

## Evaluating Alternative Pesticide-Free Athletic Field Management Strategies for New England

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### INTRODUCTION

As of July 1, 2010, the state of Connecticut has banned the use of all lawn care pesticides on athletic fields at public and private schools that service pre-K through 8<sup>th</sup> grades. This legislation has caused great concern particularly for athletic field managers due to the nature of the traffic athletic fields endure and the liability associated with their use. However, very little research based information is available regarding managing athletic fields without the use of pesticides.

Athletic fields are in a constant state of re-establishment due to their high use and intensity of traffic. This persistent turfgrass wear and reduction in turfgrass cover creates a competitive environment. Turfgrass diseases and/or insects may turn a well-established turfgrass stand into an unstable playing surface. Biological controls for turfgrass diseases and insects have shown promise, but maintaining a sufficient population of the beneficial organisms to be effective has been challenging. This combined with the prohibitive cost of application has reduced the turfgrass managers' confidence in these types of pest control strategies.

The best turfgrass species for a cool-season athletic field has traditionally been a mixed stand of Kentucky bluegrass and perennial ryegrass. The rhizomatous growth habit of Kentucky bluegrass combined with the fast germination and development of perennial ryegrass has been considered ideal. However, excessive wear and subsequent weed competition during periods of low recuperative growth for cool-season grasses have negatively impacted athletic field quality. The genetic improvements of several turfgrass species merit revisiting the question of the best turfgrass species for cool-season athletic fields, most notably the use of bermudagrass. Bermudagrass spreads by both rhizomes and stolons and is extremely aggressive during its active growth period (i.e. summer).

Topdressing natural turfgrass playing surfaces with crumb rubber has been researched since the mid-1990's. Previous research has revealed significant advantages to adding crumb rubber to a turfgrass system such as improving traffic tolerance, soil physical properties, and surface playing characteristics. Benefits have included increased turfgrass density, faster spring greenup, greater root mass, lower surface hardness and lower soil bulk density values (Rogers et al., 1998, Baker et al., 2001, and Goddard et al., 2008). However, the potential synergistic effects of alternative athletic field turfgrass species and crumb rubber topdressing on turfgrass cover, weed population and playing surface characteristics have not been researched in New England. Crumb rubber located at the playing surface increases surface temperatures potentially extending the growing season for bermudagrass; warming soils sooner in the spring and keeping them warm later in the fall. Additionally, the stoloniferous growth habit of the bermudagrass will help form a dense contiguous community with the crumb rubber layer at the surface potentially suppressing competing weeds.

The objectives of this research are to determine the effect of turfgrass species and crumb rubber topdressing on; 1) turfgrass color, quality, cover and weed populations and, 2) playing surface characteristics for athletic fields subjected to simulated traffic.

### MATERIALS AND METHODS

The research is separated into two separate studies (warm-season and cool-season grasses). A randomized complete block design arranged in a 4 x 2 x 2 factorial with three replications is being utilized for each study. The first factor in each study is turfgrass species. The warm-season study consists of three bermudagrass cultivars; 'Riviera', 'Yukon', and 'Latitude 36' (seeded/sprigged June 20, 2013) and one perennial ryegrass cultivar, 'Fiesta 4' perennial ryegrass (seeded on September 13, 2013). The cool-

season study consists of 'Supranova', supina bluegrass, 'Granite' Kentucky bluegrass, 'Mustang 4' tall fescue and 'Fiesta 4' (seeded on May 30, 2013).



**Figure 1. a) 'Latitude 36' bermudagrass was established via sprigs while two other varieties, 'Yukon' and 'Rivera' were seeded. b) Sprigs were then cleated into the soil and topdressed with a fine layer of soil to assist with root development.**

The second factor, crumb rubber topdressing has two levels; 1) yes, 2) none and is the same for both studies. In late September, 2013, crumb rubber (10/20 mesh) was applied to the cool-season study at a rate of 0.75 inch per plot and to the warm-season study at a rate of 0.5 inch per plot. The perennial ryegrass in the warm-season study was seeded at a later date than the bermudagrass and was therefore less established at the date of the crumb rubber application and only received half the application of rubber required in the fall of 2013.

The third factor, management has two levels; 1) minimal pesticides applied, and 2) no pesticides and is the same for both studies. The cool-season, minimal pesticide treatments received Tupersan 470 granules at a rate of 3lbs/1000ft<sup>2</sup> at seeding for pre-emergent crabgrass control. SpeedZone (5pts/acre) and Drive 75 DF (1lb/acre) were applied to the minimal pesticide plots of each study on 6 August for post-emergent control of crabgrass and broadleaf weeds. The cool-season study received an application of Compass 50WDG (0.25 oz/1000ft<sup>2</sup>) on 15 June to all plots as a curative for pythium foliar blight. Heritage TL (1 fl oz/1000ft<sup>2</sup>) and Daconil Ultrex (3.2 oz/1000ft<sup>2</sup>) were applied on 19 September to the cool-season minimal pesticide plots to control gray leaf spot. The warm-season study required no fungicide or herbicide applications during the establishment phase. Acelepryn G (1.15lbs/1000ft<sup>2</sup>) was applied on 19 August as a preventative insecticide treatment to the minimal pesticide plots to both the cool and warm-season studies.



**Figure 2. In September 2013, crumb rubber was applied to cool-season turfgrasses at a rate of 0.75 inch per plot and to the warm-season bermudagrass plots at a rate of 0.5 inch per plot.**

Both studies were maintained as an irrigated athletic field and mowed three days a week. The warm-season study was mowed at a height of 1.25 inches and the cool-season study was mowed at 2.5 inches. The warm and cool season study areas received a starter fertilizer (18-24-12 for a total of 0.72lbs of N) application when initially seeded/sprigged. Urea (45-0-0) was applied at a rate of 0.5lbs N 1000ft<sup>-2</sup> per



application every 14-30 days throughout the growing season (May-October) for a total of 4.22 lbs N 1000ft<sup>-2</sup> for each study.

Digital image analysis was utilized in assessing turfgrass color and cover. Controlled light conditions were provided through the use of a light box. Images were scanned using Sigma Scan Software using the following threshold values; hue=55-125 and saturation=10-100. The Dark Green Color Index (DGCI) was calculated based on hue, saturation and brightness values. Color and quality data was collected on a biweekly basis

### RESULTS AND DISCUSSION TO DATE

Results from the first year of this study are limited, since 2013 was an establishment year. Results to date are summarized below. Plots will be subjected to simulated athletic field traffic in spring 2014.

#### Warm-season study

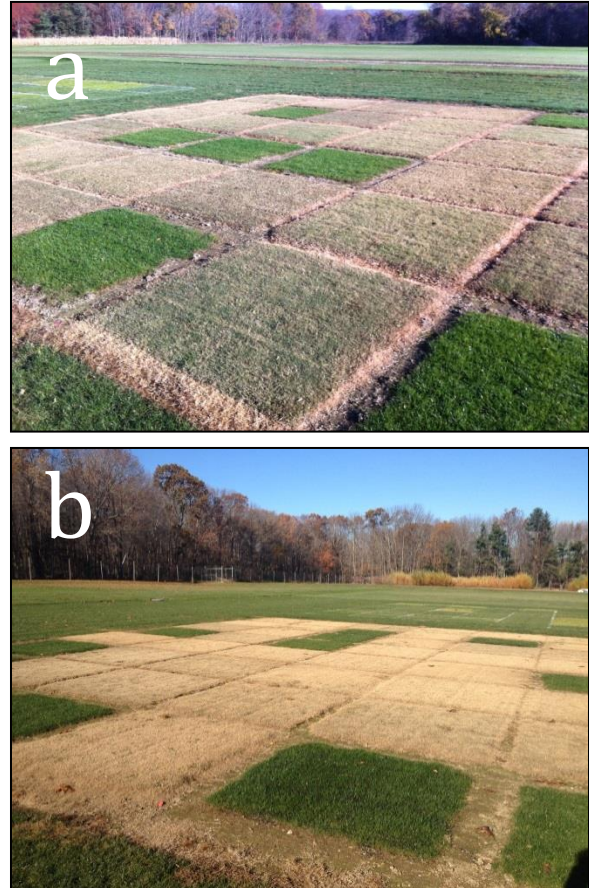
All varieties of bermudagrass were extremely aggressive. Once seeded/sprigged, establishment was rapid and turfgrass cover became dense quickly.



**Figure 3. Bermudagrass plots were completely covered within a few weeks of seeding/sprigging. This rapid growth rate competed well with crabgrass and broadleaf weed pressure.**

However, the bermudagrass went into dormancy in mid-October (much quicker than the cool-season grasses). The plots with crumb rubber were delayed

into dormancy by less than a week. The main concerns with the use of bermudagrass are its ability to survive the harsh winters of Connecticut and its ability to meet the needs of sports turf managers once dormancy occurs.



**Figure 6. Bermudagrass goes dormant quite quickly once temperatures begin to drop. Crumb rubber applications delayed dormancy about one week a) October 28, b) November 4**

#### Cool-season study

Perennial ryegrass outperformed the other cool-season grasses during the spring establishment phase by achieving higher turfgrass density much faster than the other species. The cool-season plots required two curative fungicide applications and two post-emergent herbicide applications during the

establishment phase. However, the warm-season plots required no fungicide or herbicide applications.



**Figure 5. Supina bluegrass plots showed increased weed pressure and decreased color without applications of pesticides or crumb rubber.**

#### **LITERATURE CITED**

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