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## INTRODUCTION

Clethodim, a postemergent herbicide registered for grass weed control in several broadleaf crops, is commonly applied with crop oil concentrate (COC) alone or in combination with a nitrogen source (e.g., AMS) for maximum efficacy. Clethodim is commercially available as a 0.24 kg ai L<sup>-1</sup> formulation and a newer formulation with half the active ingredient (0.12 kg L<sup>-1</sup>), which will be commercialized soon for control of grasses and volunteer grass crops including glyphosate-resistant (GR) corn. The objectives of this research were to 1) determine efficacy of two formulations of clethodim, 0.12 kg L<sup>-1</sup> and 0.24 kg L<sup>-1</sup> on bermudagrass and wheat and 2) determine effect of formulations and adjuvants on absorption and translocation of <sup>14</sup>C-clethodim in bermudagrass and wheat.

## MATERIALS AND METHODS

- Bermudagrass and wheat plants (20-cm tall, 4-5 leaves) were treated with both formulations of clethodim (0.12 and 0.24 kg L<sup>-1</sup>) at 0.11 and 0.14 kg ha<sup>-1</sup> with and without crop oil concentrate (COC) and ammonium sulfate (AMS). Plant dry weights were measured 3 weeks after treatment.
- <sup>14</sup>C-clethodim (<sup>14</sup>C label on 4 and 6 positions of the cyclohexane ring, 98% purity, specific activity 2.12 GBq mmol<sup>-1</sup>) was mixed with commercial 0.12 kg L<sup>-1</sup> or 0.24 kg L<sup>-1</sup> formulation of clethodim with and without adjuvants to give a final concentration of 0.1 kg in 190 L of water.
- Each plant received 6.7 kBq of <sup>14</sup>C-clethodim in a total volume of 10 μL, applied to the adaxial leaf surface of the 3<sup>rd</sup> true leaf of 20-cm-tall (4- to 5-leaf stage) wheat and the lateral or secondary shoot growth of six wk-old bermudagrass, respectively.
- Plants were harvested 1, 4, 12, 24, 48, and 72 h after treatment (HAT) and divided into treated leaf, rest of shoot, and root. Common procedures were adopted for measuring <sup>14</sup>C-clethodim absorbed and translocated.

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## RESULTS

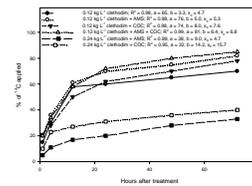
### Bermudagrass



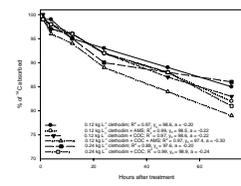
### Wheat



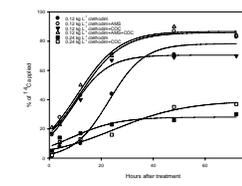
**Efficacy** – left to right: nontreated, 0.12 kg/L clethodim (0.11 kg ai/ha) + NIS + AMS; 0.12 kg/L clethodim (0.14 kg/ha) + NIS + AMS; 0.24 kg/L clethodim (0.11 kg/ha) + COC + AMS; 0.24 kg/L clethodim (0.14 kg/ha) + COC + AMS; NIS at 0.25% v/v; AMS at 28 g/ha; and COC at 1% v/v.



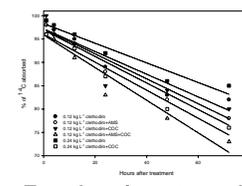
**Absorption**



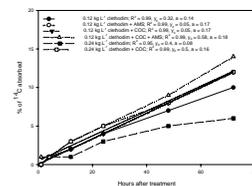
**Translocation – treated leaf**



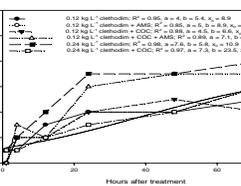
**Absorption**



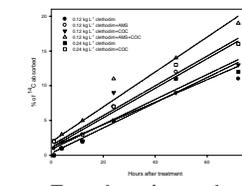
**Translocation – treated leaf**



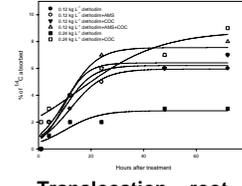
**Translocation – shoot**



**Translocation – root**



**Translocation – shoot**



**Translocation – root**

## CONCLUSIONS

- Efficacy of all clethodim treatments was almost 100% on both bermudagrass and wheat, while % reduction in shoot dry weight compared to nontreated control was higher with the 0.12 kg L<sup>-1</sup> formulation compared to the 0.24 kg L<sup>-1</sup> formulation for both species (data not shown).
- Absorption of <sup>14</sup>C-clethodim with the 0.12 kg L<sup>-1</sup> formulation was higher than with the 0.24 kg L<sup>-1</sup> formulation. Addition of adjuvant, especially COC + AMS, increased absorption of <sup>14</sup>C-clethodim with the 0.12 kg L<sup>-1</sup> formulation.
- In both species formulation did not have an impact on distribution of absorbed <sup>14</sup>C-clethodim; however presence of an adjuvant increased movement of <sup>14</sup>C-clethodim out of treated leaf.