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## Optimizing Sulfentrazone Rate in Broadleaf Crops

E.N. Johnson<sup>1</sup> and D.J. Ulrich<sup>1</sup>

<sup>1</sup>Agriculture and Agri-Food Canada, Box 10, Scott, SK, Canada

email: johnsone@agr.gc.ca

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### Introduction

Sulfentrazone is a Protoporphyrinogen oxidase inhibitor herbicide registered for weed control in a number of broadleaf crops in the United States. The use of sulfentrazone for weed control in chickpea (*Cicer arietinum* L.) was a Pesticide Minor Use Program priority and tolerance, efficacy, and residue studies have been conducted. The proposed rate for the Canadian prairies is 280 g ai ha<sup>-1</sup>. This rate was based on US rates for weed control in soybeans (*Glycine max* L.); however, unpublished re-cropping studies conducted in Saskatchewan indicate that this rate may be too high for rotational crops, particularly if a 2X margin of safety is desired. A number of efficacy studies conducted at Scott from 2002 to 2006 were analyzed to determine:

1) an optimum rate of sulfentrazone that will provide efficacious weed control in broadleaf crops;

2) if the USA rate structure is appropriate in Western Canada

### Materials and Methods

Eleven efficacy trials have been conducted at the Scott Research Farm from 2002 to 2006 in crops such as chickpea and flax (*Linum usitatissimum*). The trials were conducted on a loam soil (31% sand: 42% silt: 27% clay) with a pH of 6.0 and an organic matter content of 3.5%. The rate structure within the studies ranged from 17 to 840 g ai ha<sup>-1</sup>; however, not all rates were present in every study. Efficacy studies were performed according to the Pest Management Regulatory Agency's Directive "DIR 2003-04 Efficacy Guidelines for Plant Protection Products". Visual control ratings were taken at 7-14, 21-35, and 42-56 days after treatment (DAT). The 42-56 DAT control ratings from the 11 field trials were combined and are presented in Figure 1.

### Results and Discussion

Wild mustard (*Sinapis arvensis* L.) required sulfentrazone rates of > 420 g ai ha<sup>-1</sup> for greater than 80% control. Kochia [*Kochia scoparia* (L.) Schrad.] and shepherd's-purse [*Capsella bursa-pastoris* (L.) Medik.] were controlled at rates of  $\geq 140$  g ai ha<sup>-1</sup>. Wild buckwheat (*Polygonum convolvulus* L.) and lamb's-quarters (*Chenopodium album* L.) were controlled at rates of  $\geq 70$  g ai ha<sup>-1</sup>. Amaranthus species (*Amaranthus retroflexus* L. and *Amaranthus blitoides* S. Watson) were controlled at rates of  $\geq 140$  g ai ha<sup>-1</sup> while cow cockle [*Vaccaria hispanica* (Mill.) Rauschert] was controlled at rates of  $\geq 280$  g ai ha<sup>-1</sup>.

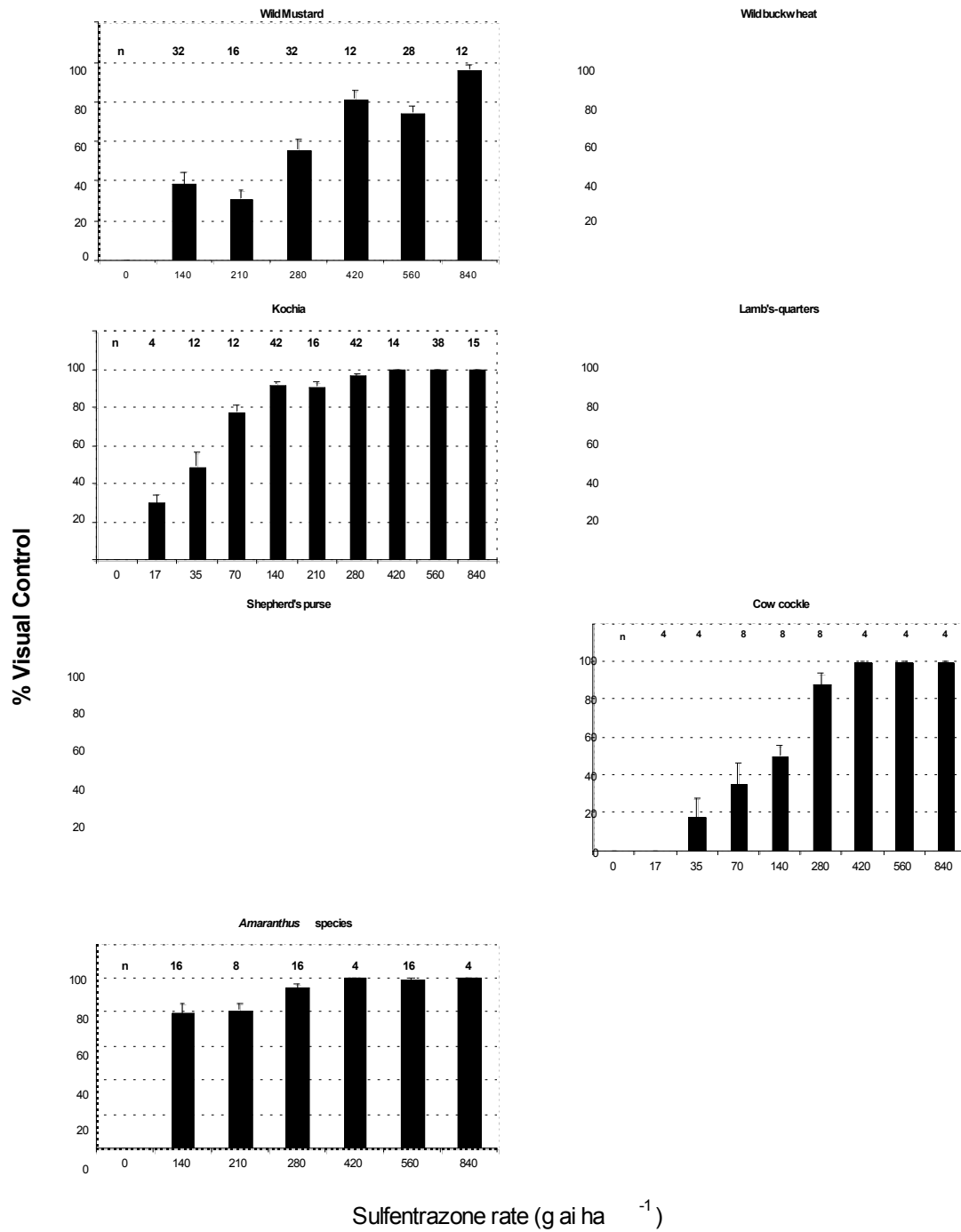
The suggested rate range in North Dakota for a soil texture and organic matter content similar to Scott is 130 to 195 g ai ha<sup>-1</sup> (Table 1). The higher rate is recommended for a soil pH < 7.0; however Scott data indicates that kochia, wild buckwheat, lamb's-quarters, prostrate pigweed, redroot pigweed, and shepherd's purse will be controlled at the lower end of the rate structure. A rate of 130 - 140 g ai ha<sup>-1</sup> would greatly reduce the risk of re-cropping injury.

### Conclusion

The proposed sulfentrazone rate of 280 g ai ha<sup>-1</sup> for chickpea is higher than is required to control weeds such as kochia, wild buckwheat, lamb's-quarters, pigweed species, and shepherd's purse for loam textured soils with 3 to 4% organic matter. The rate structure for North Dakota may have some application in Western Canada; however, further validation studies are required on different soil types.

Table 1: Sulfentrazone rates for kochia control in chickpea in North Dakota.

| % S.O.M.  | Texture               |            |           |
|-----------|-----------------------|------------|-----------|
|           | Coarse                | Medium     | Fine      |
|           | <i>Rate (g ai/ha)</i> |            |           |
| <1.0      | 65 - 87               | 87 - 130   | 87 - 130  |
| 1.0 - 3.0 | 87 - 130              | 108 - 174  | 130 - 195 |
| > 3.0     | 108 - 174             | 130 - 195* | 152 - 231 |



**Figure 1:** Effect of sulfentrazone rate on visual control (0-100%) of various broadleaf weed species. N = number of data points. Error bars represent standard error of the mean.