

## Detection of Phenoxy Herbicides in Alberta Rainfall

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### ABSTRACT

Our objective was to determine levels of 'phenoxy' herbicides in Alberta rainfall. We conducted an initial 1998 study near Lethbridge by sampling at eight locations: three city residences, two locations at the Lethbridge Research Centre (LRC), two locations on a rural golf course, and one farm location near Tempest, AB. Rainfall samples were collected at approximately weekly intervals from May 30 to Aug 17. Samples were analyzed for the following nine herbicides using a MSD-GC method with ion-ratio confirmation: 2,4-D, bromoxynil, dicamba, MCPA, diclofop, fenoxaprop, quinclorac, triallate and trifluralin.

With few exceptions, herbicides were detected in the rainfall at every sample date at every location in 1998. 2,4-D was detected most frequently and in the highest amounts with bromoxynil and dicamba usually also present. Herbicide levels were highest in early June corresponding with the agricultural spray season and the homeowner 'dandelion' season. On June 12, 2,4-D was detected at the rural golf course and at the Tempest-area farm at 5.1 and 3.6 ppb, respectively, compared with the Canadian guidelines of 4 ppb for aquatic life and 100 ppb for drinking water. In general, levels (maximum 1.0-1.6 ppb) at the three city locations were lower than at the rural locations. MCPA, diclofop, fenoxaprop, quinclorac, triallate and trifluralin were not detected in 1998.

In 1999, we monitored the rainfall at 17 locations across the province (E/W Lundbreck to Onefour, N/S Warner to Vegreville) from April 14 to September 30. Our lab analyses were expanded to include 2,4-DB, clopyralid, dichlorprop and mecoprop. The herbicides detected most often (in order), and in the highest amounts, were 2,4-D, bromoxynil, dicamba, MCPA and mecoprop. Levels in 1999 were generally higher than in 1998, in fact, some 2,4-D detections in rural southern Alberta were 20-30 ppb. There were frequent, small rainfalls during the 1999 spray season which probably contributed to the higher ppb detections. Maximum levels at two remote locations were 1.3-1.9 ppb; maximum levels at the two Lethbridge city locations were 5-10 ppb. The other herbicides were all detected in 1999, but in minor amounts. Provincial herbicide use patterns were reflected in our results in that more 2,4-D was detected in the south, and more MCPA detected in central Alberta.

The 2,4-D amounts in the southern Alberta rainfall seem unusually high, 10-250x higher than the herbicide amounts reported in two previous Canadian studies. Two specific concerns are: could herbicides in the rainfall (0.3-1.3 g/ha 2,4-D over 14 d) negatively impact surface water quality in small ponds and dugouts?, and could the maximum herbicide levels in rainfall cause sub-lethal effects in local sugar beet and potato crops? Further research is planned/underway to answer these concerns. We will also be conducting further monitoring of the rainfall across Alberta in 2000.