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Influence of temperature on ^{14}C-sulfometuron and ^{14}C-fluroxypyr absorption and translocation in leafy spurge

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Fluroxypyr and sulfometuron have shown potential for controlling leafy spurge in various field studies. However, the optimum growth stage and environmental conditions for herbicide application are not well understood. The absorption and translocation of ^{14}C-fluroxypyr and ^{14}C-sulfometuron in leafy spurge as influenced by temperature and time were evaluated in separate studies.

The experiments were conducted in a randomized complete block design with four replications and were conducted three times. All experiments were conducted using stem cuttings from leafy spurge accession 84-ND 001. The plants were 2 months old, with 6- to 8-inch shoots and two lateral roots with bud development. Plants were over-sprayed with a 2 oz ae/A rate of the respective herbicide using a greenhouse pot sprayer delivering 14 GPA prior to ^{14}C-herbicide application. The treated leaf was protected during the whole plant treatment with a wax-paper sleeve. Then the sleeve was removed and an appropriate amount of ^{14}C-labeled and unlabeled herbicide plus 0.25% surfactant WK was applied for a total rate of 2 oz herbicide/A.

Plants were maintained in growth chambers with 24/20° C or 18/14° C day/night temperature regimes and a 15-hour photoperiod with 60% relative humidity. Plants were harvested 24, 48, 96, and 168 hours after treatment by sectioning into the stem and leaves above the treated leaf, stem and leaves below the treated leaf, and roots. Unabsorbed ^{14}C-herbicide was washed from the treated leaf and the plant material was frozen, dried, and weighed. The plant material was combusted with a biological material oxidizer, and the ^{14}C-fraction was collected in scintillation cocktail fluor and assayed using liquid scintillation spectrometry.

^{14}C-fluroxypyr absorption was similar over time and averaged 41 and 47% of applied herbicide at 8 and 24° C, respectively. Most of the herbicide absorbed by the plant remained in the treated leaf. ^{14}C-fluroxypyr translocation was greatest to the growing point above the treated leaf at 24° C but to the root at 18° C and averaged 3 and 1.4% of applied herbicide, respectively. Translocation of absorbed material to the root averaged

47% at 18° C compared to 27% at 24° C 24 hours after treatment (HAT) with no increase over time at either temperature.

^{14}C-sulfometuron absorption increased from 32% to 47% of applied from 24 to 168 HAT at 24° C but was similar over time at 18° C and averaged 34%. Most of the absorbed herbicide remained in the treated leaf. Translocation of absorbed herbicide to the shoot above the treated leaf was greater at 24º C than 18º C (2 and 0.8%, respectively). Translocation of absorbed herbicide to the root averaged 39% at 18º C compared to 22% at 24º C.