

Reprinted with permission from: 1994 Leafy Spurge Symposium, Bozeman, MT.  
July 26-29, 1994. p. 27.

Sponsored by: Great Plains Agricultural Council, Montana Noxious Weed Trust Fund,  
and United States Department of Agriculture-Agricultural Research Service.

---

## Carbon allocation of leafy spurge following defoliation

BRET E. OLSON and ROSEANN T. WALLANDER

Animal and Range Sciences Department, Montana State University, Bozeman, MT 59717.

Leafy spurge (*Euphorbia esula*) is expanding in North America because it is competitive, because many large animals avoid it while grazing associated species, and because its native enemies were not introduced at the same time. Our objective was to determine how defoliating leafy spurge and associated species affect their ability to gain and allocate carbon, an indicator of the competitive ability of a plant. We grew single plants of leafy spurge in pots with single plants of one of three species, the introduced rhizomatous Kentucky bluegrass (*Poa Pratensis*), the native bunchgrass Idaho fescue (*Festuca idahoensis*), and alfalfa (*Medicago sativa*). In a randomized block design ( $n = 4$ ), leafy spurge plants and their neighbors in each pot were either: 1) defoliated, 2) not defoliated, 3) leafy spurge defoliated, neighbor not defoliated, or 4) neighbor foliated, leafy spurge not defoliated. Twenty-four hours after defoliation, we labeled these plants with the stable  $^{13}\text{CO}_2$  isotope using small plexiglass chambers placed over the plants. Plants were harvested 1 and 3 days post labeling. Shoots and roots were separated, oven-dried, weighed, and ground. These samples were sent to an analytical laboratory to determine  $^{13}\text{C}$  levels. Carbon uptake by shoots or allocation to roots of leafy spurge was not affected by the identity of neighbor species. However, carbon uptake by shoots and allocation to roots were significantly reduced by defoliation. These reductions were similar whether only the leafy spurge was defoliated, or leafy spurge and its neighbor were defoliated, indicating that leafy spurge was unaffected by the status of the neighbor. Carbon uptake by alfalfa shoots was unaffected by defoliation. However, carbon allocation to alfalfa roots was minimal when the alfalfa plant alone, or the alfalfa and leafy spurge plants within a pot were defoliated. Carbon uptake by shoots and allocation to roots in Kentucky bluegrass, and especially Idaho fescue, were reduced by defoliation. Our results indicate that although leafy spurge gains and allocates carbon similarly when growing with different species, these species have significantly different responses to defoliation when growing with leafy spurge. Using carbon uptake and allocation as an indicator of competitive ability, alfalfa is most competitive, Kentucky bluegrass is intermediate, and Idaho fescue is least competitive with leafy spurge.