EVALUATION OF HERBICIDE APPLICATIONS FOLLOWING FORAGE HARVEST TO CONTROL SMOOTH BEDSTRAW

ÉVALUATION DE TRAITEMENTS HERBICIDES APPLIQUÉS APRÈS LA RÉCOLTE DU FOURRAGE POUR LE CONTRÔLE DU GAILLET MOLLUGINE

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Abstract: Smooth bedstraw (*Galium mollugo*) is becoming a serious weed in pastures, hayfields and field margins across the Maritime region. It is typically found in acidic, low fertility areas but is moving into intensively managed areas. A trial was initiated near Bathurst, New Brunswick to evaluate herbicide control options, with application made two weeks after forage harvest. All rates of triclopyr and aminopyralid tested offered consistent control of smooth bedstraw in the season of application and into the season following application. The addition of 2,4-D amine to aminopyralid did not improve control. MCPA amine, mecoprop/MCPA/dicamba, 2,4-D amine and carfentrazone-ethyl demonstrated early activity on the weed but the effect dissipated in further evaluations. Triclopyr and aminopyralid significantly improved grass species ground cover in the year following application. The cost and control of aminopyralid and triclopyr should be evaluated further in the Maritimes, especially in comparison to glyphosate application followed by fertility and re-seeding treatments.

Résumé : Le gaillet mullogine (*Galium mollugo*) est une mauvaise herbe qui envahit de plus en plus les pâturages, les prairies et la bordure des champs dans l'ensemble de la région des Maritimes. On le trouve généralement en terrain acide et peu fertile, mais il tend à s'implanter dans les zones d'aménagement intensif. Un essai a été conduit près de Bathurst, au Nouveau-Brunswick, pour évaluer diverses options de traitement herbicide appliqué deux semaines après la récolte du fourrage. Toutes les doses de triclopyr et d'aminopyralide testées ont permis un contrôle uniforme des plants de gaillet au cours de la saison du traitement et au cours de la saison qui a suivi le traitement. L'ajout de 2,4-D amine à l'aminopyralide n'a pas amélioré le contrôle. Les produits MCPA amine, mécoprop + MCPA + dicamba, 2,4-D amine et carfentrazone-éthyle ont eu une action rapide sur la mauvaise herbe, mais l'effet s'était estompé lors des évaluations ultérieures. Le triclopyr et l'aminopyralide ont amélioré considérablement le couvert herbacé l'année qui a suivi leur application. Il y a lieu de poursuivre l'évaluation coût-efficacité de l'aminopyralide et du triclopyr dans les Maritimes, surtout en comparaison du traitement de glyphosate suivi d'épandages d'engrais et d'un réensemencement.

Introduction

Smooth bedstraw (*Galium mollugo*) is becoming a serious weed in pastures, hayfields and field margins across the Maritime region. This plant typically occurs first along roadsides, progressively moving inwards. Smooth bedstraw's invasive nature allows this plant to out-compete forage species, reducing the value of the stand. This weed contains the toxin anthraquinone that can cause systemic toxicity and skin disorders in mammals. Forage storage quality issues and poor animal performance on high diets of smooth bedstraw have been observed. Herbicides have shown activity on smooth bedstraw, although application rates for New Brunswick producers should be evaluated.

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Materials and Methods

The trial was established in a commercial hayfield with a heavy infestation of smooth bedstraw in the Bathurst region of New Brunswick (Figure 1). The area was a low input hayfield which was established more than 25 years ago. There was a large variability in forage species growth, except for the bedstraw. The trial design was a randomized complete block evaluating fourteen herbicide treatments compared to an untreated control. Each treatment was applied to a 2m x 6m plot and had four replicates. Herbicide treatments were applied with a CO_2 handheld sprayer at a pressure of 207 kPa in an equivalent water volume of 200 L/ha. Applications were made on July 19, 2007, 16 days after forage harvest in an area with 75 % bedstraw infestation with regrowth to 5-10 cm in height with 5-8 whorls present. Herbicide treatments included four rates of triclopyr (240, 480, 960 and 1920 g ai/ha), two aminopyralid rates (60 and 120 g ai/ha), aminopyralid plus 2,4-D amine (60 g ai/ha plus 840 g ai/ha), high rate of aminopyralid plus 2,4-D amine (120 g ai/ha plus 1440 g ai/ha), MCPA amine (500 g ai/ha), Mecoprop+MCPA+dicamba (600 g ai/ha), two rates of 2,4-D amine (840 and 1440 g ai/ha) and two rates of carfentrazone ethyl (18 and 28 g ai/ha plus 0.25% v/v Agral 90). Visual crop injury and weed control ratings were measured on July 30, 2007; August 13, 2007; October 17, 2007; May 29, 2008 and May 27, 2009. These ratings were evaluated on a scale of 0-100 where 0 represented no injury or weed control and 100 represented complete control or complete crop loss. An additional visual estimate of percent grass groundcover was taken on May 29, 2008. An analysis of variance was performed on all data and means were separated using the least significant difference test (LSD $P<0.05$).

Figure 1. Smooth bedstraw infestation at the trial location in 2007.

Results

Only the highest application rate of triclopyr resulted in detectable crop injury on the first rating date (data not presented). All other treatments and rating dates did not show any crop injury. Weed control, as shown in Table 1, was excellent for all triclopyr and aminopyralid treatments in general (Figure 2). A slight rate effect was noted as the lowest triclopyr rate had significantly lower control than the highest two rates on July 30. This effect was not noted on August 13, 2007, but a difference was noted for the lowest triclopyr rate on October 17, 2007, where there was a significant reduction as compared to the other triclopyr treatments. This lower rate would still be commercially acceptable. No significant difference between aminopyralid treatments was noted, although with

aminopyralid alone there was reduced control on the first rating date. Carfentrazone treatments provided early suppression of smooth bedstraw, although these suppression levels were reduced as the trial progressed and would not be commercially acceptable. All other treatments were ineffective for smooth bedstraw control and no difference to the untreated control was observed by the October 17, 2007 rating date. In the next two seasons, the control ratings for all treatments did not vary from previous ratings. All aminopyralid and triclopyr treatments continued to have excellent bedstraw control, with a slight rate effect shown for the lowest triclopyr rate. These treatments also significantly improved grass groundcover, almost tripling the grass coverage as compared to the untreated control. Other herbicide treatments improved grass coverage, but not to the extent of the triclopyr and aminopyralid treatments.

Figure 2. Untreated (L) and triclopyr (R) effect on smooth bedstraw on Aug. 13, 2007.

Table 1. Mean smooth bedstraw control (percent) and grass ground cover on May 29, 2008 after herbicide treatments applied after forage harvest in Bathurst, NB

Treatment	July 30, 2007	Aug. 13, 2007	Oct. 17, 2007	May 29, 2008	May 27, 2009	Grass Cover
Untreated	0 i*	0 e	0 d	0 e	0 c	34 f
triclopyr (240 g ai)	84 cd	91 a	85 b	88 b	75 b	74 b
triclopyr (480 g ai)	93 abc	97 a	96 a	95 ab	95 a	88 a
triclopyr (960 g ai)	97 a	97 a	95 a	98 a	98 a	90 a
triclopyr (1920 g ai)	96 a	98 a	95 a	98 a	98 a	90 a
aminopyralid (60 g ai)	83 d	95 a	94 a	96 ab	94 a	88 a
aminopyralid (120 g ai)	86 bcd	95 a	96 a	98 a	97 a	88 a
aminopyralid (60 g ai) +2,4-D amine	92 abcd	97 a	95 a	97 a	97 a	90 a
aminopyralid (120 g ai) +2,4-D amine	94 ab	97 a	96 a	98 a	98 a	91 a
MCPA amine	38 g	18 cd	0 d	0 e	0 c	44 def
mecoprop+MCPA+dicamba	33 g	25 c	0 d	1 e	0 c	48 cde
2,4-D amine (840 g ai)	18 h	13 d	0 d	0 e	0 c	40 ef
2,4-D amine (1400 g ai)	35 g	17 cd	0 d	9 de	0 c	53 cd
carfentrazone (18 g ai)	53 f	25 c	5 d	16 d	0 c	50 cde
carfentrazone (28 g ai)	71 e	45 b	23 c	28 c	0 c	59 c
LSD(0.05)**	9.80	10.14	7.77	8.90	8.13	11.31

*Means followed by the same letter do not differ significantly within columns (p=0.05)
**Least Significant Difference (p=0.05)

Discussion

The extremely high smooth bedstraw population in this trial demonstrated that the non-triclopyr and non-aminopyralid treatments would not offer acceptable weed control under high population pressures. No significant benefit was shown by increasing triclopyr rate above 480 g ai/ha, or by increasing aminopyralid rates above 60 g ai/ha or by adding 2,4-D amine to aminopyralid during the season of application. Higher rates may be of benefit to control other weeds (goldenrod or tree species). No treatment differences were noted into the third season following application. Both aminopyralid and triclopyr have a high commercial price, so the cost of use should be evaluated against the costs of alternative control measures, such as a glyphosate renovation, fertility treatment and re-establishment of the forage stand. Both products would also have a negative effect on any legume species in the forage stand, so producers should consider the effect of legume loss after application of these products. Both triclopyr and aminopyralid demonstrated a high level of smooth bedstraw control in the season of application and proved to be viable control options for high-value forage stands in New Brunswick.

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