Evaluating Desiccants for After Harvest Burn Down in Grass Seed Fields

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Abstract

The potential use of herbicides for plant burn down after harvest in Kentucky bluegrass was evaluated in central Oregon in fall, 2013. Two studies with different environmental conditions after the applications were conducted in October. The herbicides tested included glufosinate (Rely 280®) at 3.5 pt/acre, saflufenacil (Sharpen®) at 4 fl oz/acre, diquat (Reglone®) at 2 pt/acre, flumioxazin (Valor®) at 3 oz/acre, and propane burner as the comparison standard. Diquat reduced percent moisture in plant tissue regardless of the environmental conditions after spraying, although effects were more rapid under cloudy weather with rain showers. Glufosinate 10 days after treatment, provided moisture reduction equivalent to diquat and propane burner with sunny and dry conditions followed the application. None of the tested herbicides had an impact on plant biomass production, a factor that should be taken in consideration if this is the management objective.

Introduction

Grass seed fields can remain in a vegetative state when mild and moist conditions follow harvest. The removal of this green biomass is then delayed, affecting the development of the crop during the next season. Under these conditions, the management of the remaining straw is a challenge to all grass seed fields. Desiccants are used as harvest aids in many crops, and would facilitate the foliar burn down of the grass plants when applied after harvest. This approach would particularly benefit, fields within an eighth of a mile of highways where burning is not allowed. However, there can also be a benefit for fields that are burned, include more timely management of the crop residues, reduced number of fires required after harvest due to less remaining residue, and reduced propane burning. These factors can help minimize the amount of smoke produced by field burning. The herbicide Paraquat has been used as desiccant, but increasing restrictions regarding pesticide residues makes the labeling of this product very difficult. A new generation of harvest aids are currently being applied to other crops, but no information regarding their use or impacts in grass seed fields is available.

The objective of this study was to evaluate the use of herbicides as desiccants for burn down in grass seed fields with inadequate drying following harvest.

Materials and Methods

Two field studies were conducted in October of 2013 on an established Kentucky bluegrass field at COARC, Madras, Oregon. The study design was a randomized complete block with four replications with a plot size of 12 by 25 ft. The treatments consisted of glufosinate (Rely 280®), saflufenacil (Sharpen®), diquat (Reglone®), flumioxazin (Valor®), and propane burner as the comparison standard. Not all herbicides tested for burn down are currently labeled for use in grasses grown for seed, but were selected because they are being used in other crops as harvest aids. Herbicides were applied with a backpack sprayer calibrated to deliver 20 gallons of spray

solution per acre at 40 psi pressure using XR 8002 Teejet® nozzles. Application dates and environmental conditions for each study are detailed in Table 1.Herbicide rates and adjuvants are detailed in Table 2.Moisture content from plant tissue was estimated by harvesting plant biomass from a 6 ft^2 area. Fresh and dry weight of plant samples collected 3, 7 and 10 days after treatment (DAT) was recorded. Plots will be harvested in 2013 to evaluate the impacts of each treatment on grass seed yield.

Results and Discussion

The percent moisture in plant biomass in study "A" was reduced with diquat applied at 2 pt/acre, reduction occurred quickly and was evident 3 DAT (Table 2). Moisture reduction obtained with diquat was comparable to the use of propane burner. Moisture content increased in the following days reaching 48 percent for diquat 10 DAT. Nevertheless, this moisture content remained the lowest among the tested treatments.

In study "B" diquat at 2 pt/acre and glufosinate at 3.5 pt/acre effectively reduced plant moisture similarly to the use of propane burner, but the reduction was only noticeable 10 DAT.
The studies were located adjacent to each other so the differences observed in herbicide performance can be attributed greatly to the environmental conditions following the applications. For study "A" conditions after the application were cloudy and with showers (Average daily radiation = 316 Langley/day, total rain = 0.1 inches), while for study "B" weather was mostly sunny and dry (Average daily radiation = 437 Langley/day, total rain = 0).

Desiccants were effective in reducing the percent moisture in plant tissue but they had no impact in total biomass produced (Table 3). This fact should be taken in consideration if biomass reduction is a management objective. The impact of these treatments in seed yield will be evaluated next year. There are herbicides that have the potential to be alternatives for use as burn down in Kentucky bluegrass, performance will not only depend on the active ingredient used, but also by environmental conditions following after the application. Nevertheless, none of these alternatives will have an impact on plant biomass as the use of propane burner.

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Table 1. Application date and environmental conditions for the herbicide applications.

	Study "A"	Study " B"
Application Date	10/3	10/10
Time of Day	11 AM	9 AM
Air temperature (F)	46	41
Relative Humidity (%)	70	82
Wind Speed (MPH)	3	3
Wind Direction	W	SW

Table 2. Plant biomass percent moisture for each treatment, 3, 7 and 10 days after treatment.

				Plant biomass % moisture[3]					
				Study "A"			Study "B"		
	Treatment[12]	Rate	Unit	3 DAT[2]	7 DAT	10 DAT	3 DAT	7 DAT	10 DAT
1	Glufosinate Ammonium sulfate	3.5	pt/acre	58 a	60 a	57 a	57 ab	77 a	39 b
2	Saflufenacil MSO Ammonium sulfate	4	fl oz/acre	58 a	57 a	60 a	58 a	76 a	55 a
3	Diquat NIS	2	pt/acre	39 b	40 b	48 b	51 b	80 a	37 b
4	Flumioxazin MSO	3	oz/acre	58 a	58 a	60 a	57 ab	74 a	51 a
5	Propane burner			31 b	34 b	42 b	34 c	27 b	34 b
	Untreated Check			59 a	59 a	60 a	55 ab	75 a	51 a
	LSD (P=.05)			5	7	6	5	8	7

[1]Some treatments included in the study were used for experimental purposes and are NOT currently labeled for public use. Before using an herbicide, make certain is it properly labeled for the intended use.
[2]Means among columns followed by the same letter are not different at P=0.05.
[3]Abbreviations: Days after treatment, DAT, methylated seed oil, MSO, nonionic surfactant, NIS

Table 3. Average dry biomass 10 days after treatment.

	Treatment[1]	Rate	Unit	Dry biomass (lb/a)[2] Study "A"		Study "B"	
1	Glufosinate Ammonium sulfate	3.5	pt/acre	609	a	449	a
2	Saflufenacil MSO[3] Ammonium sulfate	4	fl oz/acre	641	a	513	a
3	Diquat NIS	2	pt/acre	545	a	481	a
4	Flumioxazin MSO	3	oz/acre	641	a	609	a
5	Propane burner			192	b	64	b
	Untreated Check			577	a	513	a
	LSD (P=.05)			224		256	

[1]Some treatments included in the study were used for experimental purposes and are NOT currently labeled for public use. Before using an herbicide, make certain is it properly labeled for the intended use.
[2]Means among columns followed by the same letter are not different at P=0.05.
[3]Abbreviations: Methylated seed oil, MSO, nonionic surfactant, NIS