Fungicide control of Pear Scab: 2016 field trial

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A. Materials and Methods

Table 1. Experimental design and application timing.

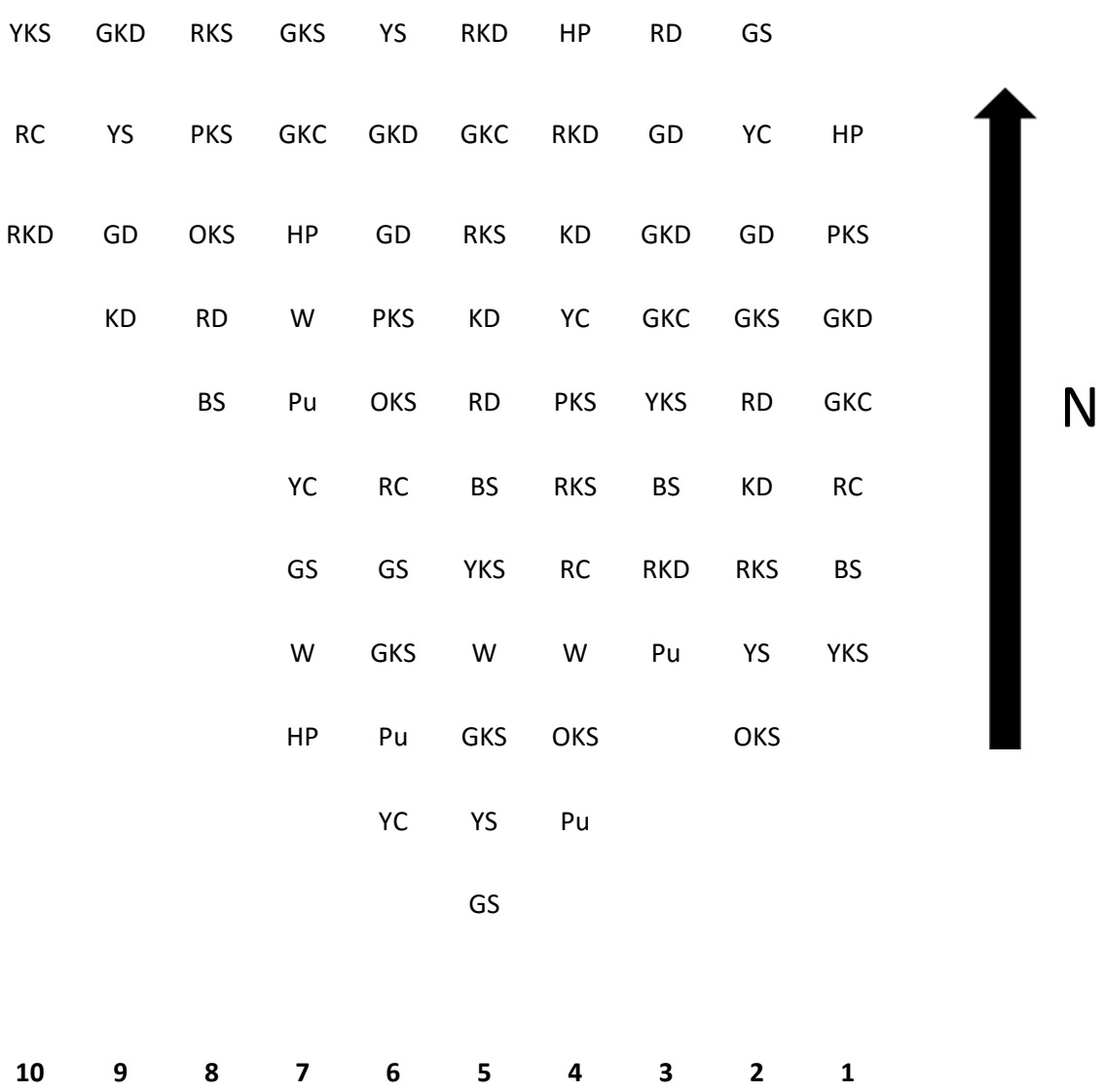
Experimental design	Complete randomized design with 4 replicates			
Experimental unit	1 tree = 1 plot			
Row and tree spacing	15 ft (row) and 13 ft (tree)	Plot unit area	195 ft^2	
Area/treatment	780 ft^2 or 0.018 acre/treatment (4 replicate trees = 1 treatment)			
Fungicide applications	A	green tip	8 Mar	100 gallons/acre 1.8 gallons/4 replicates
	B	early bloom	24 Mar	100 gallons/acre 1.8 gallons/4 replicates
	C	full bloom	31 Mar	100 gallons/acre 1.8 gallons/4 replicates
	D	petal fall	15 Apr	100 gallons/acre 1.8 gallons/4 replicates
	E	1st cover spray	3 May	125 gallons/arce 2.3 gallons/4 replicates
Equipment	Stihl SR 420 Backpack Sprayers			

Table 2. Treatment programs. "FP" = formulated product.

No.	Flag	Product(s)	FP/Acre	FP/Treatment
1	W	Unsprayed control	none	none
2	YC	Syllit (3x) then Manzate Pro-stick	3 pt (3x) then 3 lb	24.5 g (3x) then 24.5 g
3	Pu	Syllit (36 hrs eradicant after rain event) (3 apps)	3 pt	24.5 g
4	HP	Tebuconazole	2 oz/100 gal	1.0 g at 100 gal or 1.3 g at 125 gal
5	GKC	Viathon	4 pt	34.1 mL
6	GS	ProPhyt	4 pt	34.1 mL
7	GKS	Ziram alt Sovran	6 lb alt 4 oz	49.0 g then 2.0 g
8	RKS	Microthiol Disperss (sulfur)	30 lb	245.0 g
9	PKS	Merivon (4x) then Manzate Pro-stick	5 fl oz (4x) then 3 lb	2.7 mL (4x) then 24.5 g
10	OKS	Serenade Optimum	20 oz	10.2 g
11	RD	Double Nickel LC	2 qt	34.1 mL
12	BS	Cueva	2 qt	34.1 mL
13	KD	Howler + Capsil	7.5 g/L + 6 fl oz/100 gal	51.0 g + 3.2 mL at 100 gal or 65.3 g + 4.1 mL at 125 gal
14	GD	Howler + Sovran + Capsil	7.5 g/L + 2 oz + 6 oz/100 gal	51 g + 1.0 g + 3.2 mL at 100 gal or 65.3 g + 1.0 g + 4.1 mL at 125 gal
15	YS	Pyraziflumid + Syl-Coat	5.1 fl oz + 0.25% (v/v)	2.7 mL + 17.0 mL at 100 gal or 2.7 mL + 21.8 mL at 125 gal
16	GKD	WFX-16001	0.35% (v/v)	23.8 mL at 100 gal or 30.1 mL at 125 gal
17	YKS	WFX-16002	1% (v/v)	68.1 mL at 100 gal or 87.1 mL at 125 gal
18	RC	Vangard then Inspire Super then Aprovia (2x) then Inspire Super	5 oz then 12 fl oz then 5.5 fl oz (2x) then 12 fl oz	2.6 g then 6.4 mL then 2.9 mL (2x) then 6.4 mL
19	RKD	Vangard then Inspire Super then A19649 (2x) then Inspire Super	5 oz then 12 fl oz then 2.74 fl oz (2x) then 12 fl oz	2.6 g then 6.4 mL then 1.5 mL (2x) then 6.4 mL

Note: The treatments described in this report were conducted for experimental purposes only and crops treated in a similar manner may not be suitable for commercial or other use.

Figure 1. Trial layout.



B. Disease and Statistical Analysis

Disease was assessed on Jul 13 when fruits were large enough to observe scab lesions. Twenty five leaves and fruits were randomly selected from each tree. The number of lesions were scored for each leaf and fruit; estimated counts were made when the boundaries of individual lesions could be not easily distinguished. Disease incidence per replicate was determined as the proportion of leaves and fruits that were infected by at least one lesion. Disease severity for each plot was obtained as the mean density of lesions on leaves and fruits. Data was analyzed using ANOVA Fit Model test for data. Comparison of the means was made using Fisher's LSD test with α=0.05.

C. Weather and Disease

Daily temperature and precipitation values were obtained from CIMIS weather station 106. Overall temperature were mild (Figure 3) with major precipitation events in mid March (Figure 2).

Figure 2. Precipitation data for the spray season with five rain events (Mar 1 – May 15).

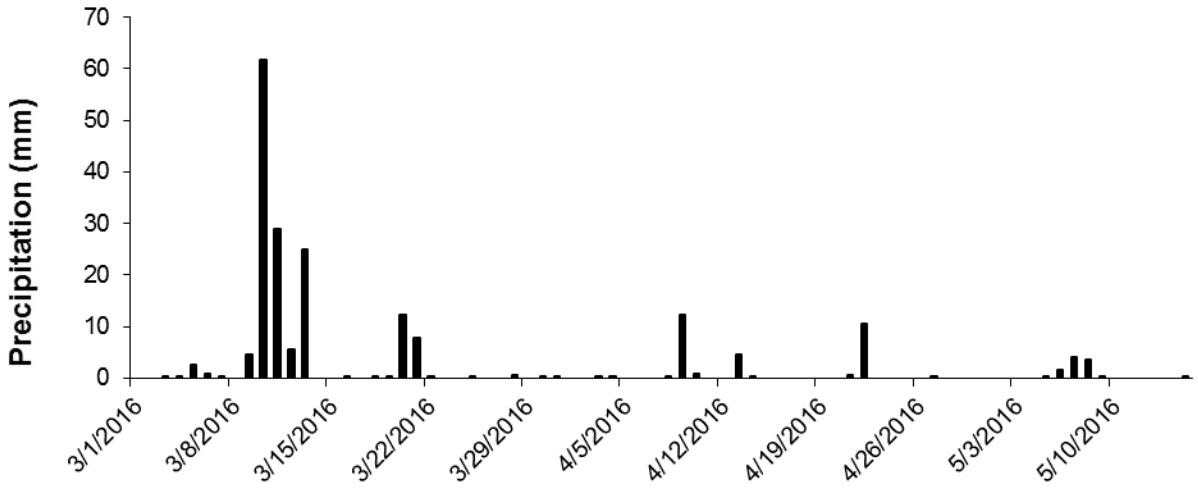
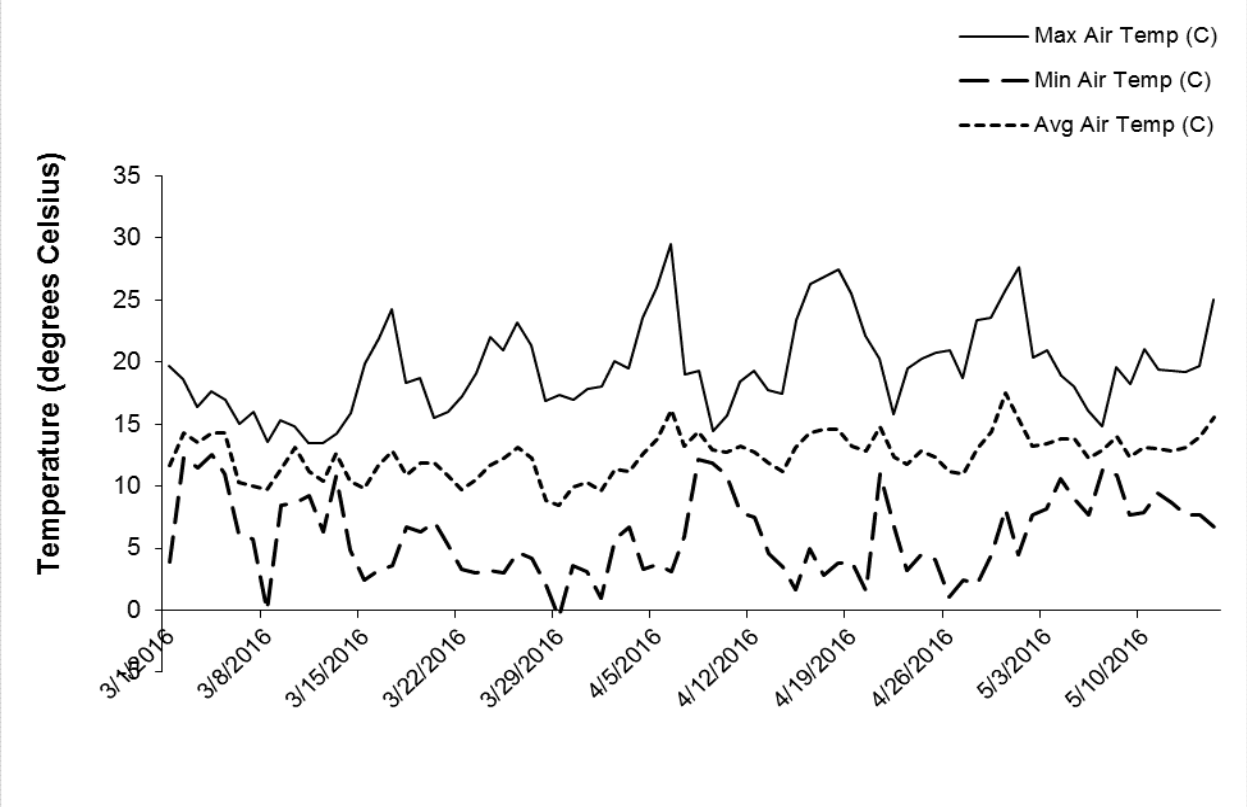


Figure 3. Daily temperature data from Mar 1 to May 15 2016.



D.Results

Table 3. Pear scab fruit severity and incidence (means). Product names are followed by rate (per acre). Treatment means followed by the same letter are not significantly different according to Student's t-test at α=0.05.

Treatment	Fruit Disease Mean Severity (%)	Fruit Disease Mean Incidence (%)
Howler 7.5 g/L + Sovran 2 oz + Capsil 6 fl oz/100 gal	0.01	0.01
Syllit (3x) 3 pt then Manzate Pro Stick 3 lb	0.01	1.00
Viathon 4 pt	0.01	1.00
Serenade Optimum 20 oz	0.02	1.01
WFX-16001 0.35% (v/v)	0.03	1.01
Pyraziflumid 5.1 fl oz + Syl-Coat 0.25% (v/v)	0.03	1.02
Vangard 5 oz then Inspire Super 12 fl oz then Aprovia (2x) 5.5 fl oz then Inspire Super 12 fl oz	0.04	1.02
Merivon (4x) 5 fl oz then Manzate Pro-stick 3 lb	0.02	2.00
WFX-16002 1% (v/v)	0.06	2.03
Cueva 2 qt	0.04	3.00
Microthiol Disperss 30 lb	0.22	3.00
Syllit (36 hrs eradicant after rain event) 3 pt	0.03	3.00
Howler 7.5 g/L + Capsil 6 fl oz/100 gal	0.04	3.01
ProPhyt 4 pt	0.07	3.03
Vangard 5 oz then Inspire Super 12 fl oz then A19649 (2x) 2.74 fl oz then Inspire Super 12 fl oz	0.06	4.02
Tebuconazole 2 oz/100 gal	0.03	4.08
Ziram 6 lb alt Sovran 4 oz	0.11	6.04
Double Nickel LC 2 qt	0.16	6.71
Untreated control	0.29	6.72

Table 4. Pear scab leaf severity and incidence (means). Product names are followed by rate (per acre). Treatment means followed by the same letter are not significantly different according to Fisher's LSD test at α=0.05.

Treatment	Leaf Disease Mean Severity (%)	Leaf Disease Mean Incidence (%)
Howler 7.5 g/L + Sovran 2 oz + Capsil 6 fl oz/100 gal	0.11	0.07
Howler 7.5 g/L + Capsil 6 fl oz/100 gal	0.03	1.02
Serenade Optimum 20 oz	0.06	2.03
Tebuconazole 2 oz/100 gal	0.07	2.03
Pyraziflumid 5.1 fl oz + Syl-Coat 0.25% (v/v)	0.12	3.03
Syllit (3x) 3 pt then Manzate Pro Stick 3 lb	0.08	3.05
Microthiol Disperss 30 lb	0.09	5.00
Viathon 4 pt	0.06	5.00
Vangard 5 oz then Inspire Super 12 fl oz then Aprovia (2x) 5.5 fl oz then Inspire Super 12 fl oz	0.22	5.09
Cueva 2 qt	0.08	6.01
Syllit (36 hrs eradicant after rain event) 3 pt	0.07	7.00
WFX-16001 0.35% (v/v)	0.14	7.00
Double Nickel LC 2 qt	0.15	7.02
Vangard 5 oz then Inspire Super 12 fl oz then A19649 (2x) 2.74 fl oz then Inspire Super 12 fl oz	0.16	7.04
Merivon (4x) 5 fl oz then Manzate Pro-stick 3 lb	0.11	8.00
Ziram 6 lb alt Sovran 4 oz	0.21	8.07
ProPhyt 4 pt	0.16	10.05
WFX-16002 1% (v/v)	0.17	10.06
Untreated control	0.28	12.05

E. Acknowledgements

We thank Ivan Lubich for use of his orchard.

F. References

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G.Appendix: Products tested

Product	Active ingredient(s) and concentration	Class	Manufacturer
A19649	Proprietary	N/A	Proprietary
Aprovia	Proprietary	N/A	Proprietary
Capsil	Polyether-polymethylsiloxane-copolymer and nonionic surfactant (100%)	Adjuvant	Aquatrols
Cueva	Copper octanoate (10%)	Mineral (M1)	Certis USA
Double Nickel LC	*Bacillus amyloliquefaciens* strain D747 (98.85%)	Biological	Certis USA
Howler	Proprietary	N/A	Proprietary
Inspire Super	Cyprodinil (24.1%), Difenoconazole (8.4%)	DMI-triazole (3)/ AP (9)	Syngenta
Isofetamid	Proprietary	N/A	Proprietary
Manzate Pro-stick	Mancozeb (75%)	Carbamate	United Phosphorous
Merivon	Fluxopyroxad (21%), Pyraclostrobin (21%)	SDHI (7)/QoI (11)	BASF
Microthiol Disperss	Sulfur (80%)	Inorganic (M2)	United Phosphorous
Prophyt	Potassium phosphite (54.5%)	Phosphonate (33)	Helena Chemical Company
Pyraziflumid	Proprietary	N/A	Proprietary
Serenade Optimum	QST 713 strain of *Bacillus subtilis* (26%)	Microbial	Bayer
Sovran	Kresoxim-methyl (50%)	QoI (11)	Cheminova
Syllit	Dodine (40%)	Guanidine (M7)	Agriphar
Tebuzol 45 DF (Elite)	Tebuconazole (45%)	DMI-triazole (3)	United Phosphorous
Vangard 75WG	Cyprodinil (75%)	AP7 (9)	Syngenta
Viathon	Potassium phosphite (49%) Tebuconazole (3.3%)	DMI (3) Phosphonate (33)	
WFX-16001	Proprietary	N/A	Proprietary
WFX-16002	Proprietary	N/A	Proprietary
Ziram 76DF	Ziram (76%), Zinc (16.25%)	Carbamate (DMDC)3 (M3)	UPI

Appendix references: (1) Adaskaveg, et al. 2012. Efficacy and timing of fungicides, bactericides and biologicals for deciduous tree fruit, nut, strawberry, and vine crops 2012, available at http://www.ipm.ucdavis.edu/PDF/PMG/fungicideefficacytiming.pdf.
(2) Gubler Lab fungicide efficacy field trials, available at http://plantpathology.ucdavis.edu/Cooperative_Extension/.
(3) Various sources including product labels and/or MSDS, product websites, and personal communications.