Responses of a Constructed Plant Community to Simulated Drift from Glyphosate and Dicamba

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Background/Questions/Methods

As part of its regulation of pesticides, the US Environmental Protection Agency must consider environmental risks, including impacts to nontarget plants exposed to pesticide drift. Normally these risk assessments consider impacts to individual species, using greenhouse, exposure-response experiments with growth endpoints. More sophisticated field tests using simulated plant communities may be required, but are rarely conducted. To provide information on possible field test procedures to indicate pesticide effects on plant communities, we developed a series of small plots using species found in Willamette Valley Oregon grasslands. The communities included nine perennial species: *Eriophyllum lanatum* (Oregon sunshine), *Iris tenax* (toughleaf Iris), *Prunella vulgaris* var. *Lanceolata* (Lance selfheal) *Camassia leichtlinii* (large camas), *Festuca roemeri* (Roemer's fescue), *Elymus glaucus* (blue wildrye), *Ranunculus occidentalis* (western buttercup), *Fragaria virginiana* (Virginia/wild strawberry), and *Potentilla gracilis* (slender cinquefoil). Exposure-response studies were conducted on two Oregon State University farms over two years. The studies evaluated the single and combined effects of drift rates of herbicides (0.01 to 0.2 x field application rates (FAR) of 1119 g ha^{-1} active ingredient (a.i) (830 g ha^{-1} acid glyphosate) for glyphosate. and 560 g ha^{-1} a.i. for dicamba). Response endpoints were % cover on a periodic basis, # of reproductive structures and seed production by species.

Results/Conclusions

Herbicide effects differed with species, year and site. Among the more notable responses, the largest species, *Eriophyllum lanatum*, had a significant reduction in total seed production with as little as 0.1 x FAR of dicamba, glyphosate or the combination of herbicides in one year, but a smaller and nonsignificant reduction in % cover. *Elymus glaucus* had a significant reduction in total seed production with 0.2 x FAR of glyphosate or the combination of herbicides in one year. The other species showed fewer responses. These studies indicated the potential effects of low levels of herbicides on reproduction of native plants, and demonstrated experimental protocols whereby a plant community can be evaluated for ecological responses.