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Fungicide control of Pear Scab: 2015 field trial

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A. Materials and Methods

Table 1. Experimental design and application timing.

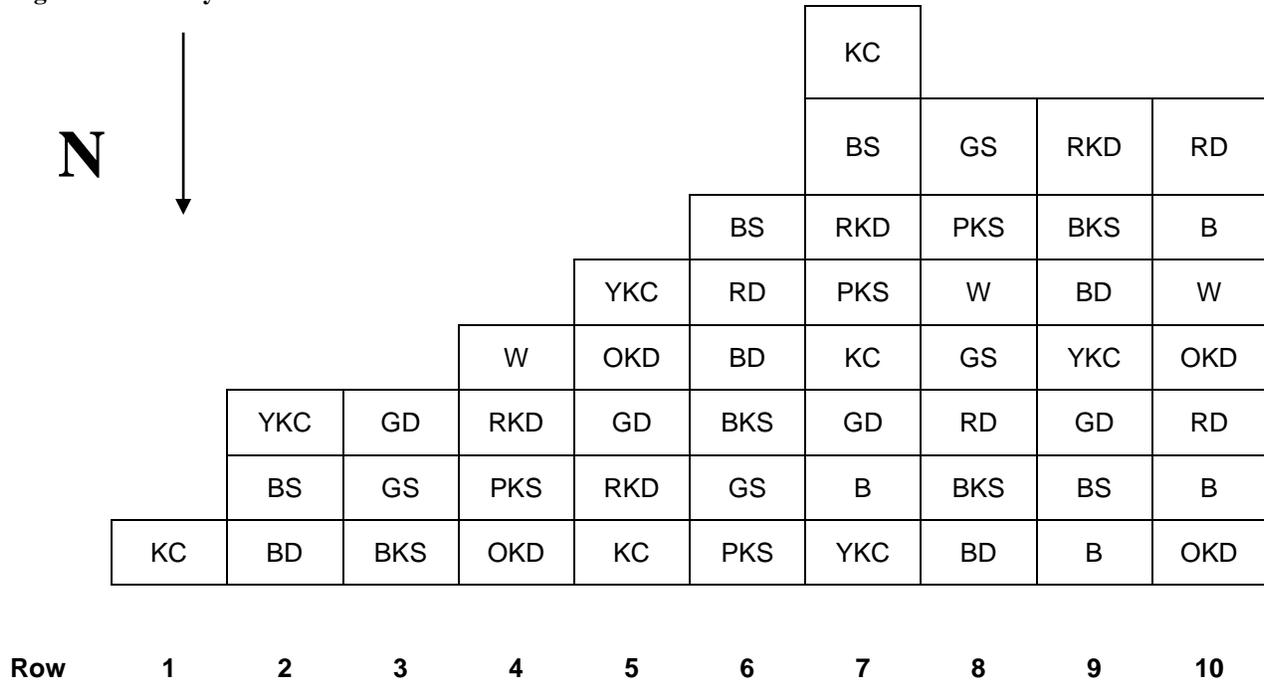
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|------------------------|--|------------------------|---------------------|--------------------------|
| Experimental design | Complete randomized design with 4 replicates | | | |
| Experimental unit | 1 tree = 1 plot | | | |
| Row and tree spacing | 20 ft (row) and 10 ft (tree) | Plot unit area | 200 ft ² | |
| Area/treatment | 800 ft ² or 0.0184 acre/treatment (4 replicate trees = 1 treatment) | | | |
| Fungicide applications | A | green tip 4 Mar | 100 gallons/acre | 1.8 gallons/4 replicates |
| | B | early bloom 10 Mar | 100 gallons/acre | 1.8 gallons/4 replicates |
| | C | full bloom 16 Mar | 100 gallons/acre | 1.8 gallons/4 replicates |
| | D | petal fall 20 Mar | 100 gallons/acre | 1.8 gallons/4 replicates |
| | E | 1st cover spray 3 Apr | 125 gallons/arce | 2.3 gallons/4 replicates |
| | F | 2nd cover spray 22 Apr | 125 gallons/arce | 2.3 gallons/4 replicates |
| | G | 3rd cover spray 19 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 | RKD | Sovran | 4 oz | 2.1 g |
| 3 | PKS | Syllit (3x) then Manzate Pro-stick | 3 pt (3x) then 3 lb | 26.1 ml (3x) then 25.0 g |
| 4 | RD | Syllit (36 hrs eradicant after rain event) | 3 pt | 26.1 ml |
| 5 | BKS | Tebuconazole | 2 oz/100 gal | 1.0 g |
| 6 | GS | Manzate Pro-stick | 3 lb | 25.0 g |
| 7 | GD | Ziram (4x) then Manzate Pro-stick | 6 lb then 3 lb | 50.0 g then 25.0 g |
| 8 | YKC | Microthiol Disperss (sulfur) | 30 lb | 250.0 g |
| 9 | BS | Merivon (4x) then Manzate Pro-stick | 5 fl oz (4x) then 3 lb | 2.7 ml (4x) then 25.0 g |
| 10 | BD | Topsin-M | 16 oz | 8.4 g |
| 11 | KC | Serenade Optimum | 24 oz | 12.5 g |
| 12 | B | (5 apps from early bloom) Vanguard then Inspire Super then Aprovia (2x) then Inspire Super | 5 oz then 12 fl oz then 6.84 fl oz (2x) then 12 fl oz | 2.6 g then 6.5 ml then 3.7 ml (2x) then 6.5 ml |
| 13 | OKD | (5 apps from early bloom) Vanguard then Inspire Super then Aprovia + Manzate Pro-Stick (2x) then Inspire Super | 5 oz then 12 fl oz then 6.84 fl oz + 3 lb (2x) then 12 fl oz | 2.6 g then 6.5 ml then 3.7 ml + 25.0 g (2x) then 6.5 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 Jun 30 when fruits were large enough to observe scab lesions. Forty 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 Student's t-test with $\alpha=0.05$.

C. Weather and Disease

Daily temperature and precipitation values were obtained from CIMIS weather station 085. Overall temperature were mild (Figure 3) with major precipitation events recorded on Mar 22, Apr 6, Apr 7, Apr 24 and May 14 as 1.0, 1.3, 2.2, 1.3 respectively (Figure 2).

Figure 2. Precipitation data for the spray season with five rain events (Mar 1 – Jun 30) of 0.1 – 2.2 mm of rain.

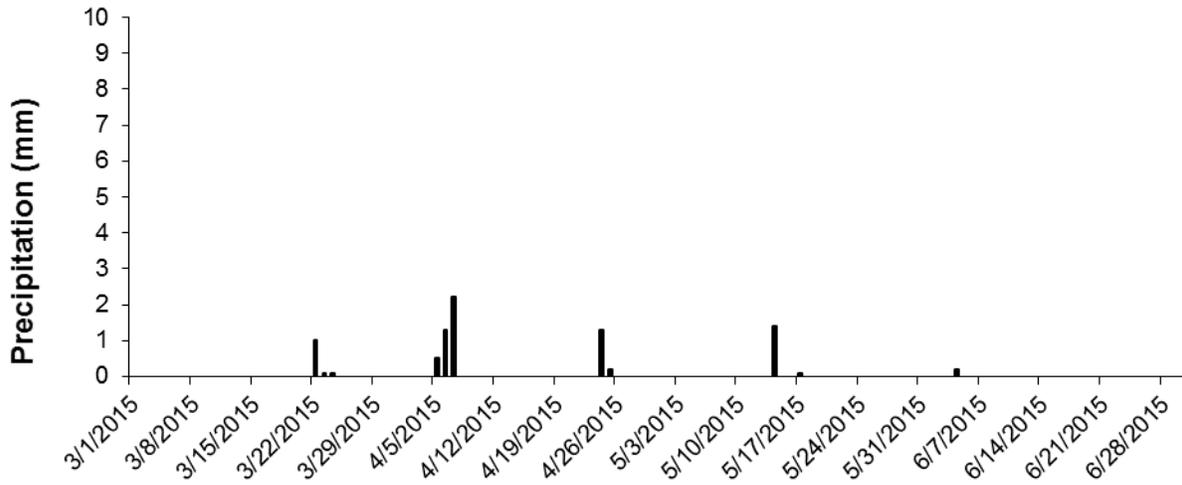
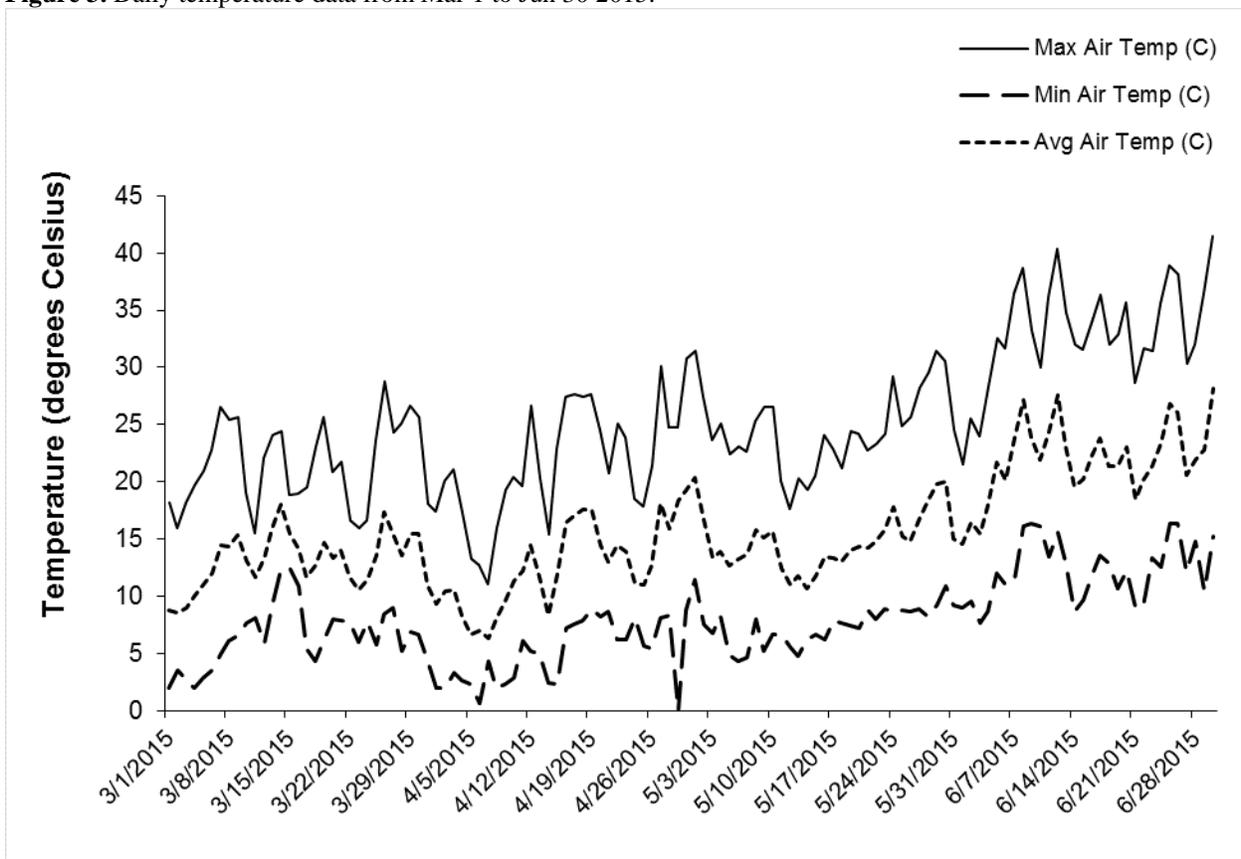


Figure 3. Daily temperature data from Mar 1 to Jun 30 2015.



D.Results

Table 3. Pear scab fruit 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 $\alpha=0.05$.

| Treatment | Fruit Disease Incidence (%) | Fruit Disease Severity (%) |
|---|-----------------------------|----------------------------|
| (5 apps from early bloom) Vanguard, 5 oz then Inspire Super, 12 fl oz then Aprovia, 6.84 fl oz (2x) then Inspire Super, 12 fl oz | 1.88 c | 0.03 b |
| (5 apps from early bloom) Vanguard, 5 oz then Inspire Super, 12 fl oz then Aprovia, 6.84 fl oz + Manzate Pro-Stick, 3 lbs (2x) then Inspire Super, 12 fl oz | 3.13 bc | 0.03 b |
| Sovran, 4 oz | 6.88 abc | 0.08 b |
| Mazate Pro-Stick, 3 lbs | 7.50 abc | 0.10 ab |
| Syllit, 3 pts (36 hrs as eradicant after rain event) | 10.63 abc | 0.16 ab |
| Tebuconazole, 2 oz/100 gal | 13.75 abc | 0.44 ab |
| Microthiol Disperss (sulfur), 30 lbs | 15.63 abc | 0.55 a |
| Serenade Optimum, 24 oz | 16.67 abc | 0.30 ab |
| Ziram, 6 lbs (4 apps) then Manzate Pro-stick, 3 lbs (3 apps) | 17.50 abc | 0.23 ab |
| Syllit, 3 pts (3 apps) then Manzate Pro-stick, 3 lbs (4 apps) | 18.78 abc | 0.41 ab |
| Topsin-M, 16 oz | 19.49 ab | 0.28 ab |
| Merivon, 5 fl oz (4 apps) then Manzate Pro-stick, 3 lbs (3 apps) | 20.87 a | 0.37 ab |
| Unsprayed Control | 21.25 a | 0.28 ab |

Table 4. Pear scab leaf 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 $\alpha=0.05$.

| Treatment | Leaf Disease Incidence (%) | Leaf Disease Severity (%) |
|---|----------------------------|---------------------------|
| (5 apps from early bloom) Vanguard, 5 oz then Inspire Super, 12 fl oz then Aprovia, 6.84 fl oz (2x) then Inspire Super, 12 fl oz | 1.88 b | 0.11 a |
| Sovran, 4 oz | 5.63 ab | 0.09 a |
| Tebuconazole, 2 oz/100 gal | 6.88 ab | 0.13 a |
| Syllit, 3 pts (36 hrs as eradicant after rain event) | 9.38 ab | 0.31 a |
| (5 apps from early bloom) Vanguard, 5 oz then Inspire Super, 12 fl oz then Aprovia, 6.84 fl oz + Manzate Pro-Stick, 3 lbs (2x) then Inspire Super, 12 fl oz | 9.38 ab | 0.19 a |
| Syllit, 3 pts (3 apps) then Manzate Pro-stick, 3 lbs (4 apps) | 10.00 ab | 0.16 a |
| Serenade Optimum, 24 oz | 10.63 ab | 0.28 a |
| Merivon, 5 fl oz (4 apps) then Manzate Pro-stick, 3 lbs (3 apps) | 12.50 ab | 0.29 a |
| Topsin-M, 16 oz | 14.38 ab | 0.41 a |
| Mazate Pro-Stick, 3 lbs | 15.00 ab | 0.23 a |
| Ziram, 6 lbs (4 apps) then Manzate Pro-stick, 3 lbs (3 apps) | 15.00 ab | 0.52 a |
| Microthiol Disperss (sulfur), 30 lbs | 20.00 ab | 0.49 a |
| Unsprayed Control | 23.13 a | 0.41 a |

E. Acknowledgements

We thank Tim Norgard of Norgard Farms for use of his orchard.

F. References

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G. Appendix: Products tested

| Product | Active ingredient(s) and concentration | Class | Manufacturer |
|-----------------------|--|---------------------------|--------------------|
| Aprovia | Proprietary | N/A | Proprietary |
| Inspire Super 2.82EW | 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 | Fluxapyroxad (21%), Pyraclostrobin (21%) | SDHI (7)/QoI (11) | BASF |
| Microthiol Disperss | Sulfur (80%) | Inorganic (M2) | United Phosphorous |
| Serenade Optimum | QST 713 strain of <i>Bacillus subtilis</i> (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 |
| Topsin-M | Thiophanate-methyl (70%) | MBC (1) | UPI |
| Vangard 75WG | Cyprodinil (75%) | AP7 (9) | Syngenta |
| 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.

