

A Combination Mechanical Cutting-Herbicide Sprayer Device for Managing Clean Borders Amongst Turfgrass Research Plots

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Introduction

Bare soil borders are often used in turfgrass field research trials containing stoloniferous grasses (Figures 1 and 2). Bare borders help reduce the frequency of mechanical cross contamination of adjacent plots caused by stolons (Figure 3).



Figure 1: High quality, non-contaminated research plots are the foundation of conducting sound turfgrass field research. Mechanical contamination amongst various turfgrass cultivars and species present in a trial is always a major concern.

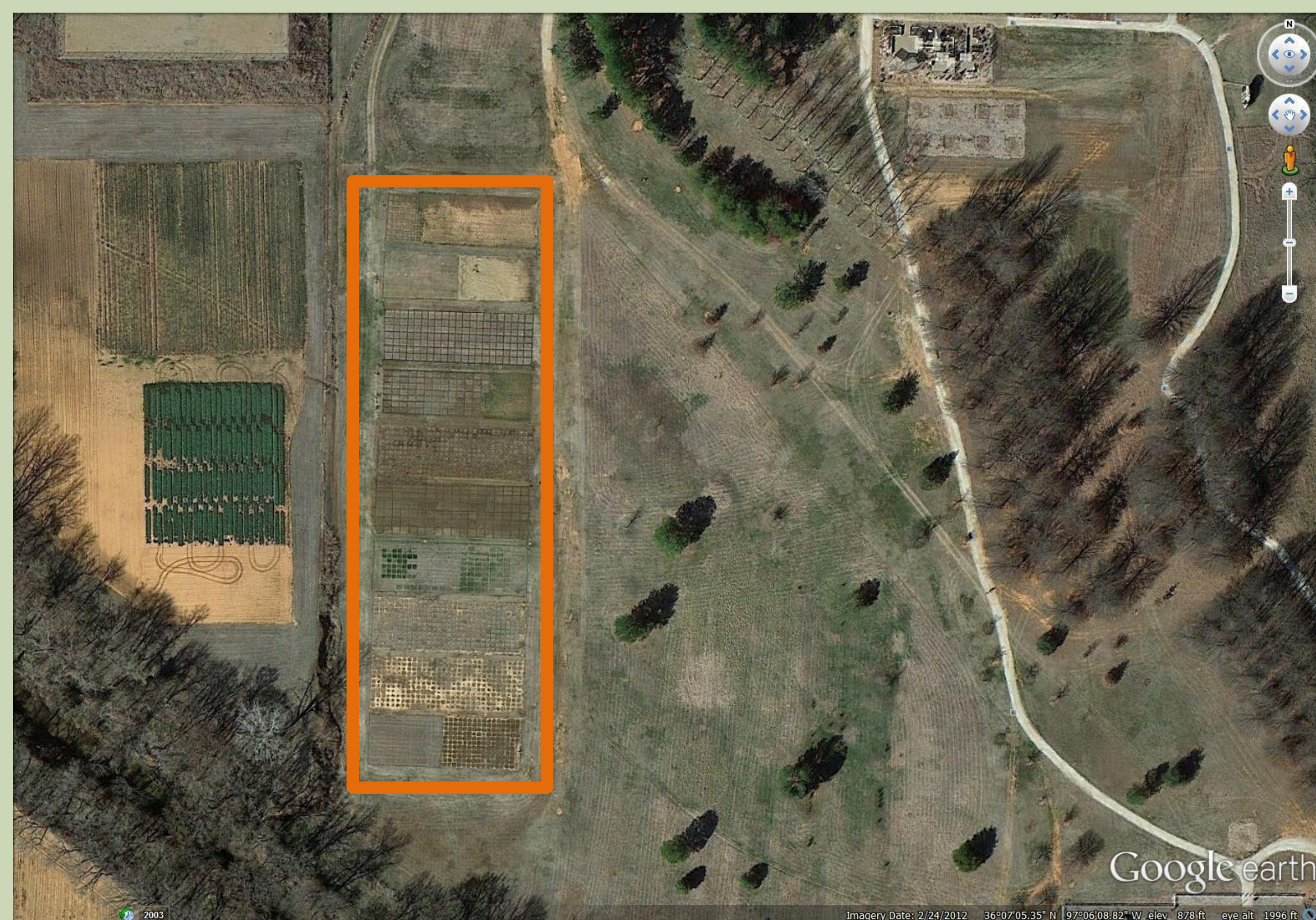


Figure 2: February 24, 2012 aerial view of 10 research trials containing about two thousand plots (orange box). Plot borders are maintained with the combination mechanical slicer-herbicide sprayer device. Image is of the south one-third of the Oklahoma Botanic Garden Turfgrass Field Research Facility, Oklahoma State University, Stillwater, OK. Image credit Google Earth, version 7.1.1.1580.



What we achieved

A combination mechanical slicer-herbicide sprayer device (Figures 4 and 5) was designed at Oklahoma State University in the late 1990s with minor modifications over time. This device has been and continues to be used in maintaining clean borders amongst turfgrass research plots (Figures 1 and 2). The device has been successfully used in over 50 research trials to reduce mechanical contamination in over 10,000 individual research plots since its invention. Details concerning the construction of our device are available by emailing the corresponding author Dennis Martin (dennis.martin@okstate.edu). This information is supplied for educational purposes only.



Figure 3: Stolons have been isolated from the main research plot in this image via cutting by disc at the same time that a band application of glyphosate-water carrier mix also containing blue spray dye has been applied to the spray band. The herbicide kills the plant material in the band while the slicing action of discs (passive by device weight) isolates the sprayed plant material preventing herbicide translocation to the main body of the plot. Dead stolons from the prior application are visible as well as green stolons that necessitated the current herbicide application.

Benefits

Specific benefits achieved by this device include a combination mechanical and herbicidal control of stolon encroachment; precision control of border width; precision application of systemic, non-selective herbicides; limitation of translocation of herbicides by stolon cutting and reduction of off-target herbicide particle drift due to physical shrouding of the spray nozzle. The slicer-herbicide sprayer device is a removable device that is mounted to a front deck-style four-wheeled mower. The discs slice by passive, ground-driven action. The cutting disc-spray unit can be raised by normal mechanical or hydraulic action for proper transport. While the device is removable if designed as such, the frequent need for usage of the equipment may dictate a dedicated permanent mounting at large facilities requiring bi-weekly to monthly applications to hundreds or thousands of plots during the growing season.



Figure 4: Front view of the combination mechanical slicer-herbicide sprayer device mounted in place of deck on an out-front deck mower. Spray nozzle (not visible) is masked by front flexible spray shroud.



Figure 5: Action view from the side of the combination mechanical slicer-herbicide sprayer device mounted in place of deck on an out-front deck mower.

Limitations

Proper pesticide applicator training and certification of the applicator is strongly suggested (required in our case). Knowledge of mechanical equipment and pesticide application equipment operation are required. Additionally, the operator should have a thorough knowledge of pesticide use labels (local, state and Federal requirements) as well as pesticide calculations, calibration, mixing, loading, application and clean-up techniques. The operator must be attentive to all mechanical as well as pesticide application variables. Care must be taken not to drive through areas of recent pesticide spray while the canopy is wet. While the sprayer shroud helps to reduce the effect of wind on spray droplets, the applicator should not make applications during non-label compliant wind speeds. The shroud does not affect herbicide volatility, thus, all label requirements with respect to herbicide volatility must be observed. During periods of rapid stoloniferous growth of bermudagrass during the warm summer months, frequent applications (~every 10 - 14 days) may be required.