**Running title:** Multiple herbicide-resistant common ragweed

Supplementary Table S1. Common ragweed accession site collection details.

|  |  |  |  |
| --- | --- | --- | --- |
| Accessiona | Nearest municipality | State | Year collected |
| DE-S1 | Georgetown | DE | 2017 |
| DE-S2 | Newark | DE | 2018 |
| MD-S1 | Union Bridge | MD | 2018 |
| DE1 | Bridgeville | DE | 2016 |
| DE2 | Harrington-1 | DE | 2018 |
| DE3 | Harrington-2 | DE | 2018 |
| DE4 | Felton | DE | 2017 |
| DE5 | Harrington | DE | 2018 |
| DE6 | Camden | DE | 2016 |
| MD1 | Hopewell | MD | 2018 |
| MD2 | Crisfield | MD | 2018 |
| MD3 | Marion Station | MD | 2018 |
| MD4 | Westover | MD | 2018 |
| MD5 | Snow Hill | MD | 2018 |
| MD6 | St. Inigoes | MD | 2018 |
| MD7 | Leonardtown | MD | 2018 |
| MD8 | Mt Vernon | MD | 2018 |
| MD9 | Bushwood | MD | 2018 |
| MD10a | Milestown | MD | 2016 |
| MD10 | Milestown | MD | 2018 |
| MD11a | Chaptico | MD | 2016 |
| MD11 | Chaptico | MD | 2018 |
| MD12 | Mechanicsville | MD | 2018 |
| MD13 | Vienna | MD | 2016 |
| MD14 | Cambridge | MD | 2018 |
| NJ1 | Ferrel | NJ | 2014 |
| NJ2b | Woolwich | NJ | 2018 |
| NJ3b | Woolwich | NJ | 2018 |
| NJ4b | Woolwich | NJ | 2018 |
| NJ5 | Allentown-1 | NJ | 2018 |
| NJ6 | Allentown-2 | NJ | 2018 |
| NJ7 | Windsor | NJ | 2018 |
| NJ8 | Robbinsville | NJ | 2016 |
| VA1 | Lawrenceville | VA | 2016 |

aAccession identified by state and location relative to others in their respective state, the most southern site designated as 1 and numbered south to north (for example, DE1 is southernmost accession in Delaware). Accessions with -S were chosen based on historic knowledge of susceptibility.

bNJ2, NJ3, NJ4 are separate fields with different cropping histories.

Supplementary Table S2. Dry weight of common ragweed accessions 28 days after treated with cloransulam, fomesafen or glyphosate.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Cloransulam | | | | | | |  | Fomesafen | | | | | | |  | Glyphosate | | | | | | |  |  | Cloransulam |
| Accession | Nontreated | R/Sa | 1X | | 2X | | 4X | |  | R/Sa | 1X | | 2X | | 4X | |  | R/Sa | 1X | | 2X | | 4X | |
|  | - g / plant - |  | ------------- g / plant ------------ | | | | | |  |  | ------------- g / plant ------------ | | | | | |  |  | ------------- g / plant ------------ | | | | | |
| DE-S1 | 3.5 | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |
| DE-S2 | 4.0 | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |
| MD-S1 | 2.4 | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |
| DE1 | 1.6 | R | 1.7 | NS | 1.7 | NS | 1.5 | NS |  | S |  | + |  | + |  | + |  | R | 1.4 | \* | 1.1 | \* | 0.9 | \* |
| DE2 | 2.3 | R |  | + |  | + |  | + |  | S |  | + |  | + |  | + |  | R | 1.1 | \*\* | 0.9 | \*\* |  | + |
| DE3 | 3.4 | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |  | S | 1.9 | \*\*\* | 0.9 | \*\*\* |  | + |
| DE4 | 2.1 | R | 1.1 | \*\* | 1.2 | NS | 1.2 | NS |  | R | 0.5 | \*\* | 0.4 | \*\*\* |  | + |  | R | 1.8 | NS | 1.5 | NS | 1.3 | \*\* |
| DE5 | 2.4 | R | 1.2 | \*\* | 1.5 | \* | 1.7 | NS |  | R | 1.1 | \*\* |  | + |  | + |  | R | 1.9 | NS | 1.6 | \* | 1.0 | \*\*\* |
| DE6 | 2.7 | R | 1.6 | \*\* | 1.5 | \*\* | 1.3 | \*\*\* |  | S |  | + |  | + |  | + |  | R | 1.7 | \*\* | 1.4 | \*\*\* | 0.5 | \*\*\* |
| MD1 | 1.9 | R | 1.6 | NS | 0.8 | \* |  | + |  | S |  | + |  | + |  | + |  | R | 1.3 | NS | 1.3 | NS | 1.1 | \*\* |
| MD2 | 3.5 | R | 2.3 | \*\* | 2.3 | \*\* | 1.4 | \*\*\* |  | S |  | + |  | + |  | + |  | R | 2.2 | \*\*\* | 2.2 | \*\*\* | 1.8 | \*\*\* |
| MD3 | 2.5 | R | 1.5 | \* | 1.5 | \*\* | 2.0 | NS |  | S |  | + |  | + |  | + |  | R | 2.2 | NS | 1.7 | \* | 1.6 | \*\* |
| MD4 | 5.1 | R | 4.2 | \* | 3.7 | \*\*\* | 4.9 | NS |  | S |  | + |  | + |  | + |  | R | 3.1 | \*\*\* | 2.3 | \*\*\* | 3.5 | \*\*\* |
| MD5 | 2.8 | R | 0.9 | \*\*\* | 1.7 | \*\* | 1.2 | \*\* |  | S |  | + |  | + |  | + |  | R | 1.2 | \*\*\* | 1.1 | \*\*\* | 0.5 | \*\*\* |
| MD6 | 3.8 | R | 2.5 | \* |  | + |  | + |  | S |  | + |  | + |  | + |  | R | 2.6 | \*\*\* | 1.6 | \*\*\* | 1.9 | \*\*\* |
| MD7 | 4.1 | R | 2.4 | \*\* | 1.9 | \*\*\* |  | + |  | S |  | + |  | + |  | + |  | R | 1.0 | \*\*\* | 1.0 | \*\*\* |  | + |
| MD8 | 1.7 | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |  | R | 1.2 | NS | 1.0 | NS | 1.0 | \* |
| MD9 | 4.2 | R | 2.3 | \*\*\* | 1.8 | \*\*\* | 1.8 | \*\*\* |  | R | 1.3 | \*\*\* | 1.6 | \*\*\* |  | + |  | R | 2.3 | \*\*\* | 2.5 | \*\*\* | 1.8 | \*\*\* |
| MD10a | 2.0 | R |  | + | 1.7 | NS | 0.9 | NS |  | S |  | + |  | + |  | + |  | R | 1.5 | NS | 1.8 | NS | 1.1 | NS |
| MD10 | 3.0 | R | 2.3 | NS | 2.3 | NS | 2.1 | \* |  | R |  | + |  | + |  | + |  | R | 1.8 | \*\*\* | 1.6 | \*\*\* | 1.4 | \*\*\* |
| MD11a | 2.0 | R | 1.9 | NS | 1.5 | NS | 1.2 | NS |  | S |  | + |  | + |  | + |  | R | 1.6 | NS | 2.0 | NS | 1.2 | \*\* |
| MD11 | 3.5 | R | 2.7 | \* | 3.4 | NS | 1.9 | \*\*\* |  | R |  | + |  | + |  | + |  | R | 2.9 | \* | 2.3 | \*\*\* | 2.3 | \*\*\* |
| MD12 | 2.4 | R | 2.1 | NS | 1.6 | NS | 1.7 | NS |  | S |  | + |  | + |  | + |  | R | 1.8 | NS | 1.8 | NS | 1.2 | \*\* |
| MD13 | 1.7 | R | 0.9 | NS | 1.1 | NS | 0.8 | \* |  | R | 0.4 | NS |  | + |  | + |  | R | 1.3 | NS | 0.9 | \* | 1.2 | \* |
| MD14 | 2.5 | R | 1.3 | \*\* | 1.4 | \*\* | 1.6 | \* |  | S |  | + |  | + |  | + |  | R | 1.9 | NS | 1.6 | \*\* | 1.6 | \*\*\* |
| NJ1 | 3.1 | R | 2.2 | NS | 1.8 | \*\* | 1.1 | \*\*\* |  | S |  | + |  | + |  | + |  | R | 1.9 | \*\*\* | 2.3 | \* |  | + |
| NJ2 | 2.4 | R | 1.7 | NS |  | + | 1.6 | NS |  | S |  | + |  | + |  | + |  | S | 1.1 | \*\*\* |  | + |  | + |
| NJ3 | 2.7 | R | 1.4 | \*\* | 1.1 | \*\*\* | 0.8 | \*\*\* |  | S |  | + |  | + |  | + |  | R | 1.2 | \*\*\* | 1.3 | \*\* | 0.9 | \*\*\* |
| NJ4 | 2.8 | R |  | + | 1.4 | \*\*\* | 2.2 | NS |  | S |  | + |  | + |  | + |  | R | 1.6 | \*\*\* | 1.1 | \*\*\* | 0.9 | \*\*\* |
| NJ5 | 3.8 | R | 2.3 | \*\*\* | 2.2 | \*\*\* |  | + |  | R | 1.9 | \*\*\* | 2.0 | \*\*\* | 2.4 | \*\*\* |  | R | 1.6 | \*\*\* | 1.8 | \*\*\* | 2.0 | \*\*\* |
| NJ6 | 4.1 | S |  | + |  | + |  | + |  | R | 2.3 | \*\*\* | 2.0 | \*\*\* | 2.1 | \*\*\* |  | R | 2.8 | \*\*\* | 2.0 | \*\*\* | 2.6 | \*\*\* |
| NJ7 | 2.7 | R | 2.1 | NS | 1.5 | \*\* | 0.9 | \*\*\* |  | S |  | + |  | + |  | + |  | R | 1.2 | \*\*\* | 1.0 | \*\*\* |  | + |
| NJ8 | 2.1 | R | 1.4 | NS | 0.9 | \*\* | 0.5 | \*\* |  | R | 1.2 | \*\* | 1.1 | \*\* | 0.7 | \*\*\* |  | R | 1.6 | NS | 1.8 | NS | 1.2 | \*\* |
| VA1 | 2.8 | S |  | + |  | + |  | + |  | S |  | + |  | + |  | + |  | R | 1.9 | \*\* | 1.7 | \*\*\* | 1.5 | \*\*\* |

Significance is designated as: \*\*\* denotes P<0.01; \*\* denotes P=0.05 to 0.01; \* denotes P=0.1 to 0.05; NS denotes P≥0.1; + denotes <3 surviving plants, no statistical comparison made. Mean dry weight (g) per plant is presented for 1X, 2X and 4X of the respective herbicide. Only those plants that demonstrated resistance with a visual observation for control ≤80% at 28 DAT were included in the statistical analyses for dry weights. Statistical comparison of differences from the nontreated check (0X) of same accession. aResistance (R) or susceptible (S) based on survivors at 2X or 4X rate (see Table 1).