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Turfgrass Research
2015

Use of a Handheld Thermal Torch as a Herbicide-Resistance Management Tool

Jared Hoyle, Jake Reeves, and Evan Alderman

Summary. Handheld thermal torches could possibly become a tool to reduce glyphosate-resistant annual bluegrass populations. One month after treatment, 5- and 6-second handheld thermal heat treatments reduced annual bluegrass populations by 50 and 60%, respectively.

Rationale. Turfgrass managers repeatedly apply glyphosate on dormant turfgrass for annual bluegrass (*Poa annua*) control. Glyphosate-resistant annual bluegrass is becoming increasingly common in turfgrass systems. Prior to broad outbreaks of resistant annual bluegrass, it is possible that small resistant populations may be controlled with thermal destruction, breaking the resistance cycle. Limited research has been conducted to explore annual bluegrass control with a handheld thermal torch.

Objectives. Evaluate the duration of thermal heat for annual bluegrass control.

Study Description. A field trial was initiated in spring of 2015 at Stagg Hill Golf Course in Manhattan, Kansas, Research was performed on a 'Meyer' zoysiagrass (*Z. japonica* Steud.) fairway maintained a 1.9 cm mowing height. At trial initiation (March 10, 2015) the research trial area contained approximately 15% annual bluegrass cover (35 to 50 annual bluegrass plants per plot) at the 6- to 8-tiller stage. Oxadiazon (3 kg ha^{-1}) was applied to entire research area to prevent further annual bluegrass emergence. Treatments were arranged in a randomized complete block design with four replications. Treatments were applied to 3 by 3 ft plots and consisted of thermal heat at 0, 1, 2, 3, 4, 5, and 6 seconds. A glyphosate application (1.1 kg ai ha^{-1}) was included for comparison.

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Thermal heat treatments were applied 5 inches from soil surface by a handheld torch (Mini Dragon; VT1-32C; 25,000 BTU) by Flame Engineering (Figure 1). Data included annual bluegrass plant counts, maximum annual bluegrass crown temperature at application, and visual zoysiagrass injury or charring.

Results. At treatment application, with an increase in thermal heat duration, maximum annual bluegrass crown temperature also increased. Annual bluegrass crown temperature resulted in 380˚F, 540˚F, and 550˚F, for 1-, 2-, and 3-second treatments, respectively. Treatments that utilized thermal heat for ≥4 seconds we not recorded, as temperatures were greater than the inferred thermometer threshold (≥610˚F). Although initial zoysiagrass injury (10 to 75% zoyisagrass charring) was observed (Figure 2) from all thermal heat durations, zoysiagrass greenup was not delayed one month after application (April 8, 2015). One month after treatment, 5- and 6-second thermal heat treatments reduced annual bluegrass populations by 50 and 60%, respectively. Initial research suggests that thermal heat treatments from a handheld torch could possibly aid in reducing glyphosate-resistant annual bluegrass populations prior to a widespread outbreak.

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Figure 1. Handheld thermal treatment torch by Flame Engineering (Mini Dragon, VT1-32C) with modified distance marker. Distance marker was used to ensure exact distance from flame to treated plant.

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Figure 2. Initial charring of annual bluegrass plants by handheld thermal torch.

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