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Tolerance of native wildflower species to postemergence herbicides

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ABSTRACT

Postemergence herbicides may facilitate weed control in native wildflower seed production fields. In a greenhouse study, we assessed the impact of 4 postemergence herbicides (linuron, halosulfuron, imazapic, and pendimethalin) on 4 wildflower species: white prairie clover (*Dalea candida* Michx. ex Willd. [Fabaceae]), blanketflower (*Gaillardia aristata* Pursh [Asteraceae]), silverleaf phacelia (*Phacelia hastata* Douglas ex Lehm. [Hydrophyllaceae], and prairie coneflower (*Ratibida columnifera* (Nutt.) Woot. & Standl. [Asteraceae]). Pendimethalin applied at 1.9 kg ai/ha (1.69 lb ai/ac) caused the least seedling injury across all species and therefore may help weed management in wildflower production systems. Although linuron applied at 0.56 kg ai/ha (0.5 lb ai/ac) appeared to be a promising alternative for weed control, oven-dry biomass for *G. aristata* was reduced by this herbicide. Imazapic and halosulfuron applied at 0.14 kg ai/ha (0.125 lb ai/ac) and 0.048 kg ai/ha (0.042 lb ai/ac), respectively, caused severe damage on wildflower seedlings.

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KEY WORDS

wildflower seed production, herbicide injury, *Dalea, Gaillardia, Phacelia, Ratibida,* linuron, halosulfuron, imazapic, pendimethalin

NOMENCLATURE

USDA NRCS (2009)

The commercial production of wildflower seeds for revegetation and restoration purposes is a relatively new agronomic enterprise for which optimal weed management practices are still being researched. Traditionally, nonindigenous seed mixtures have been used in revegetation because they are relatively inexpensive, easy to obtain, and typically fast growing, providing quick ground cover to compete with undesirable plant species (Beyers 2004). It is difficult, however, to increase species and functional diversity when seed mixes being used in restoration or revegetation projects consist mostly of rhizomatous grasses and nonindigenous species (Matesanz and others 2006).

Interest in native wildflower seed production has come about due to an increasing awareness of the importance of diversity (Hooper and others 2005), especially functional diversity (Loreau and others 2001), in providing ecosystem services. To meet the current demand for native wildflower seeds, species need to be grown in production fields to make diverse seed mixes more readily available and affordable. Increased demand for wildflower seeds has elucidated the lack of management knowledge, particularly wildflower stand establishment and weed management in crop settings. Specifically, the management of broadleaf weeds is critical as weed competition is strongest among functionally similar species with analogous environmental requirements (Zimdahl 2004).

Testing wildflower species' tolerance to crop herbicides is a necessary step to facilitate the successful establishment and seed production of native wildflowers. Previous studies show that the response of wildflowers to herbicides is not always consistent (Norcini and others 2003; Jacobs and others 2007). Also, multiple studies on the same herbicide/wildflower combinations