Reprinted with permission from: GPC-14 Annual Report: Leafy Spurge Control in the Great Plains. 1982. pp. 102-103.

Published by: Great Plains Agricultural Council.

Translocation of 2,4-dichlorophenoxy acetic acid in leafy spurge

S. E. LINGLE and J. C. SUTTLE

U.S.D.A. Metabolism and Radiation Research Laboratory, Fargo, N.D. 58105

Using the leafy spurge model system described previously. (1981 C.P.C. Annual Report, pg 65), the translocation of 2,4-dichlorophenoxy acetic acid (2,4-D) has been examined. Preliminary experiments demonstrated that the observed pattern of 2,4-D translocation was greatly influenced by a pretreatment with herbicidal rates of 2,4-D (Table 1). Therefore, in order to more closely simulate field conditions in all studies reported herein, spurge cuttings were first treated with unlabelled 2,4-D (1 kg/ha) followed by micro drop application of ^{14}C-2,4-D.

Removal of the apical meristem and subtending tissues was found to enhance movement of 2,4-D into the root zone. The root zone is defined as the roots plus the nutrient solution. The enhancement of movement of label to the root zone of apex removal was transitory; the maximum stimulation being observed after 4 days (Table 2).

In order to more fully understand the physiological basis of 2,4-D movement in spurge, the metabolism of 2,4-D was examined. Preliminary results have indicated that only very limited metabolism of this herbicide occurred (in all tissues, up to 85% of the label was found associated with 2,4-D). These results indicated that metabolism of 2,4-D cannot explain the tolerance of spurge towards this herbicide.

Future research will focus on the effects of plant growth regulators on herbicide movement and metabolism. Additional studies will examine the physiological basis for the efflux of 2,4-D from the root tissues.

Table 1. Effect of pretreatment with 2,4-D on the pattern of C-2,4-D movement in leafy spurge cuttings.

Pretreatment rate	Distribution of Radioactivity			
	Leaf	Stem	Root	Medium
0.0	9.8	71.5	11.5	7.2
0.5	49.0	46.2	2.3	2.5
1.0	43.6	49.1	2.6	4.6
2.0	41.6	54.5	2.0	1.9

Expressed as percent of absorbed radioactivity.

Table 2. Effect of apex removal on C-2,4-D translocation in leafy spurge cuttings.

Time of apex removal (days prior to C-2,4-D treatment)	Distribution of Radioactivity			
	Leaf	Stem	Root	Medium
Control[2]	21.7	50.2	5.8	22.4
1	8.8	51.4	11.8	27.9
4	10.3	41.6	12.1	36.0
7	15.0	52.8	11.1	21.0

Expressed as percent of absorbed radioactivity.

[2]Control: no treatment, apex intact.