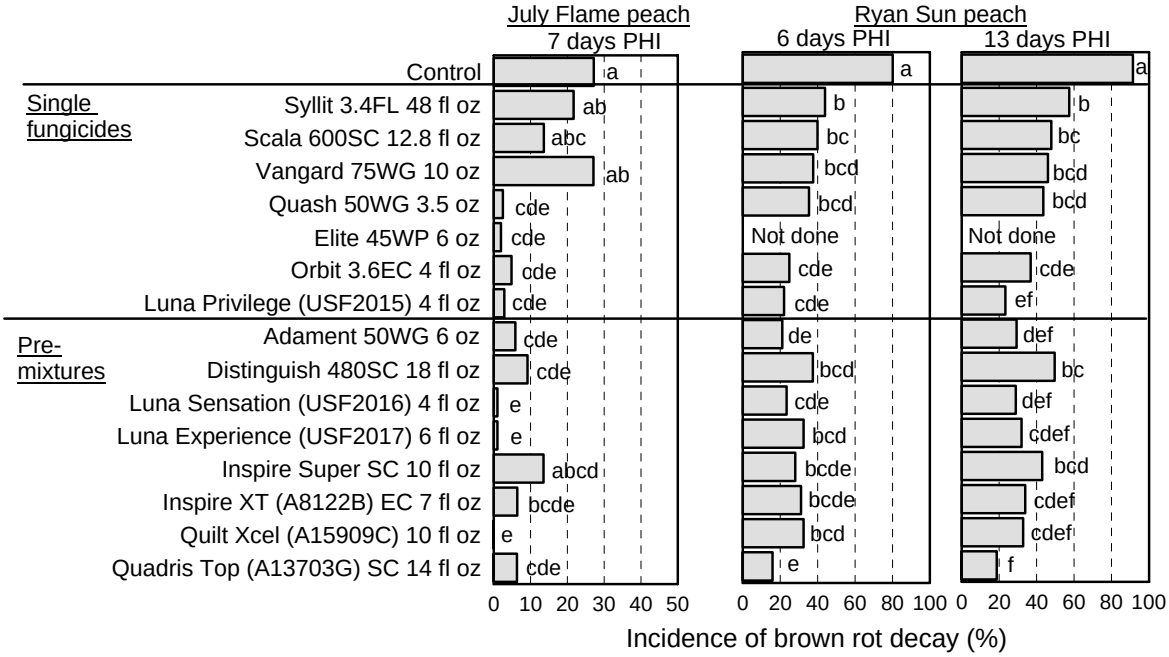
Blossoms at popcorn stage were collected in the field and allowed to open in the laboratory. Blossoms were then either treated using an air-nozzle sprayer 24 h before (pre-infection activity) or after (post-infection activity) inoculation with conidia of *M. fructicola* (15,000 conidia/ml). Blossoms were incubated at 20C for 4-5 days and were then evaluated for stamen infections.

Fig. 3. Efficacy of preharvest fungicide treatments for management of brown rot (natural incidence of decay) of nectarines and peaches at the Kearney Agricultural Center
- Orchard 1: Two preharvest applications



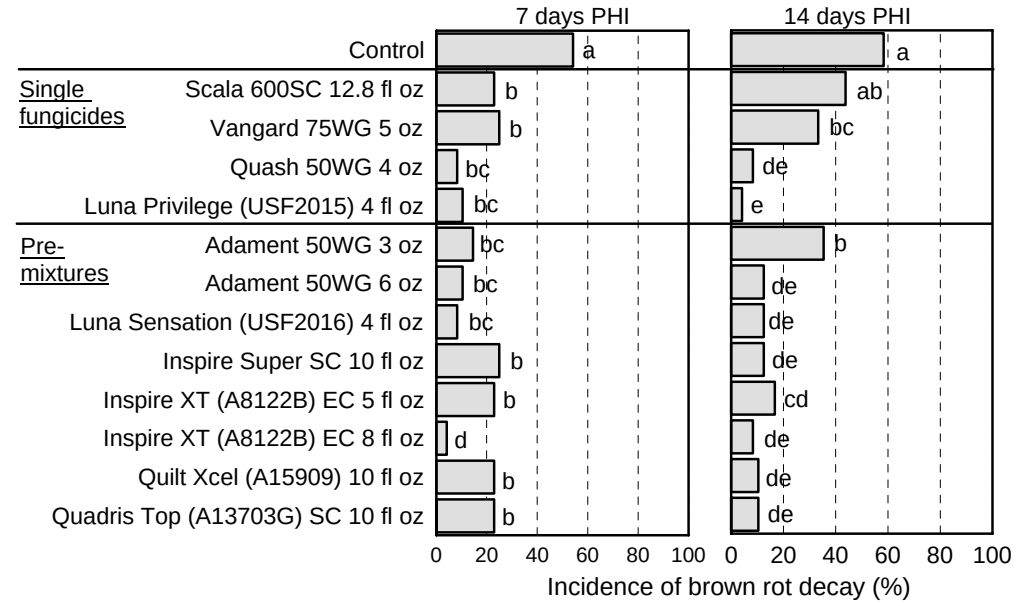
Applications were made in the field on 6-12 and 6-19-09 for Red Diamond, on 7-3 and 7-10-09 for Elegant Lady, and on 7-29 and 8-7-09 for Ryan Sun using an air blast sprayer at 100 gal/A. Fruit were harvested and stored at 1C for 7 days and were then incubated at 20C for 7 days.

Fig. 4. Efficacy of preharvest fungicide treatments for management of brown rot (natural incidence of decay) of nectarines and peaches at the Kearney Agricultural Center
- Orchard 2: One preharvest application, simulated rain treatment after fungicide treatment -



Applications were made in the field on 6-25 (Summer Flare and July Flame), 7-14 (Summer Fire), and 8-8-09 (Ryan Sun) using an air blast sprayer at 100 gal/A. The orchard was irrigated with overhead sprinklers for 6 h 2 and 4 days after fungicide application. Fruit were harvested and stored at 1C for 7 days and were then incubated at 20C for 7 days.

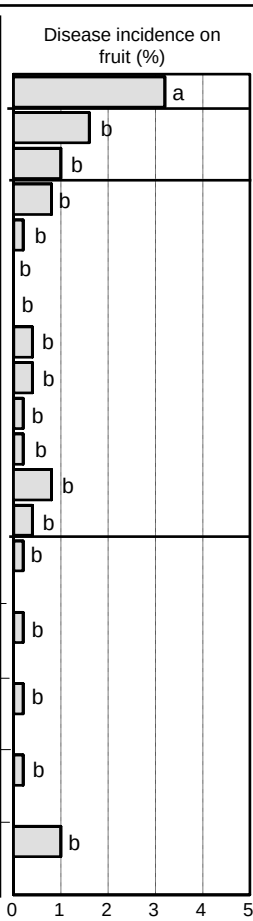
Fig. 5 Efficacy of 7-day and 14-day PHI fungicide applications for management of postharvest brown rot of Fay Elberta peach at UC Davis 2009
- Natural incidence of decay -



Applications were made in the field using an air-blast sprayer (100 gal/A) on 7-23-09. Fruit were harvested and incubated at 20C for 7 days. There were four single-tree replications for each treatment.

Fig. 6. Efficacy of fungicide treatments for management of powdery mildew of cv. Carson peach in Butte Co.

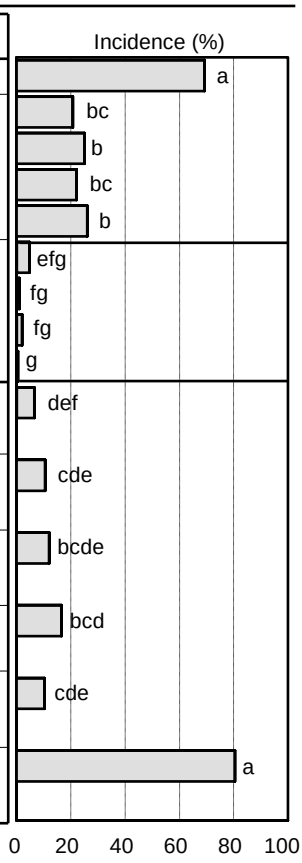
Program	Product*	3-5-09 FB	3-26-09 2 wk APF	5-5-09 5 wk APF
---	Control	---	---	---
Single products	Stylet Oil	@	@	@
	Regalia	---	@	@
Fungicide pre-mixes	Adament 50WG 3oz	@	@	@
	Adament 50WG 6 oz	@	@	@
	Luna Sensation (USF2016) 4 fl oz	@	@	@
	Luna Experience (USF2017) 5 fl oz	@	@	@
	Pristine 38WG 14.5 oz	---	@	@
	Inspire Super SC 10 fl oz	@	@	@
	Inspire XT (A8122B) EC 5 fl oz	@	@	@
	Inspire XT (A8122B) EC 7 fl oz	@	@	@
	Quilt Xcel (A15909) 10 fl oz	@	@	@
	Quadris Top (A13703G) SC 14 fl oz	@	@	@
Fungicide rotations	Iprodione 4F 32 fl oz	@	---	---
	BAS560 10 fl oz	@	@	@
	Iprodione 4F 32 fl oz	@	---	---
	BAS560 15 fl oz	@	@	@
	Iprodione 4F 32 fl oz	@	---	---
	Quintec 2L 7 fl oz	@	@	@
	Quash 50WG 2.5 oz	@	@	---
	Abound 2F 12.5 fl oz	---	---	@
	Distinguish 480SC 18 fl oz	@	---	---
	BAS560 15 fl oz	---	@	@



Treatments were applied using an air-blast sprayer at a rate of 100 gal/A. FB = full bloom, APF = after petal fall. Evaluation was done on 6-9-09.

Fig. 7. Efficacy of fungicide treatments applied during dormancy and pre-bloom against peach leaf curl of Fay Elberta peaches in a field trial at UC Davis

	Treatments*	12-12-08	12-30-08	1-27-09	3-18-09
	Control	---	---	---	---
Single fungicides	Kocide 3000 5 lb + oil 2%	@	---	@	---
	Kocide 2000 7.5 lb + oil 2%	@	---	@	---
	Badge X2 28DF 5.5 lb + oil 2%	@	---	@	---
	Kentan 40DF 6.5 lb + oil 2%	@	---	@	---
	Ziram 76DF 6 lb	@	---	---	---
	Ziram 76DF 6 lb	---	---	@	---
	Ziram 76DF 5 lb	@	---	@	---
	Ziram 76DF 4 lb	@	---	@	---
Rotations	Kocide 3000 5 lb + oil 2%	@	---	---	---
	Ziram 76DF 5 lb	---	---	@	---
	Badge X2 28DF 5.5 lb + oil 2%	@	---	---	---
	Ziram 76DF 5 lb	---	---	@	---
	Ziram 76DF 7 lb	---	@	---	---
	Kocide 3000 5 lb + oil 2%	---	---	---	@
	Ziram 76DF 7 lb	---	@	---	---
	Bravo 720 4 pts	---	---	---	@
	Ziram 76DF 7 lb	---	@	---	---
	Ziram 76DF 8 lb	---	---	---	@
	Kocide 3000 5 lb + oil 2%	---	---	@	---
	Ziram 76DF 8 lb	---	---	---	@



Treatments were applied in the field using an air-blast sprayer (100 gal/A). The application on 3-18-09 was a post-bloom treatment. Disease evaluation was done on 4-15-09.