Supplementary Table S1. Biomass of grass cover crop species collected 6 weeks after planting pooled across year.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Timinga* | Wheat | Barley | Cereal Rye | Oat | Annual Ryegrass |
| Treatment | Suffolk | Blacksburg | Suffolk | Blacksburg | Suffolk | Blacksburg | Suffolk | Blacksburg | Suffolk | Blacksburg |
| *Preemergent* | g 0.6 m-1 row |
| Atrazine | 3.9 | 7.8 | 8.3 | 14.5 | 7.4 | 10.6 | 16.1 | 7.6 | 7.1 | 5.9 |
| Bicyclopyrone + mesotrione + *S*-metolachlor | 4.2 | 10.7 | 7.9 | 18.3 | 7.8 | 15.4 | 12.1 | 8.7 | 7.8 | 7.4 |
| Flumioxazin | 3.7 | 11.9 | 9.3 | 16.1 | 9.3 | 12.2 | 15.4 | 8.5 | 6.0 | 6.3 |
| Fluometuron | 4.2 | 8.6 | 10.6 | 13.4 | 9.6 | 13.0 | 13.2 | 7.9 | 8.0 | 6.3 |
| Isoxaflutole | 3.9 | 10.2 | 8.6 | 18.0 | 7.7 | 15.5 | 11.7 | 6.8 | 7.3 | 5.5 |
| Isoxaflutole + thiencarbazone-methyl | 4.3 | 9.7 | 7.0 | 18.9 | 8.1 | 17.2 | 10.7 | 10.1 | 6.6 | 7.9 |
| Linuron | 3.5 | 9.9 | 10.8 | 20.3 | 9.5 | 13.5 | 16.5 | 7.4 | 7.0 | 5.5 |
| Metribuzin | 3.5 | 6.4 | 9.6 | 10.8 | 8.3 | 12.6 | 15.9 | 7.3 | 6.4 | 4.9 |
| Pyroxasulfone | 3.9 | 9.4 | 11.3 | 15.6 | 8.3 | 14.3 | 10.7 | 7.4 | 8.4 | 7.6 |
| Saflufenacil | 3.5 | 7.9 | 8.9 | 19.9 | 7.4 | 12.4 | 13.2 | 6.4 | 6.0 | 6.9 |
| Simazine | 4.1 | 9.0 | 10.7 | 12.4 | 8.4 | 12.2 | 17.7 | 5.6 | 6.2 | 6.4 |
| Sulfentrazone | 4.0 | 7.4 | 9.0 | 11.3 | 8.7 | 12.6 | 13.4 | 8.8 | 7.3 | 5.5 |
| *Postemergent* |  |  |  |  |  |  |  |  |  |  |
| Acetochlor | 4.3 | 11.0 | 11.4 | 16.3 | 10.0 | 11.6 | 15.4 | 8.4 | 7.9 | 5.5 |
| Chlorimuron-ethyl | 3.3 | 9.1 | 9.9 | 16.5 | 9.3 | 16.2 | 13.2 | 9.2 | 8.5 | 5.7 |
| Clopyralid | 4.6 | 7.6 | 8.6 | 14.0 | 8.7 | 14.3 | 13.5 | 8.4 | 8.4 | 5.6 |
| Cloransulam-methyl | 4.2 | 8.5 | 10.3 | 12.9 | 8.3 | 15.5 | 16.2 | 7.1 | 8.0 | 6.0 |
| Dimethenamid-*P* | 4.5 | 9.2 | 10.0 | 16.4 | 9.2 | 11.7 | 14.8 | 9.0 | 8.5 | 6.1 |
| Fomesafen | 4.3 | 9.3 | 9.0 | 17.1 | 8.4 | 16.4 | 14.5 | 9.5 | 8.2 | 7.3 |
| Imazamox | 4.7 | 10.1 | 10.2 | 17.0 | 9.4 | 14.9 | 15.4 | 7.2 | 10.5 | 5.8 |
| Imazethapyr | 4.0 | 10.8 | 9.9 | 15.1 | 8.7 | 15.9 | 15.0 | 10.1 | 8.1 | 5.9 |
| Mesotrione | 4.0 | 10.2 | 8.2 | 16.0 | 12.9 | 11.0 | 14.7 | 6.7 | 6.3 | 7.8 |
| Pendimethalin | 4.4 | 12.1 | 12.1 | 23.3 | 11.5 | 14.4 | 16.8 | 9.4 | 9.4 | 5.7 |
| Primisulfuron-methyl | 5.0 | 10.7 | 11.2 | 16.7 | 8.2 | 15.3 | 13.1 | 7.5 | 9.6 | 5.7 |
| Prosulfuron | 3.7 | 11.7 | 10.0 | 14.1 | 9.5 | 15.2 | 15.8 | 6.9 | 8.3 | 5.6 |
| Rimsulfuron + thifensulfuron-methyl | 2.9 | 10.7 | 9.1 | 12.1 | 9.2 | 17.1 | 14.6 | 7.1 | 8.0 | 4.6 |
| *S*-metolachlor | 4.4 | 13.0 | 11.9 | 15.6 | 9.2 | 14.3 | 16.7 | 9.4 | 6.8 | 5.6 |
| Tembotrione | 3.8 | 9.5 | 10.9 | 19.3 | 9.2 | 15.5 | 15.4 | 8.0 | 7.7 | 5.4 |
| Thifensulfuron-methyl | 2.8 | 8.5 | 7.8 | 13.2 | 7.3 | 12.6 | 13.1 | 8.1 | 8.6 | 4.3 |
| Topramezone | 3.0 | 8.5 | 10.0 | 17.8 | 7.7 | 14.7 | 11.6 | 9.2 | 7.5 | 6.1 |
| Trifloxysulfuron | 4.6 | 11.5 | 8.8 | 15.2 | 10.4 | 15.4 | 16.1 | 10.0 | 9.8 | 4.9 |

a Cover crops were planted in early September, approximately 14 weeks after preemergence and 10 weeks after postemergence treatment application to a fallow field.

Supplementary Table S2. Biomass of broadleaf cover crop species collected 6 weeks after planting pooled across year.a

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Timingb* | Forage Radish | Austrian Winter Pea | Crimson Clover | Hairy Vetch | Rapeseed |
| Treatment | Suffolk | Blacksburg | Suffolk | Blacksburg | Suffolk | Blacksburg | Suffolk | Blacksburg | Suffolk | Blacksburg |
|

|  |  |
| --- | --- |
| *Preemergent* | g 0.6 m-1 row |

 |
| Atrazine | 19.0 | 74.5 | . | 1.8 | 4.0 | 8.3 | 4.0 | . | . | 32.9 |
| Bicyclopyrone + mesotrione + *S*-metolachlor | 22.4 | 55.3 | . | 1.9 | 4.1 | 7.6 | 2.9 | . | . | 34.4 |
| Flumioxazin | 22.9 | 47.2 | . | 1.6 | 9.0 | 9.6 | 12.2 | . | . | 22.1 |
| Fluometuron | 24.0 | 66.5 | . | 2.2 | 7.2 | 6.4 | 7.4 | . | . | 22.1 |
| Isoxaflutole | 19.9 | 67.2 | . | 3.2 | 6.4 | 7.2 | 8.0 | . | . | 38.3 |
| Isoxaflutole + thiencarbazone-methyl | 21.5 | 55.8 | . | 2.9 | 10.8 | 6.5 | 7.1 | . | . | 39.9 |
| Linuron | 23.2 | 57.8 | . | 2.5 | 6.3 | 8.4 | 7.3 | . | . | 26.2 |
| Metribuzin | 21.2 | 42.5 | . | 1.1 | 4.9 | 4.7 | 6.5 | . | . | 26.7 |
| Pyroxasulfone | 20.3 | 60.9 | . | 1.9 | 8.4 | 8.8 | 8.2 | . | . | 34.6 |
| Saflufenacil | 21.6 | 69.5 | . | 2.0 | 6.2 | 5.4 | 10.5 | . | . | 23.2 |
| Simazine | 20.4 | 39.6 | . | 1.4 | 3.3 | 4.9 | 6.5 | . | . | 37.0 |
| Sulfentrazone | 21.5 | 54.6 | . | 2.9 | 7.2 | 6.0 | 7.6 | . | . | 28.0 |
| *Postemergent* |  |  |  |  |  |  |  |  |  |  |
| Acetochlor | 23.2 | 44.0 | . | 1.8 | 6.0 | 6.4 | 7.5 | . | . | 28.8 |
| Chlorimuron-ethyl | 28.7 | 60.0 | . | 1.7 | 4.6 | 6.9 | 6.3 | . | . | 33.2 |
| Clopyralid | 18.6 | 44.6 | . | 2.5 | 11.1 | 5.6 | 12.5 | . | . | 26.0 |
| Cloransulam-methyl | 20.3 | 51.5 | . | 2.9 | 7.0 | 6.2 | 10.9 | . | . | 31.8 |
| Dimethenamid-*P* | 18.5 | 64.7 | . | 2.8 | 12.6 | 5.9 | 9.0 | . | . | 30.6 |
| Fomesafen | 14.4 | 23.8 | . | 2.2 | 7.0 | 6.7 | 7.8 | . | . | 25.7 |
| Imazamox | 21.9 | 61.0 | . | 1.7 | 8.3 | 7.5 | 11.3 | . | . | 30.5 |
| Imazethapyr | 22.8 | 54.0 | . | 2.5 | 6.7 | 9.0 | 8.5 | . | . | 31.2 |
| Mesotrione | 21.3 | 77.1 | . | 1.7 | 7.4 | 5.5 | 10.3 | . | . | 41.5 |
| Pendimethalin | 20.2 | 66.0 | . | 1.9 | 11.0 | 7.7 | 10.0 | . | . | 34.6 |
| Primisulfuron-methyl | 28.0 | 61.9 | . | 2.1 | 16.5 | 5.6 | 9.5 | . | . | 33.3 |
| Prosulfuron | 23.1 | 61.5 | . | 2.0 | 8.0 | 5.4 | 8.1 | . | . | 36.2 |
| Rimsulfuron + thifensulfuron-methyl | 18.2 | 46.5 | . | 2.0 | 7.0 | 5.5 | 5.8 | . | . | 36.9 |
| *S*-metolachlor | 19.0 | 57.4 | . | 2.2 | 6.9 | 6.0 | 6.4 | . | . | 27.5 |
| Tembotrione | 22.0 | 47.5 | . | 2.5 | 7.5 | 6.1 | 7.3 | . | . | 31.3 |
| Thifensulfuron-methyl | 25.5 | 65.7 | . | 2.5 | 9.0 | 6.4 | 9.5 | . | . | 17.2 |
| Topramezone | 15.8 | 50.2 | . | 2.3 | 10.6 | 5.2 | 6.9 | . | . | 32.9 |
| Trifloxysulfuron | 20.5 | 59.5 | . | 2.5 | 9.6 | 5.1 | 7.8 | . | . | 31.5 |

a Periods in the data set indicate omitted data due to poor cover crop establishment throughout the entire experiment in at least one year of the omitted location.

b Cover crops were planted in early September, approximately 14 weeks after preemergence and 10 weeks after postemergence treatment application to a fallow field.