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## Weed Survey and Management Practices Used in Alfalfa (*Medicago sativa*) Seed Fields in 1997

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### Abstract

A weed survey in alfalfa seed fields, located primarily in northeast Saskatchewan, was conducted in 1997. Following the weed survey, a farm management questionnaire was used to determine the influence of farm management practices on the surveyed weed community. Results from the weed survey and farm management questionnaire were compared to a similar survey and questionnaire conducted in 1989-90. Wild oats and green foxtail were the most abundant annual grass weeds and their relative abundance did not change significantly. Narrow-leaved hawk's-beard generally decreased in relative abundance while perennial weed species usually increased. Herbicides were the most common weed management practice used in Saskatchewan alfalfa seed fields and their use increased compared to the previous questionnaire. Group 1 herbicide use exceeded the recommended frequency to delay the onset of resistance in wild oats and green foxtail in over half of the fields surveyed. The increase in herbicide use may account for the reduction in relative abundance of some annual broad-leaved weed species between 1989-90 and 1997. The decrease in annual weed competition may have allowed some perennial weeds, which are harder to control with herbicides, to increase in relative abundance.

### Introduction

Weed surveys provide valuable information by documenting the size and extent of weed infestations. In the past, weed surveys in Western Canada have concentrated on determining the weed populations in annual crops. Only a few surveys have been conducted in alfalfa seed fields and only one weed survey included a farm management questionnaire. The objectives of the weed survey and management questionnaire in Saskatchewan alfalfa seed fields were to a) determine the relative abundance of weeds, b) determine the management practices used, c) identify shifts in weed populations and management practices, and d) investigate the association of management practices and weed populations.

## Materials and Methods

The 1997 weed survey was conducted primarily in northeastern Saskatchewan with the exception of some fields near Shell Lake, Parkside, and Prince Albert. Weeds were counted within 20 quadrats along an inverted W-pattern within 120 fields ranging in age from establishment to eight year old stands. Weed counting commenced on August 6, 1997 and was completed on August 28, 1997. Weed count data were processed using several SAS procedures and summarized using relative abundance, which is based on weed frequency, uniformity and density. Following the weed survey, farm management questionnaires were sent to participating producer members. The questionnaire addressed a wide range of topics including field characterization, cropping patterns, seeding practices, tillage, fertility management, herbicide use, weed control practices, yield and troublesome weeds. Eighty-nine questionnaires were returned. Only the questions regarding weed control practices and herbicide use are summarized in this paper. Data from the weed survey and the management questionnaire were compared to a previous survey and questionnaire conducted between 1989-90 (Malik et al. 1991; Thomas pers. comm.). The 1989-90 survey included 42 alfalfa seed production fields located in northeast Saskatchewan.

## Results and Discussion

**Weed survey.** As a group, perennial weeds were the most abundant weeds observed in both surveys (Fig. 1 and 2). Most of the perennial weed species increased in 1997 compared to the 1989-90 survey. The four following perennial weeds had the highest relative abundance values in 1997: dandelion, quack grass, perennial sow-thistle, and Canada thistle. Dandelion and Canada thistle had the largest increase in relative abundance. Comparing results from the 1989-90 survey with 1997 results indicates that some facultative winter annual broad-leaved weeds, such as narrow-leaved hawk's-beard, common peppergrass, American dragonhead, bluebur and flixweed, decreased in relative abundance while Canada fleabane and shepherd's-purse increased. The summer annuals wild buckwheat and lamb's-quarters have increased. Wild oats and green foxtail were the two most abundant annual grass weeds observed in both surveys. The relative abundance of these two weeds did not change significantly.

**Farm management questionnaire.** Herbicides were the most common weed control practice used on the surveyed fields (Table 1). The most common alternative weed control practices used was clean machinery. Roguing, mowing, and chaff collection or burning were used on about 20% of the fields. The use of herbicides in alfalfa increased in 1997 compared to 1989-90 (Table 2). Most of the increase in herbicide use was due to the increase in the use of Group 1 and 2 products. In 1989-90, 24% of the fields were treated with a Group 1 or 2 product compared to 71% in 1997. Assure (quizalofop-p-ethyl) and Pursuit (imazethapyr) were the most used products in these groups. Overall, Group 4 usage decreased and there was a switch from MCPA to 2,4-DB products. Velpar (hexazinone) was the most frequently used Group 5 product in 1997. Group 1 herbicides were used more than once in three years in 59% of the fields surveyed (Table 3). This usage exceeded the recommended frequency of more than once in three years to delay the onset of resistance in wild oats and green foxtail (Beckie et al. 1998).

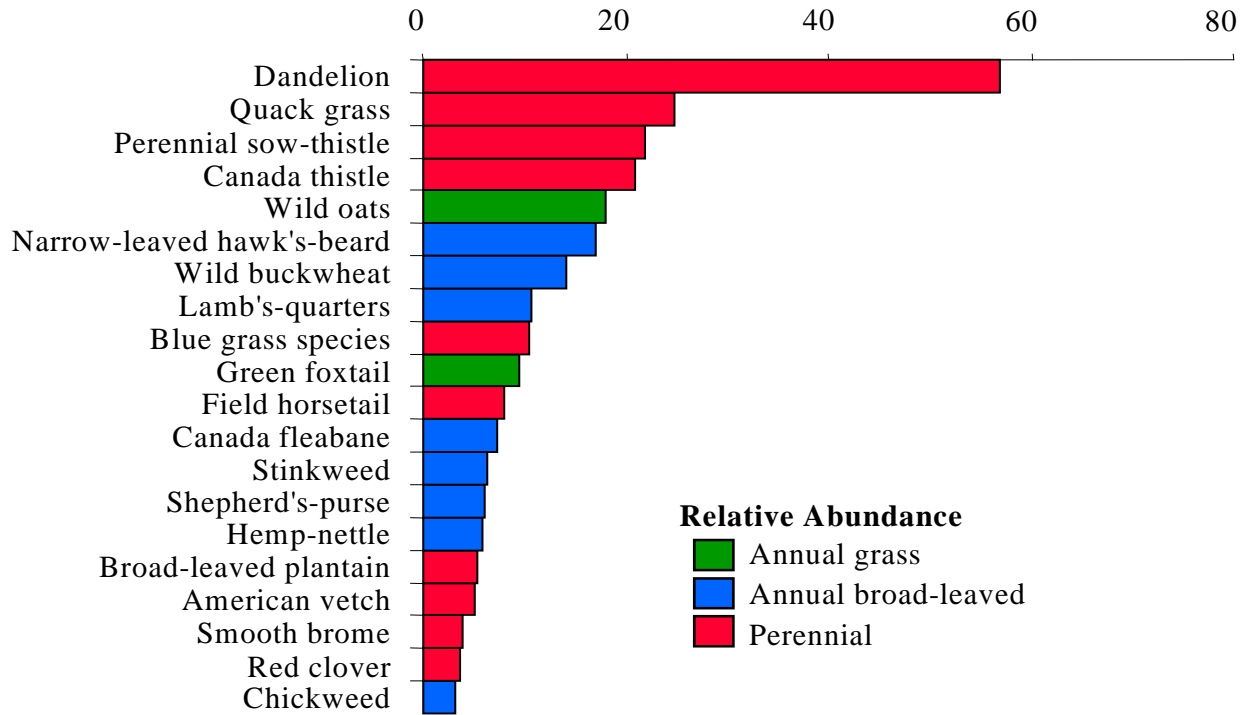
The increase in herbicide use could explain why the relative abundance of some annual broad-leaf weed species declined since the last weed survey. The reduction in annual broad-leaf weed competition may partially explain why perennial weeds, which are harder to control with herbicides, increased in relative abundance.

### **Acknowledgements**

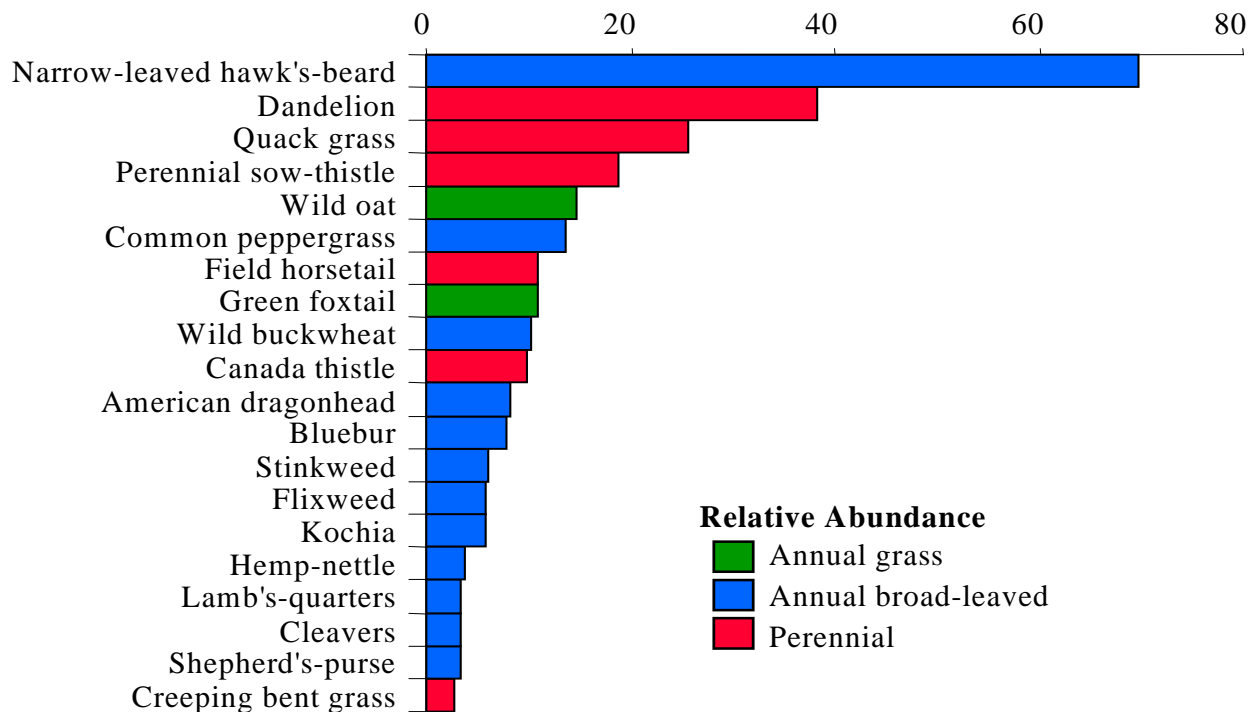
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### **References**

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**Figure 1.** Relative abundance (based on frequency, uniformity and density) of top twenty weeds in alfalfa fields surveyed in 1997.



**Figure 2.** Relative abundance (based on frequency, uniformity and density) of top twenty weeds in alfalfa fields surveyed in 1989-90.

**Table 1.** Weed Management Practices Used in 1997.

Weed Management Practice	Percent of Fields
Herbicides	66
Clean machinery	37
Rogue	22
Mow weed patches in the crop	22
Mow weed patches outside the crop	16
Chaff collection or burning	21
Fertilizer application	4
In-crop tillage	1
Total Fields	89

**Table 2.** Comparison of Herbicide Product Use in 1989-90 and 1997.

Herbicide Product	Group #	Percent of Fields	
		1989-90	1997
Assure (quizalofop-p-ethyl)	1	0	36
Venture/Fusilade (fluazifop-p-butyl)	1	19	9
Select (clethodim)	1	0	9
Poast (sethoxydim)	1	5	1
Pursuit (imazethapyr)	2	0	16
Embutox/Caliber/Cobutox (2,4-DB)	4	7	18
MCPA (MCPA)	4	19	1
Princep (simazine)	5	3	2
Sinbar (terbacil)	5	3	0
Velpar (hexazinone)	5	0	5
Pardner/Torch (bromoxynil)	6	16	21
Roundup (glyphosate)	9	0	1
Reglone (diquat)	22	0	2
Total Fields		42	88

**Table 3.** Years of Group 1 Herbicide Use From 1992 to 1997.

Years of Group 1 Herbicide Use	Percent of Fields
None	25
One	15
Two	1
Three	32
Four	21
Five	5
Six	2
Total Fields	36