Table S2 Mean weed control (% ground cover) 60 days after treatment (DAT) of plots treated with three herbicides and organic mulch (Table 5), alone or in combination, at Christmas tree farms in Michigan.

Treatment	Location/ Tree species				
	Allegan White pine	Horton Fraser fir	Sidney Blue spruce	Sidney Fraser fir	Gobles Scotch pine
Clopyralid	9.25 bc*	6.1 cd	61.51 a	25.51 bcde	8.32 bc
Glyphosate	39.92 abc	16.15 cd	58.62 a	13.1 cde	63.68 ab
Oxyfluorfen	55.04 ab	23.03 cd	65.81 a	10.69 de	54.76 ab
Oxyfluorfen + Glyphosate	16.92 abc	76.13 ab	41.19 a	64.02 abc	49.84 ab
Clopyralid + Oxyfluorfen	68.20 ab	81.42 ab	41.31 a	60.12 abcd	52.63 ab
Clopyralid + Glyphosate	20.62 abc	33.32 bc	50 a	71.43 ab	42.57 ab
Mulch	36.56 abc	47.35 abc	83.08 a	2.41 e	87.77 a
Mulch + Oxyfluorfen + Glyphosate	79.14 a	82.57 ab	89.30 a	79.1 ab	92.69 a
Mulch + Clopyralid + Oxyfluorfen	79.14 a	87.71 a	93.89 a	87.02 a	93.89 a
Mulch + Clopyralid + Glyphosate	63.92 ab	82.68 ab	92.79 a	65.37 abc	91.26 a
Clopyralid + Oxyfluorfen + Glyphosate	79.13 a	44.37 abc	91.27 a	66.21 a	78.35 ab
Control	0 c	0 d	0 b	0 e	0 c

* Means within a column followed by the same letter are not significantly different and $p<0.05$ level. Mean separation by Tukey's HSD test.

Table S3 Mean weed control (% ground cover) 30 days after treatment (DAT) of plots treated with three herbicides and organic mulch (Table 5), alone or in combination, at Christmas tree farms in Michigan.

Treatment	Location/ Tree species				
	Allegan White pine	Horton Fraser fir	Sidney Blue spruce	Sidney Fraser fir	Gobles Scotch pine
Clopyralid	6.25 bc	9.73 de**	41.76 b**	33.77 bc**	81.22 a**
Glyphosate	38.88 abc	23.72 cde	78.79 ab	17.56 cd	87.77 a
Oxyfluorfen	76.75 a	26.22 cde	90.74 ab	36.86 bc	76.57 a
Oxyfluorfen + Glyphosate	57.63 ab	74.91 abc	71.43 ab	60.00 abc	57.2 a
Clopyralid + Oxyfluorfen	84.54 a	89.15 a	79.73 ab	80.12 ab	78.16 a
Clopyralid + Glyphosate	49.08 ab	72.26 abc	87.54 ab	73.78 ab	82.75 a
Mulch	31.07 abc	36.08 bcd	83.92 ab	17.9 dc	90.08 a
Mulch + Oxyfluorfen + Glyphosate	80.52 a	88.99 a	88.24ab	82.57 ab	93.89 a
Mulch + Clopyralid + Oxyfluorfen	94.24 a	89.61 a	88.48 ab	92.69 a	97.95 a
Mulch + Clopyralid + Glyphosate	63.34 ab	85.99 ab	99.01 a	87.02 ab	92.37 a
Clopyralid + Oxyfluorfen + Glyphosate	79.13 a	66.21 ab	95.88 a	69.49 ab	95.35 a
Control	0 c	0 e	0 c	0 d	0 b

** Means within a column followed by the same letter are not significantly different and $p<0.05$ level. Mean separation by Tukey's HSD test.

Table S4 Weed control Summary Analysis of Variance (F values) for weed control of factorial combinations of three herbicides and contrast of herbicides treatments with and without mulch. Analyses based on assessments conducted 60 days after treatment (DAT).

Effect	Location/ Tree species				
	Allegan White pine	**Horton Fraser fir**	**Sidney Blue spruce**	**Sidney Fraser fir**	**Gobles Scotch pine**
Clopyralid (Clo)	1.05	17.56***	2.3	33.29**	0
Glyphosate (Gly)	0.13	23.4***	2.06	25.4***	4.28*
Oxyfluorfen (Oxy)	8.04**	76.12***	1.92	16.62***	4.43*
Clo × Gly	0.44	2.27	0.8	0.78	1.02
Clo × Oxy	0.42	1.56	2.24	1.93	0.11
Gly × Oxy	8.13**	0.06	2.03	0.03	7.07*
Clo × Gly x Oxy	1.71	1.42	7.66	2.37	0.59
Contrast: Combinations with mulch vs without	4.19*	6.88*	11.57**	1.27	5.52*

Note * p≤0.05; ** P<0.01; *** p<0.001.

Table S5 Weed control Summary Analysis of Variance (F values) for weed control of factorial combinations of three herbicides and contrast of herbicides treatments with and without mulch. Analyses based on assessments conducted 30 days after treatment (DAT).

Effect	Location/ Tree species				
	Allegan White pine	**Horton Fraser fir**	**Sidney Blue spruce**	**Sidney Fraser fir**	**Gobles Scotch pine**
Clopyralid (Clo)	1.93	35.43***	2.27	29.69***	28.76***
Glyphosate (Gly)	3.93	35.62***	8.66**	11.32**	18.45***
Oxyfluorfen (Oxy)	35.96***	57.32***	10.52**	23.67***	7.18*
Clo × Gly	0.17	0.37	1.1	0	12.91**
Clo × Oxy	0.18	0.39	5.57*	0.57	8.34**
Gly × Oxy	17.14***	3.36	22.27***	0.97	28.96***
Clo × Gly x Oxy	0.13	3.36	2.88	0.01	33.3***
Contrast: Combinations with mulch vs without	0.25	2.79	1.24	3.67	12.55**

Note * p≤0.05; ** P<0.01; *** p<0.001.

Table S6 Mean phytotoxicity percent 60 days after treatment (DAT) of plots treated with three herbicides and organic mulch (Table 1), alone or in combination, at Christmas tree farms in Michigan.

Treatment	Location/ Tree species				
	Allegan White pine	Horton Fraser fir	Sidney Blue spruce	Sidney Fraser fir	Gobles Scotch pine
Clopyralid	8.60 a*	9.53 ab	0 ab	4.12 bc	0a
Glyphosate	7.20 a	11.93 ab	3.20 ab	11.31 ab	2.94 a
Oxyfluorfen	9.25 a	4.26 ab	16.07 ab	8.60 ab	2.83 a
Oxyfluorfen + Glyphosate	8.60 a	34.79 a	1.86 ab	11.13 ab	0.318 a
Clopyralid + Oxyfluorfen	8.32 a	7.91 ab	2.94 ab	4.64 bc	5.14 a
Clopyralid + Glyphosate	4.99 a	16.23 ab	8.49 ab	22.24 a	5.48 a
Mulch	0 b	0 b	0 b	0 c	0a
Mulch + Oxyfluorfen + Glyphosate	11.04 a	7.23 ab	0.65 ab	18.70 ab	0.65 a
Mulch + Clopyralid + Oxyfluorfen	9.25 a	7.47 ab	1.86 ab	6.77 ab	1.27 a
Mulch + Clopyralid + Glyphosate	4.99 a	22.65 a	36.18 a	22.24 a	3.68 a
Clopyralid + Oxyfluorfen + Glyphosate	4.12 a	32.72 a	2.27 ab	21.07 a	4.56 a
Control	0 b	0 b	0 b	0 c	0a

* Means within a column followed by the same letter are not significantly different and $p<0.05$ level. Mean separation by Tukey's HSD test.

Table S7 Mean phytotoxicity percent 90 days after treatment (DAT) of plots treated with three herbicides and organic mulch (Table 5), alone or in combination, at Christmas tree farms in Michigan.

Treatment	Location/ Tree species				
	Allegan White pine	Horton Fraser fir	Sidney Blue spruce	Sidney Fraser fir	Gobles Scotch pine
Clopyralid	0a*	7.04 abc	0 a	0.31 bc	0 c
Glyphosate	1.26 a	6.25 abc	1.27 a	17.10 a	0.32 bc
Oxyfluorfen	1.26 a	6.10 abc	6.49 a	6.10 abc	1.26 abc
Oxyfluorfen + Glyphosate	3.68 a	13.49 ab	2.94 a	11.31 ab	0 c
Clopyralid + Oxyfluorfen	1.85 a	3.69 bc	4.65 a	8.31 abc	0.31 bc
Clopyralid + Glyphosate	1.26 a	13.49 ab	2.83 a	14.35 a	0 c
Mulch	0a	0 c	0 a	0 c	0 c
Mulch + Oxyfluorfen + Glyphosate	2.41 a	7.04 abc	1.27 a	11.89 ab	0.32 bc
Mulch + Clopyralid + Oxyfluorfen	1.26 a	6.37 abc	1.51 a	4.99 abc	1.26 abc
Mulch + Clopyralid + Glyphosate	0.31 a	19.95 ab	23.71 a	9.58 ab	11.00 ab
Clopyralid + Oxyfluorfen + Glyphosate	0.31 a	25.89 a	0 a	9.98 ab	15.69 ab
Control	0a	0 c	0 a	0 c	0 c

* Means within a column followed by the same letter are not significantly different and $p<0.05$ level. Mean separation by Tukey's HSD test.

Table S8 Phytotoxicity Summary Analysis of Variance (F values) for phytotoxicity of factorial combinations of three herbicides and contrast of herbicides treatments with and without mulch. Analyses based on assessments conducted 60 days after treatment (DAT).

Effect	Location/ Tree species				
	Allegan White pine	Horton Fraser fir	Sidney Blue spruce	Sidney Fraser fir	Gobles Scotch pine
Clopyralid (Clo)	2.09	1.98	0.13	4.13	1.85
Glyphosate (Gly)	1.04	15.31***	0.34	24.76***	1.85
Oxyfluorfen (Oxy)	9.93**	4.51*	1.7	2.68	1.58
Clo × Gly	18.38***	1.31	1.48	0.54	0.62
Clo × Oxy	13.55**	1.09	1.25	2.73	0.55
Gly × Oxy	9.29**	0.92	6.42*	2.58	6.64*
Clo × Gly x Oxy	7.43*	0.25	0.21	1.76	0.03
Contrast: Combinations with mulch vs without	0.28	0.04	0.74	5.17*	0.04

Note * p≤0.05; ** P<0.01; *** p<0.001.

Table S9 Phytotoxicity Summary Analysis of Variance (F values) for phytotoxicity of factorial combinations of three herbicides and contrast of herbicides treatments with and without mulch. Analyses based on assessments conducted 90 days after treatment (DAT).

Effect	Location/ Tree species				
	Allegan White pine	Horton Fraser fir	Sidney Blue spruce	Sidney Fraser fir	Gobles Scotch pine
Clopyralid (Clo)	0.47	11.24**	0.57	0.05	4.26*
Glyphosate (Gly)	1.87	31.65***	0.01	23.13***	4.26*
Oxyfluorfen (Oxy)	2.75	9.58**	3.09	3.38	13.28**
Clo × Gly	0.95	0.22	0.13	0.72	8.14**
Clo × Oxy	0.47	3.9	1.67	0	8.14**
Gly × Oxy	1.87	0.53	7.9**	11.89**	1.62
Clo × Gly x Oxy	0.95	5.96**	0.82	0.03	13.28**
Contrast: Combinations with mulch vs without	1.38	5.1*	0.04	0.05	24.76***

Note * p≤0.05; ** P<0.01; *** p<0.001.