

FIELD PERSISTENCE STUDIES WITH HERBICIDES COMMONLY
USED ON THE PRAIRIES

A. E. Smith, Agriculture Canada, Research Station,
Regina, Saskatchewan. S4P 3A2

The use of herbicides in Western Canada is constantly increasing and every year new chemicals become available. Traditionally, the oldest herbicides 2,4-D and MCPA are used to the greatest extent with approximately 6.5 million pounds of the former chemical, and 3.5 million pounds of the latter, being applied during 1976 as both ester and salt formulations. In the same year, about 1000 lb of TCA were used, while treatments with major wild oat herbicides triallate, barban, trifluralin, and benzoilprop-ethyl were made to 10 million acres. The combined 1976 use of such chemicals as dalapon, dicamba, bromoxynil, 2,4-DP, and niclofen accounted for approximately 1 million pounds. Thus, some 24 million pounds, or 10,000 tons, of herbicides were applied in Western Canada in 1976.

The persistence of soil applied herbicides is of great importance. Although some of the above herbicides are applied to the growing crops, some of the spray must inevitably come into contact with the soil making it necessary to determine their persistence under field conditions. On the Prairies the climatic conditions are severe with long cold winters where the ground is frozen from early November until April. The summers tend to be hot and dry. These conditions do not favour continuous microbiological degradative processes, which are possibly the most important factors contributing to the breakdown of soil-based herbicide residues.

To determine the extent of herbicidal carry-over from one growing season to the next the field persistence of a large number of herbicides has been monitored at Regina, Jameson, and Melfort in Saskatchewan for the last 8 years. Each chemical is studied for 3 years using small fallow plots (20 cm x 20 cm) where known amounts of each chemical can be accurately applied. The soils are sampled by removing the entire soil from the 0-2 inch and 2-4 inch levels of each plot. The herbicide remaining is then determined by chemical analysis. Experience has shown that despite the smallness of the plots, reliable and reproducible data can be obtained.

In summary, it has been shown that applications of the herbicides asulam, bromoxynil, 2,4-D, diallate, and dicamba made in the spring have all degraded by October, and thus are not carried over from one growing season to the next. An annual carry-over of 0-15% is observed with spring treatments of alachlor, atrazine, benazolin, benzoilprop-ethyl, dichlobenil, dichlorfop-methyl, dinitramine, flufenprop-methyl, linuron, triallate, and trifluralin. Carry-over of between 15-30% was noted with niclofen, picloram, profluralin and simazine. In general, carry-over was

greatest on the high organic Melfort silty clay and least on the Jameson sandy loam.

The persistence of triallate and trifluralin over the 3 year study is summarized in the following two tables.

RECOVERY OF TRIALLATE RESIDUES FOLLOWING
APPLICATIONS OF 1.7 kg/ha IN MAY 1972, 1973, AND 1974

SOIL	TIME (mo)	% REMAINING			
		1972	1973	1974	Avg.
SL	5	14±3	10±6	6±4	10±4
	12	7±2	6±2		
	17	0	0		
HvC	5	18±2	11±2	12±1	14±4
	12	16±1	9±4		
	17	12±3	2±1		
SiC	5	35±3	3±1	19±2	19±16
	12	25±4	5±4		
	17	12±4	0		

RECOVERY OF TRIFLURALIN RESIDUES FOLLOWING
APPLICATIONS OF 1.1 kg/ha IN MAY 1972, 1973, AND 1974

SOIL	TIME (mo)	% REMAINING			
		1972	1973	1974	Avg.
SL	5	14±1	14±6	11±4	13±2
	12	17±4	9±3		
	17	7±2	2±0		
HvC	5	12±4	8±2	11±3	10±2
	12	16±5	5±0		
	17	3±0	3±0		
SiC	5	31±7	24±6	15±4	23±8
	12	35±3	19±3		
	17	16±3	14±2		