TOLERANCE OF TEFF TO HERBICIDES

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Introduction

Teff (*Eragrostis tef*), a warm season annual grass native to Ethiopia, is grown in Oregon for forage, hay and grain. There are no herbicides registered for the control of broadleaf and grass weeds in teff. Two studies were conducted to evaluate the tolerance of teff to herbicides.

One study was conducted to evaluate the tolerance of teff to a variety of herbicides while the other study evaluated the tolerance of teff to dicamba (Clarity), 2,4-D amine (Weedar64) and 2,4-D amine-dicamba (Rifle-D) applied at various timings.

Methods

The 2010 studies were conducted at James Van Leeuwen's farm near Harrisburg, OR. The experimental design was a randomized complete block with four replications and the plots size was 8 ft by 25 ft. Herbicides treatments were applied with a unicycle sprayer calibrated to deliver 20 gallons per acre at 20 psi. The soil at this location is a Dayton silt loam with a pH of 5.9 and an organic matter content of 3.84%. Weed control was not evaluated. Visual evaluations of crop injury were conducted periodically after herbicide applications.

Study 1:

An early postemergence timing, applied to two leaf teff, with flufenacet-metribuzin (Axiom) herbicide was evaluated in the study. Postemergence herbicides evaluated were chlorsulfuron (Glean), dicamba , 2,4-D amine, 2,4-D amine-dicamba, 2,4-D acid-dicamba acid (Latigo), carfentazone (Aim), cloyralid (Stinger), bromoxynil-MCPA (Bronate Advanced) and tribenuron (Express). The postemergence herbicides were applied to 2-5 tiller teff. The crop was hand harvested for biomass on August 2, 2010. The teff and weed species were separated and biomass quantified.

Study 2:

Herbicides tested in the study were dicamba, 2,4-D amine, and 2,4-D amine-dicamba. The herbicide treatments were applied to the teff at four different timings corresponding to the following teff growth stages: two leaf, 1 tiller, 2-5 tiller and the node stage. The crop was harvested for seed on September 28, 2010 with a Wintersteiger small plot combine.

Results

Study 1:

None of the postemergence treatments caused any injury to the crop when applied to two to five tiller teff. Plots treated with flufenacet-metribuzin produced no biomass.

The teff yield data (biomass) presented in Table 1 does not contain biomass from the weed populations present in the plots resulting from a lack of efficacy since this study focused on teff tolerance to different herbicides. The weeds were separated out of the samples and weighed separately (Table 1).

The plots treated with flufenacet-metribuzin produced no biomass and there were no differences in teff biomass production between any of the postemergence treatments. These results indicate that some of these herbicides might be useful to control emerged weeds in teff depending on the weed spectrum present in the field. Further evaluation is needed with this suite of herbicides to optimize application timings and rates in teff.

Study 2:

The final visual ratings of teff injury resulting from the herbicide applications, teff seed yield and percent germination of harvested seed are included in Table 2. 2,4-D amine applied at the one tiller timing resulted in the most injury and reduced teff yield. All other treatments and timings resulted in little to no injury to the teff and the yields and germination of the harvested teff seed were not significantly different from the untreated control.

These results indicate that 2,4-D and dicamba when applied at these rates and at appropriate timings would be useful tools for broadleaf weed management in teff production systems. 2,4-D amine and dicamba have been submitted to IR-4 program to begin the labeling process. Again, there are no herbicides registered for use in teff and the only chemical weed management option available for growers is to apply glyphosate prior to planting to control emerged weeds.

Table 1. Biomass yield of teff at Van Leeuwen Farm, 2010.

Treatment	rate	appl. code	Biomass[1] weed	Biomass[1] teff
	(lb a.i./a)		------ (lb/a)	--------
check	0		125	3503
flufenacet-metribuzin*	0.42	A	0	0
chlorsulfuron	0.0117	B	24	3650
chlorsulfuron	0.0234	B	14	3847
dicamba	0.25	B	65	3754
2,4-D amine	1	B	22	3574
2,4-D amine-dicamba	0.71	B	64	4010
2,4-D acid, dicamba acid	0.656	B	20	3995
carfentrazone	0.012	B	37	3999
clopyralid	0.125	B	20	4012
bromoxynil-MCPA	0.75	B	1	4029
tribenuron	0.0078	B	52	3555
LSD (0.05)			73	825

* the crop was killed by this treatment
A – Applied June 7, 2010
B – Applied July 8, 2010
[1] Harvested August 2, 2010

Table 2. Teff injury and seed yield at Van Leeuwen Farm, 2010.

Treatment	rate	appl. code	Teff injury[1]	Teff seed yield[2]	Teff seed germ.
	(lb a.i./a)		(%)	(lb/a)	(%)
check	0		0	1405	75
dicamba	0.25	A	0	1086	75
dicamba	0.5	A	5	801	78
2,4-D amine	1	A	3	917	81
2,4-D amine	2	A	10	710	76
2,4-D amine-dicamba	0.71	A	8	781	76
dicamba	0.25	B	0	1030	81
dicamba	0.5	B	0	1174	77
2,4-D amine	1	B	13	580	75
2,4-D amine	2	B	20	410	76
2,4-D amine-dicamba	0.71	B	10	738	76
dicamba	0.25	C	3	1193	78
dicamba	0.5	C	0	803	74
2,4-D amine	1	C	0	1093	79
2,4-D amine	2	C	3	1116	76
2,4-D amine-dicamba	0.71	C	0	113	74
dicamba	0.25	D	8	754	74
dicamba	0.5	D	3	1119	78
2,4-D amine	1	D	0	1327	76
2,4-D amine	2	D	0	1086	77
2,4-D amine-dicamba	0.71	D	0	1156	78
LSD (0.05)				632	NS

A – Applied June 7, 2010
B – Applied June 21, 2010
C – Applied July 18, 2010
D – Applied July 14, 2010
[1] Evaluated September 8, 2010
[2] Harvested September 28, 2010