

**Cooperative Research Project, Doug Gubler, U.C. Davis Dept. of Plant Pathology Final report**

|                    |   |              |                                    |
|--------------------|---|--------------|------------------------------------|
| Trial name.....    | Grape bunch rot fungicide trial, 2003   |              |                                    |
| Location.....      | Valley Foothills Vineyard, Philo, Mendocino County, CA 95466                          |              |                                    |
| Investigators..... | Doug Gubler, 530.752.0304; Ken Dell, Eugene Erickson 530.752.4982                     |              |                                    |
| Cooperators.....   | Ted Bennett and Jim Klein, Navarro Vineyards<br>Dave Olson, Valley Foothills Vineyard |              |                                    |
| Crop.....          | Grape, 'Johannesburg Riesling'  | Disease..... | Bunch Rot, <i>Botrytis cinerea</i> |

**Trial layout and method**

|                           |  |                            |                              |
|---------------------------|--|----------------------------|------------------------------|
| Objective.....            | Efficacy of fungicides for control of <i>Botrytis</i> bunch rot  |                            |                              |
| Experimental design ....  | Treatments are field applications to 4 vine plots, in a randomized complete block design, with 4 replications. |                            |                              |
| Application method ....   | high pressure hand gun sprayer   |                            |                              |
| Vine spacing .....        | 8'   | Row spacing.....           | 12'                          |
| Treatment unit.....       | 4 vines  | Treatment unit area.....   | 384 sq ft                    |
| Area/Treatment, sq ft ... | 1536   | Area/Treatment, acre ..... | 0.0352617                    |
| Vol. Water/acre, gal..... | 113 - 142  | Vol. water/trt, L .....    | 15.1 - 18.9                  |
| Apps timing .....         | A=bloom; B=close; C=veraison; D= preharvest ( if needed)   |                            |                              |
| Treatment interval.....   | Approx 3 weeks   | Evaluation stage.....      | immediately prior to harvest |

**Treatments protocol**

| #  | Color | Materials   | Timing               | FP/A   | Tol |
|----|-------|---|----------------------|--|-----|
| 1  | W     | Untreated   |                      |  | Y   |
| 2  | OD    | Rovral 50WP<br>Rovral 75WG  | A<br>BCD             | 1.0 lb<br>10.7 oz  | Y   |
| 3  | GD    | V-10116 1.67SC  | ABCD                 | 6.13 floz  | N   |
| 4  | W/R   | V-10116 1.67SC  | ABCD                 | 8.20 floz  | N   |
| 5  | W/G   | V-10114 1.67FL  | ABCD                 | 13.8 floz  | N   |
| 6  | WOC   | V-10114 1.67FL  | ABCD                 | 26.8 floz  | N   |
| 7  | W/B   | Pristine 38WG   | ABCD                 | 1.44 lb  | Y   |
| 8  | OBKD  | Stylet Oil  | ABCD                 | 1.0 %  | Y   |
| 9  | YBKC  | Stylet Oil +<br>Vanguard 75WG   | ABCD                 | 1.0 %<br>5 oz  | Y   |
| 10 | Y/BK  | Vanguard 75WG   | ABCD                 | 5 oz   | Y   |
| 11 | W/BK  | Flint 50WG<br>Flint 50WG<br>Elite 45DF  | A<br>C<br>BD         | 1.5 oz<br>3.0 oz<br>4.0 oz                                   | Y   |
| 12 | WBKC  | Spiroxamine 300<br>Flint 50WG<br>Elite 45WP   | A<br>BC<br>D         | 18.0 foz<br>3.0 oz<br>4.0 oz                                 | N   |
| 13 | W/O   | Vanguard 75WG   | AC                   | 10 oz  | Y   |
| 14 | WBC   | Flint 50WG  | A<br>BCD             | 2.0 oz<br>3.0 oz   | Y   |
| 15 | B     | Scala 60SC  | ABCD                 | 18.0 foz   | N   |
| 16 | RD    | Scala 60SC +<br>Elite 45WP  | ABCD                 | 9.0 foz<br>4.0 oz  | N   |
| 17 | PPC   | Scala 60SC +<br>Flint 50WG  | ABCD                 | 9.0 foz<br>2.0 oz  | N   |
| 18 | O/BK  | Scala 60SC +<br>Rovral 75WG<br>Scala 60SC +<br>Flint 50WG<br>Scala 60SC +<br>Elite 45WP | AB<br><br>C<br><br>D | 9.0 foz<br>10.7 oz<br>9.0 foz<br>2.0 oz<br>9.0 foz<br>4.0 oz | N   |

Notes: 1. Tol indicates whether all products in the treatment have an EPA tolerance for grapes, and the crop can be harvested.

**Materials list**

| Sponsor  | Product           | Active Ingr.         | Conc.   | Tol | Mfr             |
|----------|-------------------|----------------------|---------|-----|-----------------|
| BASF     | Pristine 38WG     | BAS516               | 38%     | Y   | BASF<br>DowAgro |
|          | Latron B-1956     | Non-ionic surfactant |         | Y   |                 |
| Bayer    | Spiroxamine 300SC | Spiroxamine          | 300 g/L | N   | Bayer           |
|          | Elite 45WP        | Tebuconazole         | 45%     | Y   | Bayer           |
|          | Flint 50WG        | Trifloxystrobin      | 50%     | Y   | Bayer           |
|          | Scala 60SC        | Pyrimethinal         | 60 g/L  | N   |                 |
| JMS      | Stylet Oil        | Mineral oil          | 99%     | Y   | JMS             |
|          | Vangard 75WG      | Cyprodinil           | 75%     | Y   | Syngenta        |
| Syngenta | Vangard 75WG      | Cyprodinil           | 75%     | Y   | Syngenta        |
| Valent   | V-10116 1.67SC    | V-10116              |         | N   | Valent          |
|          | V-10114 1.67FL    | V-10114              |         | N   | Valent          |
| Lab      | Rovral 75WG       | Iprodione            | 50%     | Y   | Bayer           |
|          | Vangard 75WG      | Cyprodinil           | 75%     | Y   | Syngenta        |

**Application schedule**

| Date .....  | 18 Jun 03                  |                  | 17 Jul 03                  |                  | 26 Aug 03                  |                 | 27 Aug 03                  |                 |
|-------------|----------------------------|------------------|----------------------------|------------------|----------------------------|-----------------|----------------------------|-----------------|
| App.# ....  | A                          |                  | B                          |                  | C                          |                 | C                          |                 |
| Stage ..... | BBCH 68                    |                  | BBCH 75-79                 |                  | BBCH 83-85                 |                 | BBCH 83-85                 |                 |
| Vol/trt ... | 15L                        |                  | 15L                        |                  | 20L                        |                 | 20L                        |                 |
| Trt#1       | ----                       |                  | ----                       |                  | ----                       |                 |                            |                 |
| 2           | Rovral 50                  | 16 g             | Rovral 75                  | 10.7 g           | Rovral 75                  | 10.7 g          |                            |                 |
| 3           | V-10116                    | 6.4 ml           | V-10116                    | 6.4 ml           | V-10116                    | 6.4 ml          |                            |                 |
| 4           | V-10116                    | 8.6 ml           | V-10116                    | 8.6 ml           | V-10116                    | 8.6 ml          |                            |                 |
| 5           | V-10114                    | 14.4 ml          | V-10114                    | 14.4 ml          | V-10114                    | 14.4 ml         |                            |                 |
| 6           | V-10114                    | 28.0 ml          | V-10114                    | 28.0 ml          | V-10114                    | 28.0 ml         |                            |                 |
| 7           | Pristine                   | 23.2 g           | Pristine                   | 23.2 g           | Pristine                   | 23.2 g          |                            |                 |
| 8           | Stylet Oil                 | 151 ml           | Stylet Oil                 | 151 ml           | Stylet Oil                 | 189 ml          |                            |                 |
| 9           | Stylet Oil +<br>Vangard 75 | 151 ml<br>5.0 g  | Stylet Oil +<br>Vangard 75 | 151 ml<br>5.0 g  | Stylet Oil +<br>Vangard 75 | 189 ml<br>5.0 g |                            |                 |
| 10          | Vangard 75                 | 5.0 g            | Vangard 75                 | 5.0 g            | Vangard 75                 | 5.0 g           |                            |                 |
| 11          | Flint 50WG                 | 1.5 g            | Flint 50WG                 | 3.0 g            | Flint 50WG                 | 3.0 g           |                            |                 |
| 12          | KWG 4168                   | 18.8 ml          | Flint 50WG                 | 3.0 g            | Flint 50WG                 | 3.0 g           |                            |                 |
| 13          | Vangard 75                 | 10.0 g           |                            | --               | Vangard 75                 | 10.0 g          |                            |                 |
| 14          | Flint 50WG                 | 2.0 g            | Flint 50WG                 | 3.0 g            | Flint 50WG                 | 3.0 g           |                            |                 |
| 15          | Scala 60SC                 | 18.8 ml          | Scala 60SC                 | 18.8 ml          |                            |                 | Scala 60SC                 | 18.8 ml         |
| 16          | Scala 60SC +<br>Elite 45WP | 9.4 ml<br>4.0 g  | Scala 60SC +<br>Elite 45WP | 9.4 ml<br>4.0 g  |                            |                 | Scala 60SC +<br>Elite 45WP | 9.4 ml<br>4.0 g |
| 17          | Scala 60SC +<br>Flint 50WG | 9.4 ml<br>2.0 g  | Scala 60SC +<br>Flint 50WG | 9.4 ml<br>2.0 g  |                            |                 | Scala 60SC +<br>Flint 50WG | 9.4 ml<br>2.0 g |
| 18          | Scala 60SC +<br>Rovral 75  | 9.4 ml<br>10.7 g | Scala 60SC +<br>Rovral 75  | 9.4 ml<br>10.7 g |                            |                 | Scala 60SC +<br>Flint 50WG | 9.4 ml<br>2.0 g |

*Calendar of events*

| Date   | Activity   |
|--------|--|
| 18 Jun | KD, EE, app. #1; 11:45-3:15PM; 68F; clear, 5-18 mph W wind; BBCH 63-69 (mostly 68). No disease observed.                                 |
| 7 Jul  | EE; checked berries for progress, BBCH 73  |
| 17 Jul | EE app. #2; 9:00AM-1:30PM; 66-80F; clear, calm-10 mph W breeze; BBCH 75-79   |
| 6 Aug  | EE; checked berries, BBCH 81; 2 symptomatic berries in one check cluster.  |
| 13 Aug | EE; checked berries, BBCH 81; symptomatic berry on an unsprayed vine in Row 10 on the hillside   |
| 17 Aug | EE; checked berries, BBCH 81-83  |
| 26 Aug | KD, EE app. #3, 10am – 1pm, clear, calm; BBCH 83-85. Pump gearbox break, 5 trts unfinished.  |
| 27 Aug | KD, app #3 finish, 12pm – 2pm; clear, calm.  |
| 3 Sep  | rain   |
| 9 Sep  | rain   |
| 9 Sep  | Chuck Olson: berries at 17 Brix; Jim Klein: harvest in about 3 wks   |
| 29 Sep | Chuck: berries at 22.5 Brix, probably harvest between 3 and 6 Oct  |
| 1 Oct  | EE, KD, Connie, José; rate 45 clusters/rep, drop crop (GD, W/R, W/G, WOC, WBKC, B, RD, PPC, O/BK), remove flags. Harvest to start 3 Oct. |

*Results and discussion*

Disease was first observed in August, and remained at low levels during the trial. The plots were rated as close to harvest as possible, on 1 Oct. with harvest set to begin within a couple of days. An average of 1.6% of each cluster surface in untreated plots was infected with *Botrytis* grey mold. Treatments were not a significant effect on fruit bunch rot severity or incidence, according to ANOVA,  $p \leq 0.05$ , when all treatments were analyzed together (Table 1). However, when five treatments were excluded from the analysis due to high variability, the remaining data set showed significant treatment effects according to ANOVA,  $p \leq 0.05$ , and the means were separated by Fisher's LSD t Test at  $p \leq 0.05$  (Table 2).

Table 1. Grape bunch rot fungicide trial, results of all treatments.

| #  | Materials, rate/A                             | Timing <sup>1</sup> | Severity <sup>2</sup> | Incidence <sup>3</sup> |
|----|---|---------------------|-----------------------|------------------------|
| 1  | Untreated .....                               |                     | 1.64                  | 22.8                   |
| 2  | Rovral 50WP, 1 lb                             | A                   |                       |                        |
|    | Rovral 75WG, 19.7 oz                          | BC.....             | 1.55                  | 18.9                   |
| 3  | V-10116 1.67SC, 6.13 foz                      | ABC.....            | 2.86                  | 24.4                   |
| 4  | V-10116 1.67SC, 8.20 foz                      | ABC.....            | 0.66                  | 16.1                   |
| 5  | V-10114 1.67FL, 13.8 foz                      | ABC.....            | 0.65                  | 7.2                    |
| 6  | V-10114 1.67FL, 26.8 foz                      | ABC.....            | 0.60                  | 9.6                    |
| 7  | Pristine 38WG, 1.44 lb                        | ABC.....            | 0.82                  | 11.1                   |
| 8  | Stylet Oil, 1%                                | ABC.....            | 2.46                  | 23.9                   |
| 9  | Stylet Oil, 1% +<br>Vangard, 5.0 oz           | ABC.....            | 1.22                  | 20.0                   |
| 10 | Vangard, 5.0 oz                               | ABC.....            | 1.36                  | 16.1                   |
| 11 | Flint 50WG, 1.5 oz                            | A                   |                       |                        |
|    | Elite 45DF, 4.0 oz                            | B                   |                       |                        |
|    | Flint 50WG, 3.0 oz                            | C .....             | 0.79                  | 13.9                   |
| 12 | Spiroxamine 300, 18 foz                       | A                   |                       |                        |
|    | Flint 50WG, 3.0 oz                            | BC.....             | 2.64                  | 21.7                   |
| 13 | Vangard, 10.0 oz                              | AC.....             | 0.90                  | 13.9                   |
| 14 | Flint 50WG 2.0 oz                             | A                   |                       |                        |
|    | Flint 50WG 3.0 oz                             | BC.....             | 0.97                  | 16.1                   |
| 15 | Scala 60SC, 18.0 foz                          | ABC.....            | 0.80                  | 11.7                   |
| 16 | Scala 60SC, 9.0 foz +<br>Elite 45WP, 4 oz     | ABC.....            | 0.69                  | 16.7                   |
| 17 | Scala 60SC, 9.0 foz +<br>Flint 50WG, 2.0 oz   | ABC.....            | 0.86                  | 11.1                   |
| 18 | Scala 60SC, 9.0 foz +<br>Rovral 75WG, 10.7 oz | AB                  |                       |                        |
|    | Scala 60SC, 9.0 foz +<br>Flint 50WG, 2.0 oz   | C .....             | 0.68                  | 15.0                   |

<sup>1</sup> Treatments were applied at bloom (A), berry touch (B), and veraison (C).

<sup>2</sup> Forty-five clusters per replicate plot were rated for percent of surface area with symptoms of grey mold rot; severity is the average percent cluster surface area infected.

<sup>3</sup> Incidence is the percent of clusters rated with any Botrytis grey mold infection.

Table 2. Grape bunch rot fungicide trial, results of a subset of treatments which was analyzed for statistical differences.

| #  | Materials, rate/A                             | Timing <sup>1</sup> | Severity <sup>2</sup> | Incidence <sup>3</sup> |
|----|---|---------------------|-----------------------|------------------------|
| 6  | V-10114 1.67FL, 26.8 foz                      | ABC.....            | 0.47 d <sup>45</sup>  | 9.6 de <sup>5</sup>    |
| 5  | V-10114 1.67FL, 13.8 foz                      | ABC.....            | 0.55 cd               | 7.2 e                  |
| 4  | V-10116 1.67SC, 8.20 foz                      | ABC.....            | 0.62 cd               | 16.1 abcd              |
| 16 | Scala 60SC, 9.0 foz +<br>Elite 45WP, 4 oz     | ABC.....            | 0.63 cd               | 16.7 abcd              |
| 18 | Scala 60SC, 9.0 foz +<br>Rovral 75WG, 10.7 oz | AB                  |                       |                        |
|    | Scala 60SC, 9.0 foz +<br>Flint 50WG, 2.0 oz   | C.....              | 0.66 cd               | 15.0 bcde              |
| 7  | Pristine 38WG, 1.44 lb                        | ABC.....            | 0.72 bcd              | 11.1 cde               |
| 17 | Scala 60SC, 9.0 foz +<br>Flint 50WG, 2.0 oz   | ABC.....            | 0.73 bcd              | 11.1 cde               |
| 11 | Flint 50WG, 1.5 oz                            | A                   |                       |                        |
|    | Elite 45DF, 4.0 oz                            | B                   |                       |                        |
|    | Flint 50WG, 3.0 oz                            | C.....              | 0.77 bcd              | 13.9 cde               |
| 13 | Vanguard, 10.0 oz                             | AC.....             | 0.80 bcd              | 13.9 cde               |
| 2  | Rovral 50WP, 1 lb                             | A                   |                       |                        |
|    | Rovral 75WG, 19.7 oz                          | BC.....             | 1.13 abcd             | 18.9 abc               |
| 10 | Vanguard, 5.0 oz                              | ABC.....            | 1.20 abc              | 16.1 abcd              |
| 1  | Untreated .....                               |                     | 1.50 ab               | 22.8 ab                |
| 8  | Stylet Oil, 1%                                | ABC.....            | 1.93 a                | 23.9 a                 |
|    | Fisher's Least Significant Difference.....    |                     |                       | 8.66                   |

<sup>1</sup> Treatments were applied at bloom (A), berry touch (B), and veraison (C).

<sup>2</sup> Forty-five clusters per replicate plot were rated for percent of surface area with symptoms of grey mold rot; severity is the average percent cluster surface area infected.

<sup>3</sup> Incidence is the percent of clusters rated with any Botrytis grey mold infection.

<sup>4</sup> Severity values were log (y+1) transformed prior to statistical analysis due to heterogeneity of variance; values shown are back-transformed.

<sup>5</sup> Values in a column with the same letter are not significantly different according to Fisher's protected LSD t Test, p≤0.05.