THE FIVE MOST UNWANTED MIDWEST NURSERY WEEDS-PART 4

Red Stem Filaree

(*Erodium cicutarium*)

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Five of the most unwanted Midwest nursery weeds include: creeping yellow cress (*Rorippa sylvestris* L.); mugwort (*Artemisia vulgaris* L.); red stem filaree (*Erodium cicutarium*); field horsetail (*Equisetum arvense*) and yellow nutsedge (*Cyperus esculentus* L.). Through past USDA Specialty Crop Block Grants (SCBG) conducted in Michigan in conjunction with the Michigan Department of Agriculture (MDA) and the Michigan Nursery and Landscape Association (MNLA), we have found various products to control these extreme weeds with varying levels of success. In parts one, two and three we discussed creeping yellow cress, mugwort and yellow nutsedge, respectively. Despite red stem filaree being identified in our earliest MI SCBG (Fall, 2010) as the second most common weed found in Michigan fields, we have never conducted a trial that specifically addressed controls for this weed. This will change in late 2016 into 2018 when we will be conducting a new USDA SCBG with MNLA expressly targeting individual difficult weeds including *Erodium cicutarium*.

Red stem filaree is also known as filaree, common storksbill, heronsbill, pin-weed and pin-grass (Uva et al. 1997) and is in the geranium family (Geraniaceae). It is a winter annual or biennial that overwinters as a prostrate basal rosette (Fig. 1). Seed production has been found to be dependent on plant size,

relative to its neighbors, rather than absolute size (Harmon and Stamp, 2002). The two plants in Fig. 1, for example, would have similar abilities in reproduction. Stems elongate the following spring and can reach 10-50 cm in height. Leaves and stems are often reddish (Fig. 2). The flowers range from pink to purple, five to eight mm long (Uva et al. 1997) (Fig. 2 and Fig. 3B).

Each flower produces a fruit that consists of five sections called mericarps joined together. Each fruit will grow a large style that is spine-like in shape (Evangelista et al., 2011) (Fig. 2, Fig. 3A and 3C). The style consists of the awns of each mericarp. Red stem filaree possesses a unique seed dispersal mechanism consisting of explosive release and self-burial (Evangelista et al., 2011). As the fruit dry, stressors within the awn cause the fruit to separate abruptly and fling their seed up to half a meter away (explosive dispersal) (Stamp, 1989). Once on the ground, the awn can be uncoiled under wet conditions, or twisted into a spiral shape when dry (Stamp, 1989). These changes, depending on moisture combined with hairs on the seed and along the awn, allow the seed to move along the surface of the ground. Eventually the seed will lodge into a

F1 Two equal sized neighboring red stem filaree plants shown as overwintering rosettes, which are expected to have similar seed production in this MI Lilac liner field. Picture taken by H. Mathers, 04/13/2016 in Grand Haven, MI.

F2 The flowers of red stem filaree are produced from April to June in clusters of two to eight, on long leafless stalks (pedicels, lower left of photo). Each flower has five petals that range from pink to purple and are five to eight mm long. Each flower produces a beak-like fruit (middle right of photo). Picture taken by H. Mathers, 04/12/2012, in a deciduous B&B nursery field, Madison, OH.

F3 **A, B, C and D. (A)** Red stem filaree is also known as filaree or common stork's bill (Uva et al. 1997) because each fruit will grow a large style that is spine-like in shape, similar to a stork's bill. **(B & C)** Leaves are pinnate and 15 cm long and stems are often reddish. **(C)** The stems and leaves are hairy with opposite leaf arrangement. **(B)** The leaves are also finely divided with toothed or lobed margins. **(B and C)** Leaves grow on short stems and have a reddish tint. **(C)** The flowers range from pink to purple and are five to eight mm long (Uva et al. 1997). Pictures taken by: H. Mathers in Ohio, 2015.

crevice and the uncoiling and coiling awn will create a corkscrew action, drilling the seed into the ground (self-burial) (Evangelista et al., 2011). The self-burial appears to increase seedling survival whereas explosive dispersal relates to spacing and size or patches (Stamp and Lucas, 1983) (Fig. 4).

Because the leaves and stems of red stem filaree are sometimes densely covered in hairs that are sometimes glandular (Webb et al., 1988), the addition of adjuvants such as a methylated seed oil concentrate (MSO) to any potential control products is well advised. Kimball and Schiffman (2003) discuss the characteristics of *E. cicutarium* that make it such a problem weed: *E. cicutarium* germinates and flowers early and continues to flower throughout the growing season, giving it a longer inductive time period than many later-maturing annual species. *E. cicutarium* is a fierce competitor, producing many seeds that germinate early, develop a tap root quickly, deplete soil water, and prevent sunlight from reaching seedlings of other species that germinate later. Perennial grasses are potentially prevented from establishing by the blocking of access to light (Kimball and Schiffman, 2003).

Gallery 75DF (isoxaben) applied in the fall is an anecdotal suggestion for control (Anonymous). Since Gallery is a cellulose inhibitor (CI) (Group 21), we will be testing two other CIs, Marengo SC (Group 29) and Casoron (Group 20) in our 2016-2018 trials. Sulphonylurea or sulfonylurea herbicides such as halosulfuron (Sedgehammer), imazapic (Plateau), imazaquin (Image™), Chlorsulfuron (Corsair™), sulfosulfuron (Certainty) and imazapyr (Habita™t) are reported to be the most efficacious herbicides in cereal crops. Sulfonylurea herbicides kill weeds by inhibiting the enzyme Acetolactate synthase (ALS). ALS inhibition is their mode of action (MoA) or WSSA Group 2. ALS inhibitors work on a broad range of grasses and broadleaf weeds, but not on many cereal crops. The invention of sulfonylurea herbicides, in June 1975 by George Levitt of DuPont, revolutionized the use of herbicides. Because of the very high toxicity of ALS-inhibiting herbicides to susceptible plants, the application rates of these herbicides are extremely low, typically 3 to 150 g ai/ha (Senseman, 2007). Combined with the low application rates, selectivities for a variety of crops, and short half-lives, ALS herbicides were a revolutionary advance in agrichemicals in the 1980s. The sensitivity of ornamental plants to Group 2 herbicides has limited their registration and use in nursery crops; however, we hope in our

F4 The explosive dispersal of red stem filaree can allow the plants to form large patches in areas unexploited by other species such as this one at the end of this nursery field. Its unique self-burial mechanism allows it to thrive in dry, sandy soils. It is a problem in nurseries, orchards, and Christmas tree plantations. Picture taken by: H. Mathers in West Olive, MI, 2011.

2016-2018 SCBG with MNLA to find a safe rate or method of application of these ALS herbicides and achieve control of red stem filaree.

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