# Efficacy of Bactericides on *Xanthomonas hortorum* pv. *begoniae* on Rieger Begonia

A. R. Chase
Chase Agricultural Consulting, LLC
937 Tierra Verde Circle
Cottonwood, AZ 86326
928-649-0400

Purpose: Evaluate new bactericides on Xanthomonas leaf spot on begonia.

Plant Material: *Begonia tuberhybrida* 'Nonstop White'

Transplanted into 4 inch pots - 19 April 2019 containing a peat-based potting medium. Top-dressed with Osmocote Plus minors19-6-12. Plants were grown in a covered greenhouse.

| Treatments: | Rate/100 gal |
|---|---|
| A. Noninoculated control | — — — |
| B. Inoculated control | — — — |
| C. Kalmor | 32 oz |
| D. Kalmor and Triathlon BA | 16 oz and 64 oz |
| E. Triathlon BA | 128 oz (1%) |
| F. EcoSwing and Capsil | 32 oz and 4 oz |
| G. BotryStop and Capsil | 48 oz and 4 oz |

| Date | Time | Temperature |
|---|---|---|
| May 20 | 8:00-8:20 am | 59 F |
| May 27 | 7:40-8:00 am | 73 F |
| June 3 | 7:50-8:15 am | 71 F |

| | |
|---|---|
| Inocula started on Nutrient Agar medium | May 22 2019 |
| Plants under high humidity conditions | May 23 2019 |
| Inoculation | May 24 2019 |

June 9 severity rating (1=none, 2=slight, 3=moderate, 4=severe and 5=dead)

Normality Test (Shapiro-Wilk): Failed ($P < 0.050$)
Equal Variance Test (Brown-Forsythe): Passed ($P = 0.525$)

| Group Name | N | Missing | Mean | | Std Dev | SEM |
|---|---|---|---|---|---|---|
| Col 1 | 12 | 0 | 1.167 | a | 0.389 | 0.112 |
| Col 2 | 12 | 0 | 2.167 | b | 0.577 | 0.167 |
| Col 3 | 12 | 0 | 1.417 | ab | 0.669 | 0.193 |
| Col 4 | 12 | 0 | 1.750 | ab | 0.754 | 0.218 |
| Col 5 | 12 | 0 | 1.500 | ab | 0.798 | 0.230 |
| Col 6 | 12 | 0 | 1.667 | ab | 0.492 | 0.142 |
| Col 7 | 12 | 0 | 1.917 | ab | 0.793 | 0.229 |

| Source of Variation | DF | SS | MS | F | P |
|---|---|---|---|---|---|
| Between Groups | 6 | 7.905 | 1.317 | 3.066 | 0.010 |
| Residual | 77 | 33.083 | 0.430 | significant | |
| Total | 83 | 40.988 | | | |

The differences in the mean values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = 0.010).
Power of performed test with alpha = 0.050: 0.714

June 9 severity rating (1=none, 2=slight, 3=moderate, 4=severe and 5=dead)14

Normality Test (Shapiro-Wilk): Failed (P < 0.050)
Equal Variance Test (Brown-Forsythe): Passed (P = 0.559)

| Group Name | N | Missing | Mean | Std Dev | SEM |
|---|---|---|---|---|---|
| Col 1 | 12 | 0 | 1.333 | 0.492 | 0.142 |
| Col 2 | 12 | 0 | 2.333 | 0.615 | 0.178 |
| Col 3 | 12 | 0 | 1.625 | 0.932 | 0.269 |
| Col 4 | 12 | 0 | 1.708 | 0.689 | 0.199 |
| Col 5 | 12 | 0 | 1.625 | 0.801 | 0.231 |
| Col 6 | 12 | 0 | 2.000 | 0.640 | 0.185 |
| Col 7 | 12 | 0 | 1.833 | 0.961 | 0.278 |

| Source of Variation | DF | SS | MS | F | P |
|---|---|---|---|---|---|
| Between Groups | 6 | 7.321 | 1.220 | 2.167 | 0.055 |
| Residual | 77 | 43.354 | 0.563 | not significant | |
| Total | 83 | 50.676 | | | |

The differences in the mean values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; there is not a statistically significant difference (P = 0.055).
Power of performed test with alpha = 0.050: 0.433

The power of the performed test (0.433) is below the desired power of 0.800.

Less than desired power indicates you are less likely to detect a difference when one actually exists. Negative results should be interpreted cautiously.

Conclusions:
1. Disease severity was low in this trial.
2. All products were somewhat effective to about the same level statistically. None were significantly different than either the inoculated or the noninoculated controls.
3. None of the products caused any signs of damage to these begonias.