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Operational-scale validation of a winter-use pattern for endothall to control submersed aquatic weeds in ponded Australian irrigation canals

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ABSTRACT

Endothall was applied to irrigation canals in three irrigation areas in Australia to validate, at an operational scale, a recently developed winter-use pattern to control two submersed aquatic weeds, namely, ribbon weed (*Vallisneria australis* S.W.L. Jacobs & Les) and floating pondweed (*Potamogeton sulcatus* A. Benn). Applications of either amine endothall or dipotassium endothall were made in the austral winter of 2017 (June–July), in ponded irrigation canals during the irrigation off-season. The target concentrations were 2.4 mg acid equivalent (ae) L^{-1} for amine endothall and 4.8 mg active ingredient (a.i.) L^{-1} for dipotassium endothall, with an exposure period of 3–10 wk. Reference pools, with no herbicide, were selected upstream of pools receiving herbicide or in adjacent canals. Restricted maximum-likelihood models were developed that showed both endothall formulations were effective at reducing ribbon weed percent volume occupied, stem length, and relative frequency in irrigation canal pools compared to untreated ribbon weed in the reference pools. Regrowth was greater in the pools treated with amine endothall than those treated with dipotassium endothall. These responses were consistent across the three irrigation areas and lasted for at least 33 wk of the 40-wk irrigation season. Floating pondweed abundance was also reduced substantially after the application of endothall, over the same period. We conclude that effective control of these submersed weeds in irrigation canals 1) can be achieved using the winter-use pattern, 2) can be achieved with either formulation of endothall (thus allowing the ecologically safer dipotassium endothall to be used), 3) can be achieved at operational scales, 4) is consistent across multiple geographic locations, and 5) lasts at least a full irrigation season.

Key words: amine endothall, aquatic herbicide, aquatic weed control, dimethylalkylamine salt of endothall, dipotassium endothall, dipotassium salt of endothall, irrigation channel, *Potamogeton sulcatus*, submersed aquatic vegetation, *Vallisneria australis*.

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