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USE OF TRINEXAPAC-ETHYL TO REDUCE MOWING REQUIREMENTS OF WARM-SEASON GRASSES IN SUBTROPICAL AUSTRALIA

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ABSTRACT

Trinexapac-ethyl is a plant growth regulator used to reduce turfgrass growth and, hence, mowing operations. A one-year study was conducted near Brisbane in subtropical southern Queensland (Australia) to determine the effect on mowing frequency of trinexapac-ethyl applied monthly (at rates of 60-240 mg/ha of active ingredient) during the active growing period across a range of 19 varieties of four medium- to coarse-textured warm-season turfgrass species (*Cynodon dactylon* (L.) Pers., *Cynodon dactylon* x *C. transvaalensis* Burtt-Davy, *Digitaria didactyla* Willd., *Pennisetum clandestinum* Hochst. ex Chiov.). For the full year and across all 4 species and 19 varieties, 15, 17, 24 and 29% fewer mowings were required at monthly trinexapac-ethyl rates of 60, 96, 180 and 240 mg/ha, respectively. Some phytotoxic damage, including stunting of stem and leaf growth and discoloration, was observed at the two higher rates of trinexapac-ethyl.

INTRODUCTION

Trinexapac-ethyl is a plant growth regulator used by turf managers primarily to restrict leaf and stem growth of turfgrasses, thereby reducing mowing operations (Howieson and Christians, 2001). Recommended label rates vary greatly – 18-960 mg of active ingredient (a.i.) per hectare – depending on the target species, but are claimed to give an approximate 20-50 % reduction in clippings over a 2-6 week period under optimum management and environmental conditions (Syngenta Crop Protection, 2011).

A study was conducted near Brisbane in southern Queensland (Australia) to determine the effect of trinexapac-ethyl sprayed monthly during the active growing period (at rates of 60-240 mg a.i./ha) on reducing mowing frequency, and hence costs, across a range of medium- to coarse-textured warm-season turfgrass species and varieties commonly used on sports and recreational areas in subtropical Australia.

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Abbreviations: HOC, height of cut; a.i., active ingredient; masl, metres above sea level; QLD, Queensland; NSW, New South Wales

Keywords: Australia, bermudagrass, blue couch, *Cynodon dactylon, Cynodon dactylon* x *C. transvaalensis, Digitaria didactyla,* hybrid bermudagrass, kikuyugrass, mowing frequency, *Pennisetum clandestinum*

MATERIALS AND METHODS

The experiment was located on the Redlands Research Facility at Cleveland, QLD, Australia (27º32'S lat, 153º15'E long, c. 25 masl) on a fertile red volcanic (krasnozem) soil.

The underlying experiment was a randomised block design, with 4 replications of 19 varieties and accessions from 4 warm-season turfgrass species:

- 10 varieties of *Cynodon dactylon* (L.) Pers. (bermudagrass) – 'Grand Prix', OZ TUFF® ('Oz-E-Green'), 'CT-2', 'Wintergreen', 'Hatfield', 'Winter Gem', Conquest™ ('Riley's Evergreen'), 'Premier', Legend® ('C1') and 'Blue Dynasty';
- 4 varieties of *Cynodon dactylon* (L.) Pers. x *C. transvaalensis* Burtt-Davy (hybrid bermudagrass) – 'AGRD', TifSport™ ('Tift 94'), 'Santa Ana' and 'Patriot';
- 4 varieties of *Digitaria didactyla* Willd. (blue couch) – 'Aussiblue', 'Tropika', Queensland blue couch and MR-D1 (a clonal selection of Queensland blue couch); and
- 1 variety of *Pennisetum clandestinum* Hochst. ex Chiov. (kikuyugrass) – 'Whittet'.

A strip-plot design was superimposed over the underlying four-block varietal design to trial five rates of trinexapac-ethyl product (120g a.i./L), including an untreated control treatment. The following monthly treatments were applied to each plot based on label rates recommended by Syngenta Crop Protection (2011): (c) unsprayed control (0 mg/ha); (1) 60 mg/ha; (2) 96 mg/ha; (3) 180 mg/ha and (4) 240 mg/ha of trinexapac-ethyl. Treatments were applied on 5 April, 3 May, 14 September, 11 October, 9 November, 15 December 2011, 10 January, 1 February and 28 February 2012, during the active growing periods over the one-year study period. The individual sub-plots each measured 1 x 1.5m.

Subplots were measured twice per week using a Toro® height of cut (HOC) prism to monitor plant growth. If during the inspection any subplots had grown 15 mm (from 30 to 45 mm) they were identified and mown (following the one-third mowing rule – e.g. Turgeon, 2011) on the same day. Ideally, a lower height of cut could have been adopted; but due to the less frequent mowing of community sports fields and recreational areas compared with higher quality turf facilities, a 30 mm height of cut was chosen. The first recording took place 8 April 2011 and observations continued twice per week until 23 March 2012.

RESULTS AND DISCUSSION

Significant variation was observed among the different turf species. Annual mowing requirements across all combinations

of Treatments 1-4 x Variety x Season within species varied considerably: in blue couch, the annual number of mowings ranged from 4.3 to 5.5 (overall annual mean for treatment c: 6.8) compared with hybrid bermudagrass 4.1 to 5.0 (c: 5.7), bermudagrass 3.8 to 5.4 (c: 6.5) and kikuyugrass 21.5 to 22.8 (c: 21.5) mowings (Figure 1). In general, trinexapac-ethyl reduced mowing requirements needed to maintain the turfgrass species at a 30 mm HOC, with the exception of kikuyugrass. Significantly, application rates of 240-960 mg a.i./ha of trinexapac-ethyl are recommended for the suppression of kikuyugrass, appreciably higher than for other turfgrass species. Data across all four seasons and all 19 warm-season turfgrass varieties showed that, on average, untreated turf required 7.2 mowings per year, compared with 6.1, 6.0, 5.5 and 5.1 mowings at monthly rates of 60, 96, 180 and 240 mg/ha of trinexapac-ethyl, respectively. This gave corresponding mowing reductions of 15, 17, 24 and 29% (treatments 1-4), respectively, which is somewhat lower than the label claim by Syngenta Crop Protection (2011) of 20-50% reduction in clipping yield (as measured indirectly by mowing operations in our trial).

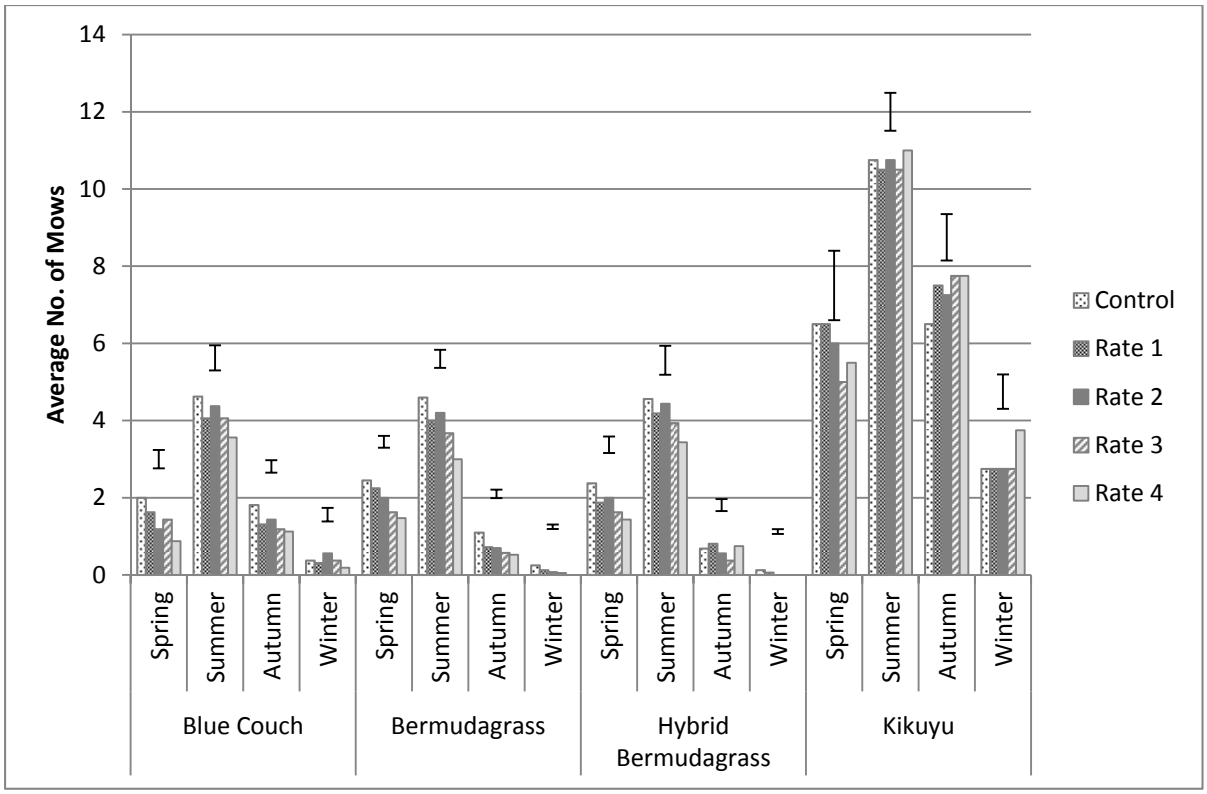

Figure 1. Average number of mowings required throughout each Australian season during 2011-12 following the application of trinexapac-ethyl treatments (Rate 1 – 60 mg/ha; Rate 2 – 96 mg/ha; Rate 3 – 180 mg/ha; and Rate 4 – 240 mg/ha of active ingredient) and a control (c) treatment. Data are shown at the species level for each season: spring - 1 September to 30 November 2011, summer – 1 December 2011 to 28 February 2012, autumn – 1 April to 31 May 2011 and 1 to 23 March 2012, and winter – 1 June to 31 August 2011. LSD values shown as vertical bars are at P=0.05.

Some phytotoxic damage, including stunting of stem and leaf growth and discoloration, was observed following the routine application of the higher rates of trinexapac-ethyl in treatments 3 and 4. It is recommended that further work be undertaken across a range of cultivars and environments (to cover Genotype x Environment interactions) so that safe application rates of trinexapac-ethyl can be determined for a range of situations (e.g. parks, ovals, general grassed areas) to assist turf managers in preparing a quality turf surface while reducing labour costs.

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