FACTORS AFFECTING THE EFFICACY OF TWO TURFGRASS GROWTH REGULATORS, TRINEXAPAC-ETHYL AND V-10029

By

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ABSTRACT

FACTORS AFFECTING THE EFFICACY OF TWO TURFGRASS GROWTH REGULATORS, TRINEXAPAC-ETHYL AND V-10029

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Trinexapac-ethyl is a foliar absorbed turfgrass growth regulator that inhibits shoot growth in many turfgrass species. Research initiated in 1995 showed the addition of Sylgard 309® + 28% urea ammonium nitrate could significantly enhance the efficacy of trinexapac-ethyl on four cool-season turfgrass species. Ammonium sulfate compensated for reductions in trinexapac-ethyl efficacy when hard water was the carrier and increased the rainfastness of trinexapac-ethyl for perennial ryegrass. The plant base was determined to be a preferred site of absorption for 14C-trinexapac-ethyl in Kentucky bluegrass while absorption by the leaf blade could be enhanced by adding Sylgard 309®. Translocation of 14C-trinexapac-ethyl in Kentucky bluegrass was acropetal when the material was absorbed by the plant base and basipetal when the material was absorbed by the leaf blade. An experimental turfgrass growth regulator, V-10029, significantly suppressed seedhead formation and shoot growth in five cool-season turfgrass species but was more injurious than trinexapac-ethyl, due to its herbicidal mode of action.
INTRODUCTION

Trinexapac-ethyl is a foliar absorbed turfgrass growth regulator that has been commercially available since 1993. Trinexapac-ethyl inhibits the biosynthesis of gibberellic acid by inhibiting the 3β-hydroxylation of GA$_{20}$ to GA$_1$. Compared to the activity of other turfgrass growth regulators that inhibit gibberellin biosynthesis, this inhibition appears very late in the pathway, occurring immediately prior to biosynthesis of the primary active gibberellin that stimulates shoot elongation. Compounds such as paclobutrazol and flurprimidol inhibit gibberellin biosynthesis by blocking an earlier step in the pathway.

The singularity of the mode of action seen with trinexapac-ethyl, coupled with its relative market infancy, create a multitude of research areas that need to be addressed with this compound. Research concerning the physiological effects of applying turfgrass growth regulators, especially on a long-term basis, has been limited. Commercially available products such as trinexapac-ethyl may impact the responses of turfgrass species to a variety of environmental and cultural stresses. The purpose of the research presented in this thesis was to determine the influence of several factors related to growth regulator application on the efficacy of trinexapac-ethyl and of an experimental growth regulator, V-10029, which has an herbicidal mode of action.
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