

# Evaluating Harvest Weed Seed Controls for Italian Ryegrass (*Lolium perenne* ssp. *multiflorum*) Management in Mid-Atlantic Wheat Production

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Can harvest weed seed controls (HWSC) prevent Italian ryegrass dispersal in double crop wheat? Maybe not.

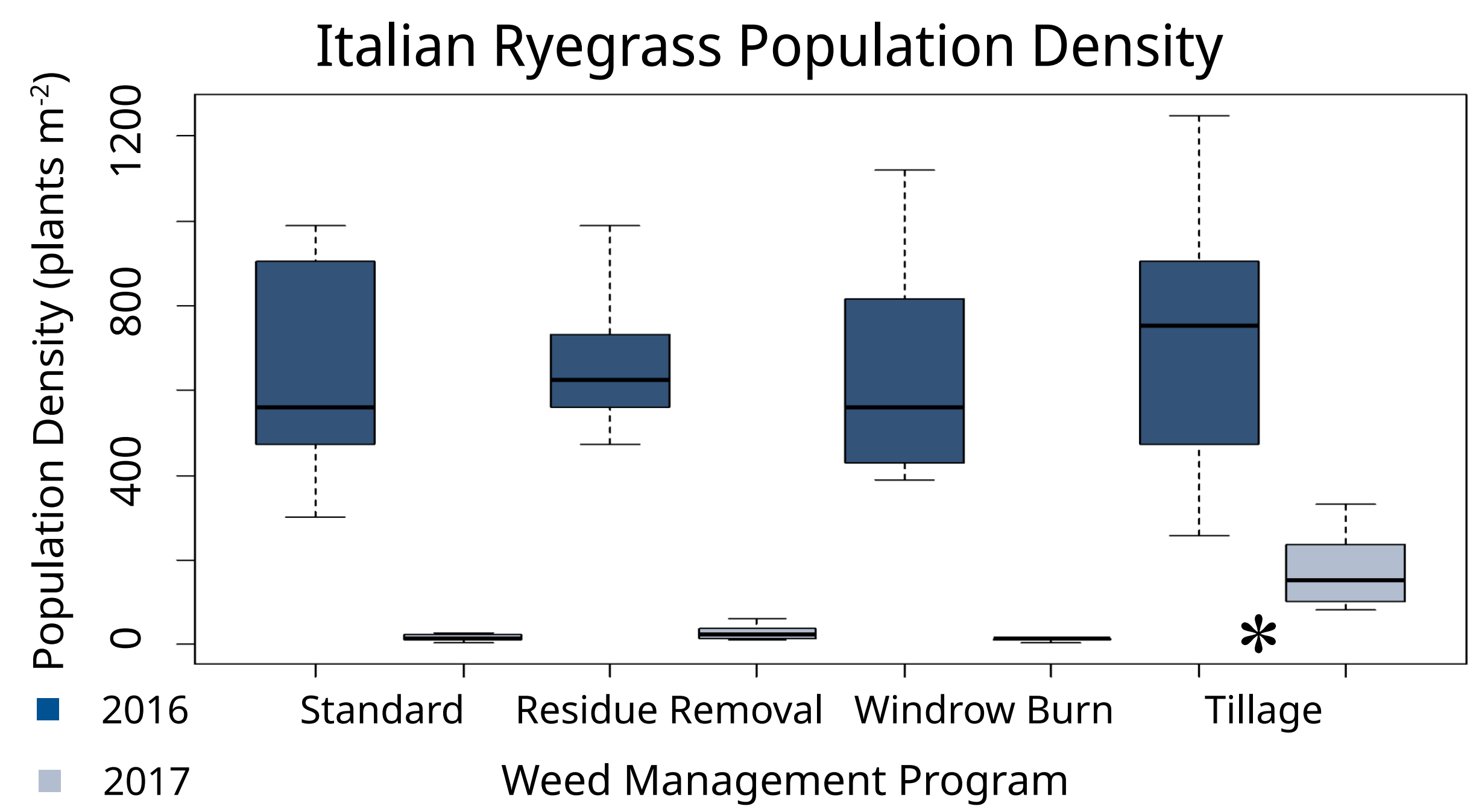
## 1 Better farms through HWSC

HWSC refers to management practices that **disrupt weed seed dispersal at crop harvest time**. Coincidental maturity between crop and weed leads to weed seed dispersal through crop residue spreading. Treating crop residue to destroy weed seeds can diversify weed management programs by reducing seed bank density. HWSC has been embraced by Australian wheat growers, and it is often viewed as a **positive practice for combatting herbicide resistant weeds** (Walsh et al. 2018, Pest Mang. Sci. doi:10.1002/ps.4802). To date, few people have applied HWSC to double crop wheat production systems.

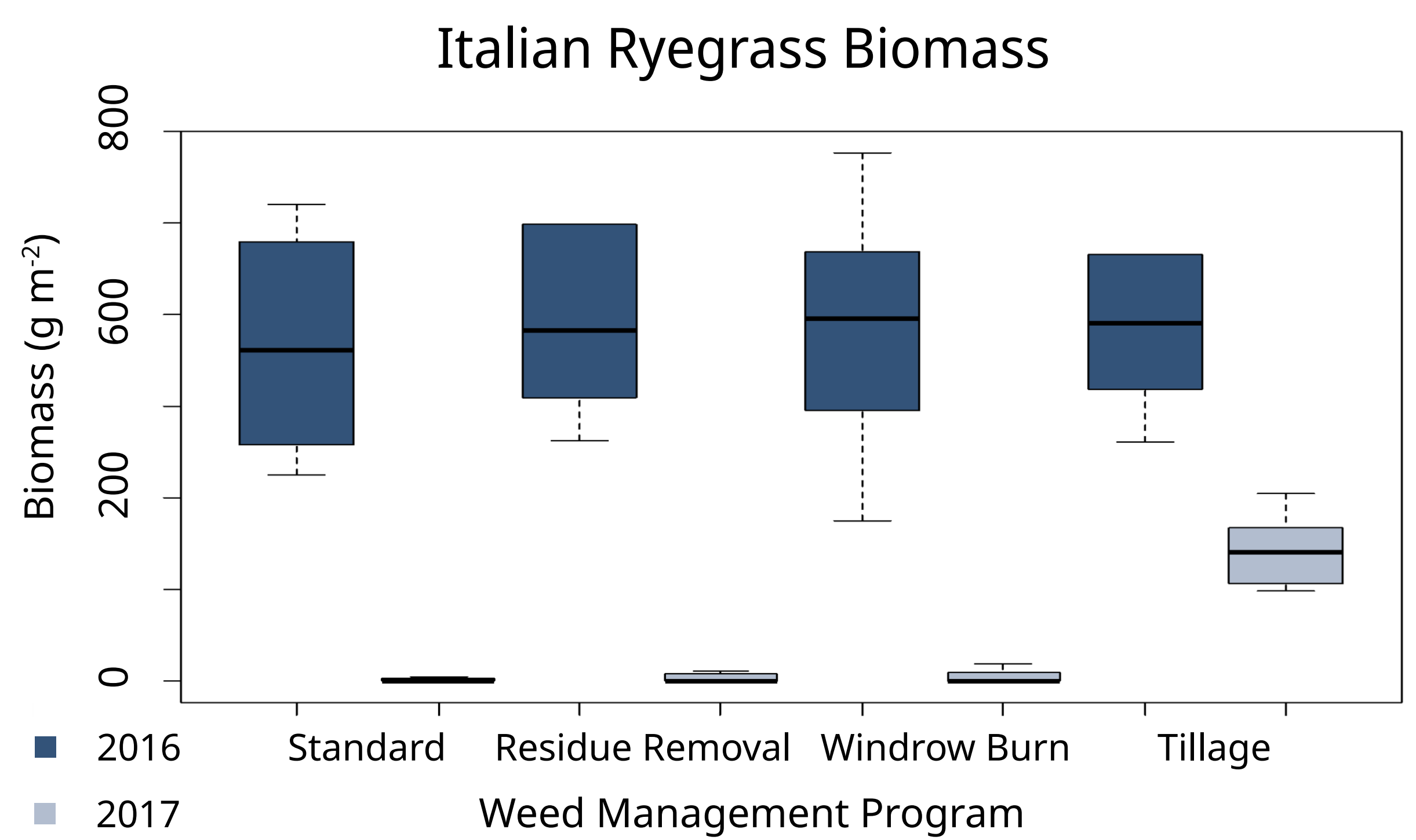
## 2 HWSC field experiments

Field plots were established in conventional double crop wheat and soybean fields infested with Italian ryegrass. Weed management programs featuring HWSC techniques, **windrow burning and field residue removal**, were compared to no-tillage (standard) and conventional tillage programs. In addition to **wheat yield, Italian ryegrass population density** (counted at postemergent herbicide application), **biomass** (collected at harvest), and **seed retention at harvest** were measured in the years before and after HWSC use. Data were analyzed with ANOVA and Fisher's Protected LSD, and the **interaction** between treatment and year (i.e. before and after HWSC application) evaluated differences between weed management programs.

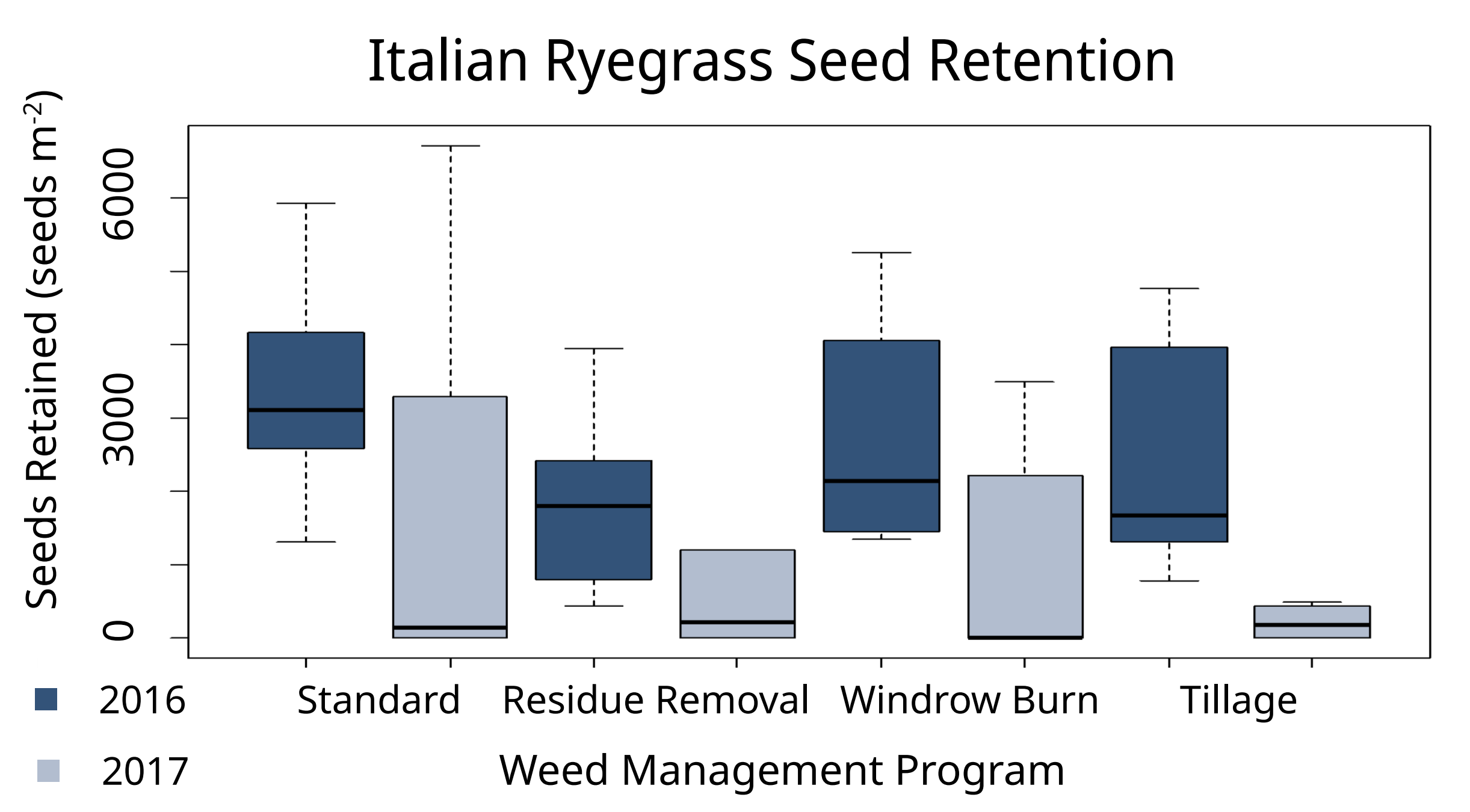
## 3 HWSC and Italian ryegrass



Italian ryegrass populations decreased from 2016 to 2017. Standard and HWSC treatments reduced ryegrass populations at a greater magnitude than the tillage treatment ( $p < 0.01$ ).

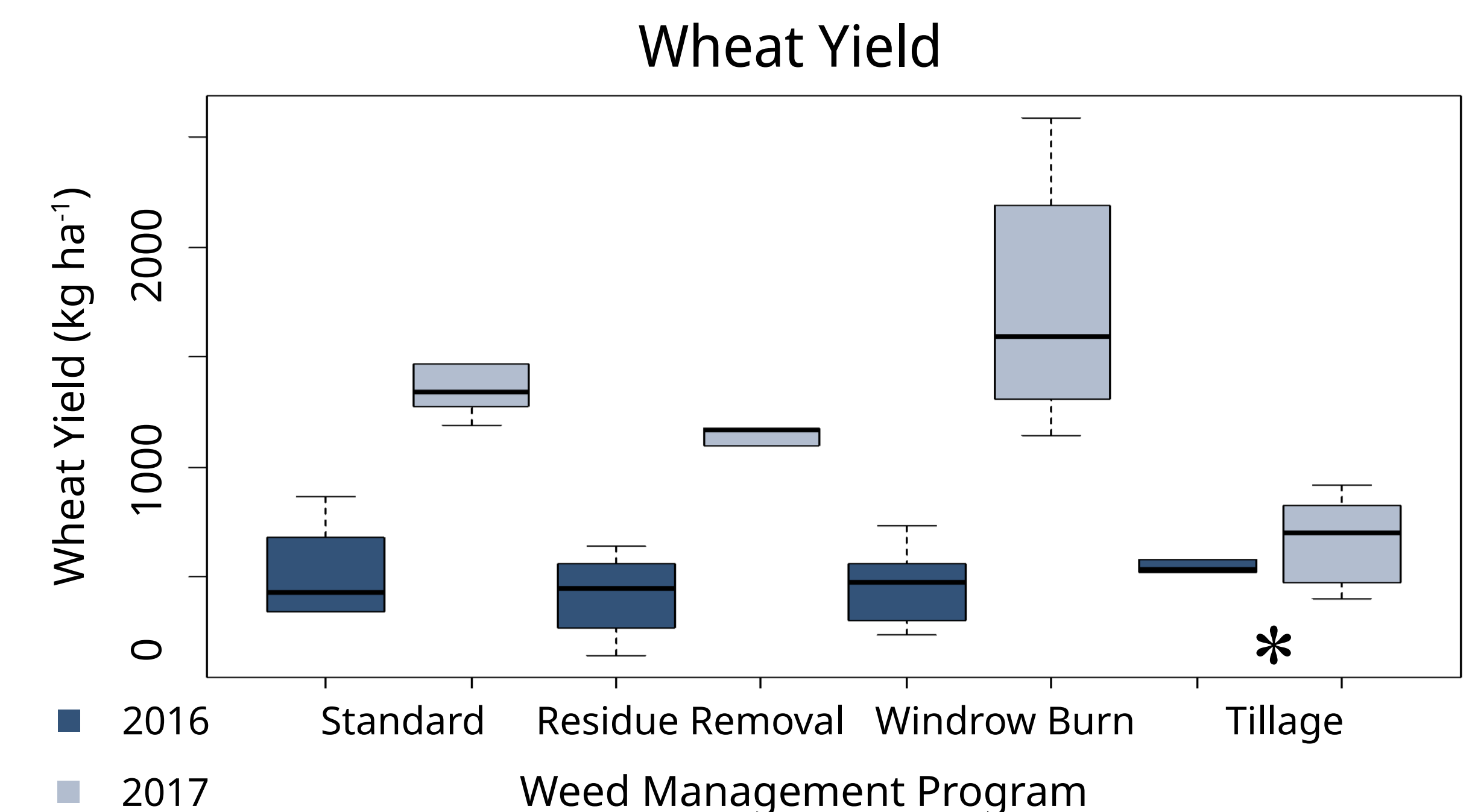


Italian ryegrass biomass decreased from 2016 to 2017. The magnitude of year-to-year change did not differ across treatments ( $p > 0.10$ ).



Italian ryegrass seed retention decreased from 2016 to 2017. The year-to-year change did not differ in magnitude across treatments ( $p > 0.10$ ).

## 4 HWSC and wheat yield



Wheat yield increased from 2016 to 2017 for the standard and HWSC treatments but remained constant for the tillage treatment ( $p < 0.05$ ).

## 5 Improving HWSC

HWSC did not effectively manage Italian ryegrass in this study. Effective herbicidal weed management may have precluded the need for additional benefits from HWSC. **Tillage encouraged Italian ryegrass populations** and reduced wheat yield, possibly by stimulating Italian ryegrass germination. This study suggests that HWSC may not be universally applicable, and **more research is needed to support HWSC adoption in new cropping systems**. HWSC can be a valuable part of an integrated weed management program, but logistical concerns, diverse weed biology, and dynamic seed bank ecology complicate its adoption. Future research must consider repeated selection by long term HWSC use, such as for early seed shattering or prostrate growth habit.

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