##### **Supplemental Material**

**Supplemental Material Table 1.** Parameter estimates and descriptive statistics for triangular probability density functions of initial Palmer amaranth (PDa in # ha-1) and mortality rates (% of PD removed) by size of weed and herbicide using 10,000 iterations.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Palmer amaranth < 10 cm | | | | | |  | Palmer amaranth at 13- to 25-cm | | | | | |
|  |  | |  |  | Percentiles | |  |  |  |  |  | Percentiles | |  |
| Namea | Min. | | Mean | Max. | 5% | 95% | K-Sb |  | Min. | Mean | Max. | 5% | 95% | K-S |
| PD | 431 | | 5,194 | 10,764 | 929 | 10,085 | 0.26 |  | 430 | 5,194 | 10,763 | 929 | 10,085 | 0.26 |
| D | 76.2 | | 92.0 | 100 | 81.4 | 99.4 | 0.25 |  | 0.0 | 55.7 | 85.7 | 16.0 | 83.4 | 0.19 |
| G | 55.2 | | 85.0 | 100 | 65.0 | 98.9 | 0.24 |  | 0.1 | 39.8 | >99.9b | 3.2 | 88.9 | 0.15 |
| D + G | 80.9 | | 93.6 | 100 | 85.1 | 99.5 | 0.37 |  | 16.3 | 64.7 | >99.9 | 31.7 | 93.1 | 0.12 |
| D fb D 7 | 89.6 | | 96.5 | 100 | 91.9 | 99.7 | 0.63 |  | 58.0 | 85.9 | 100 | 67.2 | 98.9 | 0.31 |
| D fb D 14 | 68.5 | | 89.5 | 100 | 75.4 | 99.2 | 0.63 |  | 67.0 | 89.0 | 100 | 74.3 | 99.2 | 0.17 |
| D fb D 21 | 91.6 | | 97.2 | 100 | 93.4 | 99.8 | 0.75 |  | 69.2 | 89.7 | 100 | 76.0 | 99.2 | 0.25 |
| G fb G 7 | 93.1 | | 97.7 | 100 | 94.6 | 99.8 | 0.50 |  | 37.4 | 79.0 | 100 | 51.1 | 98.4 | 0.26 |
| G fb G 14 | 67.1 | | 88.9 | 100 | 74.2 | 99.2 | 0.43 |  | <0.1 | 64.2 | 100 | 17.1 | 97.3 | 0.28 |
| G fb G 21 | 64.2 | | 88.0 | 100 | 72.1 | 99.1 | 0.30 |  | <0.1 | 63.8 | 100 | 16.3 | 97.2 | 0.19 |
| D fb G 0.2 | 81.9 | | 93.9 | 100 | 85.9 | 99.5 | 0.25 |  | 17.5 | 72.3 | 100 | 35.4 | 97.9 | 0.17 |
| D fb G 3 | 87.3 | | 95.7 | 100 | 90.1 | 99.7 | 0.50 |  | 15.5 | 71.8 | 100 | 34.2 | 97.9 | 0.31 |
| D fb G 7 | 75.3 | | 91.7 | 100 | 80.7 | 99.4 | 0.63 |  | 54.8 | 84.8 | 100 | 64.6 | 98.9 | 0.16 |
| D fb G 14 | 96.9 | | 99.0 | 100 | 97.6 | 99.9 | 0.88 |  | 54.2 | 84.7 | 100 | 64.3 | 98.8 | 0.40 |
| D fb G 21 | 87.5 | | 95.8 | 100 | 90.2 | 99.7 | 0.50 |  | 43.0 | 80.8 | 100 | 55.3 | 98.5 | 0.40 |
| G fb D 0.2 | 76.0 | | 92.0 | 100 | 81.3 | 99.4 | 0.38 |  | 3.6 | 67.6 | 100 | 24.6 | 97.5 | 0.16 |
| G fb D 3 | 90.0 | | 96.6 | 100 | 92.1 | 99.7 | 0.38 |  | 18.8 | 72.8 | 100 | 36.5 | 97.9 | 0.20 |
| G fb D 7 | 85.4 | | 95.1 | 100 | 88.6 | 99.6 | 0.25 |  | 44.9 | 81.6 | 100 | 57.2 | 98.6 | 0.14 |
| G fb D 14 | 84.9 | | 94.9 | 100 | 88.2 | 99.6 | 0.43 |  | 42.5 | 77.1 | 94.4 | 54.0 | 93.1 | 0.28 |
| G fb D 21 | 66.5 | | 88.8 | 100 | 73.9 | 99.1 | 0.30 |  | <0.1 | 56.3 | 88.4 | 14.2 | 86.0 | 0.11 |

a First letter provides information about herbicide used (D = Dicamba, G = Glufosinate), fb stands for followed by if applicable and + stands for a mixture, second capital letter (if applied in sequence) is herbicide, and the number reports d between passes.

b K-S is the Kolmogorov-Smirnov statistic. A value less than 0.05 represents a statistically significant lack of fit.

c >99.9 implies less than complete control and <0.01 implies nearly no mortality.

**Supplemental Material Table 2.** Partial correlation coefficients of among weed control treatment alternatives when herbicide was applied to Palmer amaranth at <10 cm size.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Herbicidea | D | G | D + G | DD 7 | DD 14 | DD 21 | GG 7 | GG 14 | GG 21 | DG .2 | DG 3 | DG 7 | DG 14 | DG 21 | GD 0.2 | GD 3 | GD 7 | GD 14 | GD 21 |
| Dicamba (D) | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Glufosinate (G) | 0.45 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D + G | 0.54 | 0.46 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D fb D 7 | 0.19 | -0.61 | 0.23 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D fb D 14 | 0.27 | -0.17 | **0.73** | **0.67** | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D fb D 21 | 0.47 | 0.06 | -0.32 | 0.17 | -0.34 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| G fb G 7 | 0.55 | **0.87** | 0.53 | -0.47 | -0.17 | 0.04 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |
| G fb G 14 | **0.82**b | 0.47 | 0.46 | -0.03 | 0.33 | 0.30 | 0.36 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |
| G fb G 21 | 0.55 | 0.62 | **0.87** | 0.13 | 0.53 | -0.01 | 0.53 | 0.47 | 1.00 |  |  |  |  |  |  |  |  |  |  |
| D fb G 0.2 | -0.40 | 0.48 | 0.30 | -0.55 | -0.08 | **-0.66** | 0.46 | -0.30 | 0.22 | 1.00 |  |  |  |  |  |  |  |  |  |
| D fb G 3 | **0.85** | 0.26 | 0.24 | 0.02 | 0.04 | 0.34 | 0.41 | **0.72** | 0.10 | -0.47 | 1.00 |  |  |  |  |  |  |  |  |
| D fb G 7 | 0.33 | 0.39 | 0.51 | 0.00 | 0.56 | -0.08 | 0.03 | **0.69** | **0.63** | 0.00 | 0.09 | 1.00 |  |  |  |  |  |  |  |
| D fb G 14 | -0.05 | 0.43 | 0.32 | -0.23 | 0.30 | -0.22 | -0.01 | 0.32 | 0.56 | 0.28 | -0.31 | **0.87** | 1.00 |  |  |  |  |  |  |
| D fb G 21 | **0.61** | 0.28 | -0.18 | -0.23 | -0.31 | **0.71** | 0.25 | **0.72** | -0.03 | -0.50 | **0.66** | 0.19 | -0.07 | 1.00 |  |  |  |  |  |
| G fb D 0.2 | 0.49 | 0.27 | **0.96** | 0.39 | **0.87** | -0.35 | 0.29 | 0.47 | **0.82** | 0.14 | 0.21 | 0.61 | 0.39 | -0.22 | 1.00 |  |  |  |  |
| G fb D 3 | -0.05 | 0.07 | 0.42 | -0.13 | 0.35 | -0.45 | 0.11 | 0.17 | 0.34 | 0.34 | -0.18 | 0.34 | 0.34 | -0.05 | 0.42 | 1.00 |  |  |  |
| G fb D 7 | 0.41 | 0.52 | 0.07 | -0.14 | -0.43 | 0.56 | 0.58 | 0.00 | 0.37 | -0.05 | 0.20 | -0.21 | -0.11 | 0.21 | -0.10 | -0.39 | 1.00 |  |  |
| G fb D 14 | **0.73** | 0.45 | **0.86** | 0.22 | **0.73** | -0.05 | 0.39 | **0.82** | **0.79** | -0.03 | 0.47 | **0.77** | 0.45 | 0.24 | **0.88** | 0.37 | -0.05 | 1.00 |  |
| G fb D 21 | 0.33 | 0.22 | **0.82** | 0.30 | 0.52 | -0.37 | 0.53 | 0.01 | 0.58 | 0.39 | 0.11 | -0.07 | -0.17 | -0.42 | **0.72** | 0.28 | 0.16 | 0.46 | 1.00 |

aFirst letter provides information about herbicide used (D = Dicamba, G = Glufosinate), fb stands for followed by if applicable and + stands for a mixture, second letter (if applied in sequence) again informs about herbicide choice, and the number indicates the number of d between herbicide applications.

b Bold numbers indicate partial correlations statistically significantly different from zero at p < 0.10 and are based on 8 observations per treatment.

**Supplemental Material Table 3.** Partial correlation coefficients of among weed control treatment alternatives when herbicide was applied to Palmer amaranth at 13- to 25-cm size.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Herbicidea | D | G | D + G | DD 7 | DD 14 | DD 21 | GG 7 | GG 14 | GG 21 | DG .2 | DG 3 | DG 7 | DG 14 | DG 21 | GD 0.2 | GD 3 | GD 7 | GD 14 | GD 21 |
| Dicamba (D) | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Glufosinate (G) | 0.24 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D + G | 0.01 | **0.47** | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D fb D 7 | -0.39 | 0.04 | 0.42 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D fb D 14 | 0.11 | 0.08 | 0.16 | 0.13 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| D fb D 21 | -0.21 | **-0.47** | -0.30 | 0.24 | 0.00 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| G fb G 7 | -0.29 | 0.10 | 0.40 | 0.20 | -0.09 | -0.27 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |
| G fb G 14 | -0.15 | **0.44** | -0.08 | -0.26 | 0.12 | -0.31 | -0.04 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |
| G fb G 21 | -0.01 | **0.63** | 0.14 | 0.00 | 0.06 | -0.41 | 0.08 | 0.17 | 1.00 |  |  |  |  |  |  |  |  |  |  |
| D fb G 0.2 | 0.31 | 0.01 | 0.08 | -0.10 | -0.19 | -0.41 | **0.50** | -0.10 | -0.25 | 1.00 |  |  |  |  |  |  |  |  |  |
| D fb G 3 | 0.31 | -0.41 | -0.08 | -0.23 | -0.26 | 0.02 | -0.19 | **-0.59** | -0.28 | 0.32 | 1.00 |  |  |  |  |  |  |  |  |
| D fb G 7 | 0.18 | 0.22 | 0.11 | 0.04 | **-0.43** | 0.01 | 0.20 | -0.09 | 0.01 | 0.29 | -0.06 | 1.00 |  |  |  |  |  |  |  |
| D fb G 14 | -0.16 | -0.07 | -0.12 | 0.01 | 0.31 | **0.46** | 0.18 | -0.12 | 0.04 | -0.15 | -0.03 | -0.24 | 1.00 |  |  |  |  |  |  |
| D fb G 21 | 0.06 | 0.12 | 0.04 | 0.30 | 0.15 | -0.16 | 0.19 | 0.10 | 0.13 | 0.14 | -0.32 | -0.06 | -0.29 | 1.00 |  |  |  |  |  |
| G fb D 0.2 | -0.02 | 0.23 | 0.24 | -0.04 | -0.40 | **-0.49** | **0.45** | -0.29 | **0.47** | **0.48** | 0.28 | 0.27 | -0.19 | 0.12 | 1.00 |  |  |  |  |
| G fb D 3 | 0.40 | 0.10 | 0.12 | -0.19 | **-0.51** | -0.40 | 0.12 | **-0.43** | 0.13 | **0.62** | **0.69** | 0.35 | -0.36 | -0.04 | **0.77** | 1.00 |  |  |  |
| G fb D 7 | -0.29 | 0.35 | 0.37 | 0.36 | **-0.47** | -0.01 | 0.19 | -0.01 | 0.25 | 0.17 | 0.11 | **0.47** | -0.14 | -0.21 | **0.50** | **0.44** | 1.00 |  |  |
| G fb D 14 | 0.25 | -0.02 | -0.05 | -0.37 | 0.25 | -0.23 | 0.55 | -0.01 | -0.04 | **0.51** | 0.17 | -0.21 | **0.51** | 0.05 | 0.14 | 0.10 | -0.38 | 1.00 |  |
| G fb D 21 | 0.11 | -0.37 | -0.07 | -0.34 | 0.26 | 0.10 | -0.22 | -0.12 | -0.08 | -0.01 | 0.56 | -0.38 | 0.19 | -0.39 | 0.01 | 0.13 | -0.04 | 0.20 | 1.00 |

aFirst letter provides information about herbicide used (D = Dicamba, G = Glufosinate), fb stands for followed by if applicable and + stands for a mixture, second letter (if applied in sequence) again informs about herbicide choice, and the number indicates the number of d between herbicide applications.

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