REDSTEM FILAREE (*ERODIUM CICUTARIUM*) CONTROL IN SUGARBEETS

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ABSTRACT

Field experiments were conducted at the Powell Research and Extension Center, WY to evaluate the effect of preplant and/or postemergence herbicides on redstem filaree control in sugarbeets. Preplant treatments consisted of ethofumesate and/or pyrazon. Postemergence treatments consisted of standard rate and micro-rate of desmedipham-phenmedipham-ethofumesate plus triflusulfuron plus clopyralid. Micro-rate system included 1.5% methylated seed oil. Redstem filaree control increased as the number of applications increased. The highest control was achieved with four applications using micro-rate (96%). There was no significant difference between treatments containing preplant herbicides and those without. Sugarbeet injuries were higher with standard than micro-rate treatments. With standard rate sugarbeet injuries increased as the number of applications increased. Sugarbeet root yields were higher in treated plots than the check and closely related to redstem filaree control and sugarbeet injury. Sugar content was not affected by any of the treatments.

INTRODUCTION

Redstem filaree (*Erodium cicutarium* L.) is becoming a serious weed problem in sugarbeet fields in northern Wyoming. This weed species originated in the Mediterranean region of Europe and has spread to many areas of the world including Africa (Venter and Verhoeven 1990), Australia (Stephenson 1992), South and North America (Cudney et al. 1993; Harmon and Stamp 1992; Pelaez et al. 1995).

Redstem filaree, a winter annual or biennial broadleaf, is a prolific seed producer (Blackshaw and Harker 1998a) and can quickly develop into dense infestations. Blackshaw (1992) reported that under controlled condition, redstem filaree seeds germinated at soil temperature of 5 to 20 C and produced optimal vegetative growth at 15 to 20 C.

Information about redstem filaree competitive ability with crops is scarce. Studies have shown that redstem filaree has the ability to compete and cause major economic losses in perennial pasture and forage crops such as alfalfa (Cudney et al. 1993; Palmer 1976) and in annual cereals and oilseed crops (Blackshaw and Harker, 1998). In a zero-tillage cropping system study, Blackshaw et al. (2000) found that an increase in wheat (*Triticum aestivum*) seeding rate from 50 to 300 kg/ha reduced redstem filaree biomass and seed production by 53 to 95%. No data are available on the competitive effect or control of redstem filaree in sugarbeets.

This study was conducted to determine a) the effect of preplant and postemergence herbicides on redstem filaree control b) herbicide rate, number and time of applications required to control redstem filaree without injuring sugarbeets.

MATERIALS AND METHODS

Field experiments were conducted in 2001 and 2002 at the Research and Extension Center, Powell, WY on a Garland clay loam soil (fine, mixed Mesic, Typic Haplargid) with pH 7.7 and 1.4% organic matter. Sugarbeet (Var. Geyser) seeds were planted to stand in rows spaced 56-cm apart on April 19, 2001 and April 28, 2002. Redstem filaree seeds were broadcast with a cyclone seeder prior to sugarbeet planting. Ethofumesate and/or Pyrazon herbicides were applied and incorporated to a depth of 2 to 3 cm with a rotary power incorporator during the planting operation. Postemergence treatments consisted of the combination desmedipham-phenmedipham-ethofumesate plus triflusulfuron plus clopyralid. Herbicides rates consisted of standard and micro-rate (Table 1) applied broadcast with a CO_2 pressurized knapsack sprayer delivering 190 litre/ ha. Micro-rate treatments included methylated seed oil at 1.5 % v/v. Standard treatments consisted of two or three applications, while, micro-rate treatments consisted of three or four applications starting at sugarbeet cotyledon stage with 7-day interval between applications.

Experimental units consisted of six sugarbeet rows 10-m long were established under furrow irrigation. Percent redstem filaree control was calculated by counting number of redstem filaree plants in 15-cm by 3-m area from the two middle rows in each plot. Sugarbeet injuries were visually evaluated 2 weeks after the last application. Sugarbeet roots were harvested from the entire length of the center row in each plot using a one-row, wheel type harvester on October 11, 2001 and October 7, 2002. The total sugarbeet weight from each plot was used to calculate root yield/ha. Root yield were adjusted for a 5 percent tare. A sample of 10 beets was taken from each plot and sent to Western Sugar Company in Billings, Montana for quality analysis.

The experimental design was a randomized complete block and the treatments were replicated three times. Sugarbeet injury, root yield and percent redstem control data were analyzed using standard analysis of variance procedures (Steel and Torrie, 1980). When significant differences were detected among treatments, Fisher=s protected Least Significant Difference (LSD) at 5% probability level was calculated and used as a means separation technique.

Table 1. Herbicide rates on g/ha for standard and micro-rate treatments.

Herbicides	standard rate (g/ha)	Micro-rate (g/ha)
Desmedipham/phenmedipham/ethofumesate	284	91
Triflusulfuron	18	4.5
Clopyralid	102	26
Methylated seed oil	---	1.5% v/v

RESULTS AND DISCUSSI ON

Redstem filaree control increased as the number of applications increased. Without preplant herbicides, redstem filaree control with standard treatments increased from 72 to 80% as the number of applications increased from two to three applications (Table 1). Two applications of standard rate starting at two leaf stage was poor (55%) compared to treatments starting at cotyledon stage. Ethofumesate and/or pyrazon applied as preplant did not show any significant effect on redstem filaree control. Sugarbeet injuries were higher with standard treatments and increased as the number of applications increased. Treatment containing pyrazon as preplant caused the highest injury. Sugarbeet root yields were higher in treated plots than the check. In general, root yields appear to be closely related to redstem control as well as sugarbeet injury.

Table 2. Redstem filaree control and sugarbeet response to pyrazon and/or ethofumesate as preplant followed by two or three post applications using standard treatments.

Treatments	Application		Sugarbeet			Redstem filaree Control
	Rate	Timing	Injury	Sucrose	Yield	
	(g/ha)	(days)	(%)	(%)	(T/ha)	(%)
Pyrazon/ des-phen-etho + triflusulfuron + clopyralid	1700 284+18+102	PPI Cot/7d	7	17.3	47.5	75
Ethofumesate/ des-phen-etho + triflusulfuron + clopyralid	1700 284+18+102	PPI Cot/7d	5	17.1	48.8	77
Pyrazon + ethofumesate/ des-phen-etho + triflusulfuron + clopyralid	850+850 284+18+102	PPI Cot/7d	5	17.6	50.5	74
Des-phen-etho + triflusulfuron + clopyralid	284+18+102	Cot/7d	0	17.3	47.5	72
Des-phen-etho + triflusulfuron + clopyralid	284+18+102	2-lf/7d	0	17.3	44.3	55
Pyrazon/ des-phen-etho + triflusulfuron + clopyralid	1700 284+18+102	PPI Cot/7d/14d	9	17.4	52.0	84
Ethofumesate/ des-phen-etho + triflusulfuron + clopyralid	1700 284+18+102	PPI Cot/7d/14d	7	17.4	53.3	84
Pyrazon + ethofumesate/ des-phen-etho + triflusulfuron + clopyralid	850+850 284+18+102	PPI Cot/7d/14	7	17.6	55.0	82
Des-phen-etho + triflusulfuron + clopyralid	284+18+102	Cot/7d/14d	4	17.7	51.5	80
Weedy check	---	---	--	17.2	40.8	--
LSD (0.05)	---	---	4	NS	4.6	8.4

Similarly, redstem filaree control with micro-rate treatments increased as the number of applications increased (Table 2). Without preplant herbicides, redstem filaree control increased from 84 to 96% as the number of application increased from three to four applications. Redstem filaree control was similar between treatments containing preplant herbicides and those without.

With micro-rate treatments, no sugarbeet injury was recorded except with treatments containing pyrazon (3 to 5%). With micro-rate treatments, Sugarbeet root yields were higher in treated plots than the check and were closely related to redstem filaree control. Sucrose content was similar among all treatments including the check.

Redstem filaree control appears to be influenced by the time and number of applications. At cotyledon stage, redstem filaree is very sensitive to herbicides than at two leaf stage. For an effective control of redstem filaree, the number of applications appears to be very important. Micro-rate treatments were very effective in controlling redstem filaree without causing any damage to sugarbeet.

Table 3. Redstem filaree control and sugarbeet response to pyrazon and/or ethofumesate as preplant followed by three or four post applications using micro-rate treatments.

Treatments	Application		Sugarbeet			Redstem filaree Control
	Rate	Timing	Injury	Sucrose	Yield	
	(g/ha)	(days)	(%)	(%)	(T/ha)	(%)
Pyrazon/ des-phen-etho + triflusulfuron + clopyralid + MSO	1700 91+4.5+26	PPI Cot/7d/14	5	17.5	49.8	88
Ethofumesate/ des-phen-etho + triflusulfuron + clopyralid + MSO	1700 91+4.5+26	PPI Cot/7d/14d	0	17.4	51.0	85
Pyrazon + ethofumesate/ des-phen-etho +riflusulfuron + clopyralid + MSO	850+850 91+4.5+26	PPI Cot/7d/14d	3	17.5	55.0	88
Des-phen-etho + triflusulfuron + clopyralid + MSO	91+4.5+26	Cot/7d/14d	0	17.7	55.8	84
Pyrazon/ des-phen-etho + triflusulfuron + clopyralid + MSO	1700 91+4.5+26	PPI Cot/7d/14d/21d	0	17.2	59.0	94
Ethofumesate/ des-phen-etho + triflusulfuron + clopyralid + MSO	1700 91+4.5+26	PPI Cot/7d/14d/21d	0	17.6	57.3	94
Pyrazon + ethofumesate/ des-phen-etho + triflusulfuron + clopyralid + MSO	850+850 91+4.5+26	PPI Cot/7d/14d/21d	3	17.4	58.5	92
Des-phen-etho + triflusulfuron + clopyralid + MSO	91+4.5+26	Cot/7d/14d/21d	0	17.6	60.0	96
Weedy check	---	---	--	17.2	40.8	--
LSD (0.05)	---	---	4	NS	4.6	8.4

MSO=Methylated seed oil at 1.5% v/v.

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