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Mugwort Control in an Abandoned Nursery Using Herbicides That Mimic Indole-3-Acetic Acid

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Summary. **Field and greenhouse studies were conducted to determine if two indole-3-acetic acid herbicide mimics, aminopyralid and aminocyclopyrachlor-methyl, applied at 70, 140, and 280 g·ha^{-1} postemergence (POST) would control mugwort (*Artemisia vulgaris*) in an abandoned nursery. These were compared with the commercial standards picloram at 280 g·ha^{-1} a.i. and clopyralid at 280 g·ha^{-1}. In the field study, picloram and clopyralid controlled mugwort 75% and 31% by 365 days after treatment (DAT), respectively. In contrast, aminopyralid and aminocyclopyrachlor-methyl applied at 140 g·ha^{-1} controlled mugwort over 90% by 365 DAT. In the greenhouse study, aminopyralid and aminocyclopyrachlor-methyl applied at 140 g·ha^{-1} controlled mugwort 92% and 96% respectively, although aminopyralid at 70 g·ha^{-1} provided better visual control (94%) in comparison with aminocyclopyrachlor-methyl (79%) at 70 g·ha^{-1}. Regardless, following shoot growth removal at 30 DAT, mugwort failed to regrow by 60 DAT following exposures to all rates of both herbicides. On the basis of these studies, aminopyralid and aminocyclopyrachlor-methyl have potential to provide excellent control of mugwort compared with the current standards clopyralid and picloram.**

Mugwort has been reported in 56 countries as a highly invasive weed that has adapted to a broad range of climates (Holm et al., 1997). Mugwort persists in diverse soil types and can establish in both undisturbed and cultivated lands. Mugwort plants produce volatile allelochemicals that negatively impact surrounding vegetation by inhibiting growth and survival of other plant seedlings (Barney et al., 2005). The highest concentrations of these allelochemicals are found in young leaves, thus giving young mugwort plants an advantage in establishing new populations. Mugwort propagates by both rhizome and seed, but seed viability appears to depend upon climatic conditions (Pawlowski et al., 1967). Over 200,000 viable seeds can be produced by one plant and most will germinate the following spring (Pawlowski et al., 1967). However, few viable seeds are produced in the eastern United States (Holm et al., 1997), thus rhizomes are the primary method of mugwort reproduction. Since mugwort plants can grow from ≈6-mm long rhizomes; mechanical methods of control such as hand pulling or tilling are not desirable and may contribute to the spread of this species (Klingeman et al., 2004; Rogerson, 1964). In addition, Rogerson (1964) found that a 10-cm shoot of mugwort could create 23 m of rhizomes in 4 months, thereby, further explaining the aggressive invasive nature of this species.

The invasive potential of mugwort is often favored by conditions created in nursery environments. Klingeman et al. (2004) found that as little as a 2-cm fragment of mugwort rhizomes would regenerate 69% to 85% regardless of whether planted in soil, sand, or pine bark media. This adaptability to various soil types allows mugwort rhizomes intermingled with the roots of nursery stock to survive transplant between field and container production areas. Also, control of broadleaf weeds in container or field grown nursery plants is often limited to herbicides that have soil residual activity and must be applied before emergence of the target weed (Senseman, 2007). However, many of these residual herbicides have proven to be ineffective in controlling mugwort because they are not systemic or because those that have activity on mugwort can also have detrimental impacts to desirable nursery species (Danielson, 1965). Therefore, systemic herbicides, which are herbicides that translocate to the roots or rhizomes of susceptible weeds, are needed to limit reproduction and to ensure complete plant death of perennial plants like mugwort.

Herbicides that inhibit amino acid formation in plants and those which mimic indole-3-acetic acid are usually systemic in nature, and therefore, multiple herbicides in these classes of chemistry often have some activity on perennial weeds like mugwort (Senseman, 2007). Bradley and Hagood (2002) reported that the herbicide mimics of indole-3-acetic acid 2,4-D (amine or ester formulation) and triclopyr provided less than 50% control of mugwort 1 year after treatment (YAT). Other studies found that initial

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Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.3048	ft	m	3.2808
0.0929	ft^2	m^2	10.7639
9.3540	gal/acre	L·ha^{-1}	0.1069
2.54	inch(es)	cm	0.3937
28.3495	oz	g	0.0353
70.0532	oz/acre	g·ha^{-1}	0.0143
(°F – 32) ÷ 1.8	°F	°C	(1.8 × °C) + 32