S3. Parameters values for each population of *A. spica-venti* for the five herbicides tested (with replicates for iodosulfuron, fenoxaprop, and prosulfocarb) along with biomass response variable used, Resistance Index (RI), and phenotype label based percentage of herbicide field rate in Denmark to achieve each population’s ED50 (S; 0-15%, sr; 15-30%, r; 30-50%, R; 50-80%, RR; 800-100%, RRR;>100).\* signifies that the ED50 value of the population is significantly different from the susceptible reference (S ref). Some ED50 values indicated using >highest dose used in the bioassay.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Herbicide | collection year | Experiment no. | response variable | Population | e | e SE | b | b SE | d | d SE | RI | phenotype |
|
| iodosulfuron | 2013 | 937 | adjFW | 80 | 3.3 | 2.9 | 0.86 | 0.9 | 2.7 | 0.7 | 2 | R |
|  |  |  |  | 70 | 20.6 | 10 | 25.4 | 10 | 2.6 | 0.25 | 12.8 | RRR |
|  |  |  |  | 72 | 2.33 | 0.21 | 15.18 | 9.9 | 2.77 | 0.42 | 1.4 | r |
|  |  |  |  | 75 | 4.12 | 4.9 | 0.46 | 0.4 | 3.8 | 0.64 | 2.5 | R |
|  |  |  |  | 78 | 2.27 | 0.85 | 3.6 | 3.28 | 2.05 | 0.35 | 1.4 | r |
|  |  |  |  | 71 | 1.96 | 1.3 | 1.3 | 0.98 | 2.69 | 0.66 | 1.2 | sr |
|  |  |  |  | 81 | 0.005 | 0.006 | 0.24 | 0.07 | 6.6 | 0.5 | 0.006 | S |
|  |  |  |  | 76 | 0.1 | 2.88 | 0.0006 | 0.001 | 0.89 | 0.21 | 0.06 | sr |
|   |   |   |   | S ref | 1.6 | 0.8 | 1.2 | 0.6 | 3.2 | 0.5 |   | sr |
| iodosulfuron | 2013 | 906 | DW | 80 | >80 | 10 | -19.5 | 9 | -116 | 10 | 348 | RRR |
|  |  |  |  | 65 | 8.12 | 13.03 | 0.68 | 0.54 | 2.65 | 0.92 | 13 | RRR |
|  |  |  |  | 70 | 17.8 | 32.4 | 1.08 | 1.34 | 3.05 | 0.4 | 28 | RRR |
|  |  |  |  | 72 | 21.4 | 16.7 | 0.69 | 0.3 | 4.5 | 0.5 | 35 | RRR |
|  |  |  |  | 75 | 3.4 | 1.3 | 6.5 | 8.2 | 3.12 | 0.4 | 5 | R |
|  |  |  |  | 71 | 0.12 | 0.3 | 0.28 | 0.21 | 5.15 | 0.7 | 0.2 | S |
|  |  |  |  | 81 | 0.09 | 0.13 | 1.23 | 1.6 | 5.32 | 0.59 | 0.15 | S |
|  |  |  |  | 76 | 0.2 | 0.04 | 1.1 | 0.28 | 10.15 | 0.69 | 0.3 | S |
|   |   |   |   | S ref | 1.2 | 0.7 | 0.68 | 0.31 | 1.5 | 0.15 |   | S |
| iodosulfuron | 2014 | 906 | DW | 80 | 12.5 | 23 | 89.88 | 1.12 | 0.89 | 0.3 | 372 | RRR |
|  |  |  |  | 65 | 5.88 | 2.2 | 0.97 | 0.53 | 2.11 | 0.3 | 56 | RR |
|  |  |  |  | 70 | 5.86 | 3.17 | 0.9 | 0.38 | 1.57 | 0.19 | 55 | RR |
|  |  |  |  | 72 | 0.77 | 0.12 | 1.56 | 0.43 | 2.9 | 0.23 | 7.7 | S |
|  |  |  |  | 75 | 0.95 | 0.96 | 0.5 | 0.2 | 1.4 | 0.22 | 9 | S |
|  |  |  |  | 71 | 1.12 | 1.17 | 0.5 | 0.2 | 1.4 | 0.22 | 10.6 | sr |
|  |  |  |  | 76 | 0.32 | 0.1 | 2.01 | 1.06 | 1.4 | 0.08 | 3 | S |
|   |   |   |   | S ref | 0.1 | 0.1 | 1.53 | 0.7 | 1.4 | 0.05 |   | S |
| Fenoxaprop | 2013 | 937 | adjFW | 80 | >138 | 15198 | 0.009 | 0.13 | 2.7 | 0.54 | 776 | RRR |
|  |  |  |  | 70 | 12.09 | 7.15 | 0.82 | 0.45 | 3.02 | 0.49 | 3.4 | sr |
|  |  |  |  | 75 | 9.75 | 6.21 | 0.93 | 0.44 | 2.4 | 0.39 | 2.7 | S |
|  |  |  |  | 71 | 3.64 | 1.02 | 3.09 | 2.89 | 2.26 | 0.47 | 1.02 | S |
|  |  |  |  | 81 | 2.83 | 1.17 | 2.2 | 1.62 | 2.1 | 0.46 | 0.79 | S |
|  |  |  |  | 76 | 7.5 | 5.5 | 2.6 | 3.8 | 0.89 | 0.32 | 2.12 | S |
|   |   |   |   | S ref | 3.54 | 1.03 | 9.5 | 36.4 | 3.7 | 0.37 |   | S |
| Fenoxaprop | 2013 | 906 | FW | 80 | 44.8 | 41.6 | 1.45 | 0.97 | 24.5 | 4.7 | 27.3 | R |
|  |  |  |  | 65 | 99 | 847 | 0.44 | 1.07 | 12.2 | 10.8 | 59 | RRR |
|  |  |  |  | 70 | 17.2 | 7.3 | 2.69 | 2.41 | 21.1 | 4.02 | 10.4 | sr |
|  |  |  |  | 72 | 13.7 | 7.2 | 0.76 | 0.28 | 55.6 | 7.7 | 8.3 | sr |
|  |  |  |  | 75 | 12.3 | 8.2 | 1.09 | 0.72 | 31.7 | 7.3 | 7.4 | sr |
|  |  |  |  | 81 | 7.59 | 4 | 12.3 | 56.8 | 10.5 | 3.8 | 4.5 | sr |
|  |  |  |  | 76 | 4.9 | 2.6 | 1.67 | 1.0 | 32.5 | 8.07 | 2.9 | S |
|   |   |   |   | S ref | 1.66 | 2.9 | 0.67 | 64 | 25 | 7.7 |   | S |
| Prosulfocarb | 2013 | 936 | FW | 80 | 0.45 | 18.6 | 0.71 | 5.6 | 0.85 | 0.13 | 1.15 | S |
|  |  |  |  | 65 | 34.9 | 577 | 4.5 | 98 | 1.18 | 0.19 | 7.5 | S |
|  |  |  |  | 70 | 0.76 | 12.5 | 0.65 | 2 | 2.03 | 0.19 | 0.16 | S |
|  |  |  |  | 72 | 18.4 | 784 | 2.86 | 85.3 | 1.65 | 0.19 | 3.9 | S |
|  |  |  |  | 75 | 57.8 | 199 | 7.5 | 99.7 | 1.01 | 0.18 | 12.4 | S |
|  |  |  |  | 71 | 3.63 | 69.8 | 1.19 | 6.96 | 2.3 | 0.19 | 0.78 | S |
|  |  |  |  | 76 | 22.8 | 1020 | 4.48 | 157 | 1.94 | 0.19 | 4.9 | S |
|  |  |  |  | S ref | 4.6 | 4366 | 8.9 | 850 | 2.56 | 0.19 |  | S |
|  |  |  |  | 81 | 0.27 | NA | 1.3 | NA | 2.3 | 0.16 | 0.04 | S |
| Prosulfocarb | 2013 | 907 | FW | 80 | 127 | 65.8 | 2.27 | 1.8 | 1.3 | 0.13 | 1 | S |
|  |  |  |  | 65 | 50.2 | 164 | 0.77 | 1.22 | 0.29 | 0.18 | 0.42 | S |
|  |  |  |  | 70 | 113.4 | 75.2 | 4.4 | 7.1 | 1.7 | 0.12 | 0.96 | S |
|  |  |  |  | 72 | 82.4 | 43 | 6.6 | 30 | 0.5 | 0.11 | 0.69 | S |
|  |  |  |  | 76 | 160.7 | 1260 | 10.8 | 113 | 1.4 | 0.11 | 1.3 | S |
|  |  |  |  | 81 | 162 | 504 | 9.5 | 43.3 | 1.7 | 0.11 | 1.3 | S |
|  |  |  |  | S ref | 117.4 | 43 | 3.2 | 3.2 | 2 | 0.16 |  | S |
|  |  |  |  | 75 | 86.5 | 57.2 | 9 | 40 | 1.8 | 0.13 | 0.72 | S |
| Imazethapyr | 2013 | 915 | FW | 80 | 28.6 | 281.2 | 0.15 | 0.13 | 26.5 | 22.4 | 73 | r |
|  |  |  |  | 65 | 7.0 | 7.6 | 0.64 | 1 | 6.9 | 1.9 | 18 | S |
|  |  |  |  | 70 | 9.4 | 7.6 | 1.4 | 1.2 | 8.1 | 1.7 | 24 | S |
|  |  |  |  | 72\* | 7.7 | 9.7 | 0.90 | 1.3 | 6.7 | 2.15 | 19 | S |
|  |  |  |  | 75 | 6.4 | 5.4 | 0.85 | 0.62 | 8.3 | 1.3 | 16 | S |
|  |  |  |  | 81 | 16.5 | 5.9 | 2 | 1.3 | 11.6 | 1.2 | 42 | sr |
|  |  |  |  | 76 | 1.2 | 1.1 | 0.54 | 0.26 | 15.5 | 2.4 | 3.3 | S |
|  |  |  |  | S ref | 0.39 | 0.51 | 0.64 | 0.54 | 13.4 | 3.1 |  | S |
| Pyroxsulam | 2013 | 909 | FW | 80\* | 33.2 | 9.25 | 3.3 | 3.2 | 18.5 | 3.3 | 68 | RRR |
|  |  |  |  | 70 | 0.32 | 1.9 | 1.4 | 5 | 36.3 | 3.7 | 0.2 | S |
|  |  |  |  | 72 | 1.5 | 0.5 | 3.3 | 4.7 | 21.2 | 5.2 | 0.99 | S |
|  |  |  |  | 75 | 0.21 | 0.5 | 1.07 | 1.1 | 69.6 | 3.7 | 0.13 | S |
|  |  |  |  | 76 | 2.0 | 0.66 | 5.3 | 4.5 | 21.8 | 3.7 | 1.3 | S |
|  |  |  |  | 81 | 1.33 | 0.68 | 4.2 | 14.4 | 28.7 | 5.3 | 0.83 | S |
|  |  |  |  | S ref | 1.5 | 0.3 | 6.6 | 20.6 | 31.7 | 3.7 |  | S |