Elvenia J. Slosson Endowment Fund – Final Report

Comparing "Weed and Feed" Combinations to Fertilizer and Overseeding for Weed Control in Home Lawns – 2nd year with modifications

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Introduction

Weed and feed products are promoted as an easy and efficient way for homeowners to apply fertilizer and kill weeds in one step. However, proper timing of fertilizer and herbicide applications are often not coincident resulting in either overuse of herbicide or application of the wrong kind of herbicide, or the potential of over-application of fertilizer. This can lead to increased pollutants in runoff. Alternatively, keeping lawns healthy by encouraging a thick turf stand is the preferred method of weed management. Theoretically, a thick stand should out-compete most weeds. Nevertheless, there has been little work done to test this theory in home lawns. This study is a follow up to a study completed in 2007 which compared turf managed as recommended by the fertilizer or weed and feed labels and overseeding.

Tall fescue is the most commonly planted turfgrass in California. This is a cool season grass but is popular in most of California due to its ability to stay green throughout the year. There are many varieties that were developed for specific uses such as low water use, fine blades, and ability to tolerate heat. Generally, nitrogen fertilizer is applied to tall fescue in coastal southern California when it is beginning to grow actively in March followed by another application in May. Fall applications of a complete fertilizer are done in October and November (Henry et al., 2002). Three to 6 lb N/1000ft^2/year is recommended, divided up evenly among the application times. Green et al. (2005) conducted an extensive study to determine appropriate nitrogen application rates to minimize nitrate leaching and optimize fescue performance. This study recommended that 4-6 lb N/1000ft^2/year be used. Fertilizers were applied in March, May, August, and October. Turf quality in most plots including the untreated plots decreased in February and May.

A summary of homeowners' fertilization practices reported in Understanding Watershed Behavior (Anon., 1996) found that homeowners apply fertilizer from 1.7 to 3.2 times per year with spring being at least one of those times. The most common fertilizer products sold in the U.S. are Scotts brand fertilizer and Scotts weed and feed products (Scotts, 2005). Presumably these products are attractive to the consumer because he or she can do two tasks with only one product and in only one step.

Although these products do provide a measure of weed control and are good turf fertilizers they may not be as effective as they could be for weed management. A major cause of poor weed control by herbicides is improper timing. Herbicides are less effective is if applied too early, for example if a postemergence herbicide is applied before the peak of emergence, or applied too late such as in the case where the first flush of emerged weeds have already started flowering or even more detrimental, producing seeds (Yelverton, 1996). According the Pest Note for crabgrass (Elmore, 2002), cool season turf should be fertilized during periods of active growth in order to enhance the competitiveness of the turf. For tall fescue, that is March-June and October-December. This coincides well with the fertilizer recommendations from Green et al. (2005) and Henry et al. (2002). However, postemergent control of weeds is best accomplished when the weeds are small but actively growing which may or may not coincide with that timing.

Weeds in lawns are best managed by maintaining a vigorous, healthy turf (LeStrange and Reynolds, 2004). Although herbicides can be used effectively for controlling weeds in lawns, long term control is only accomplished by modifying the habitat such that it is difficult for weeds to become established and spread. Despite these statements, which are generally recognized as the mantra for weed control in lawns and other low to moderate use turf sites, little research has been conducted to demonstrate its effectiveness. In fact, the great majority of research for weed management in turf is in the efficacy of herbicides. For example, of 80 turf weed control reports from North Carolina in 2004, only two focused on cultural management for weed control in turf (NCSU, 2005). Ecological studies such as those used to develop predictive weed emergence models are done primarily for recommending when the most effective time to apply an herbicide would be (Masin et al., 2005).

Long term weed control in turf depends on the competitive ability of the turf species and reducing vegetation gaps (Caruso, 1970, Larsen et al., 2004). It follows that the methods to improve the competitive ability of the turf and decrease the size and number of gaps would make the site less susceptible to weed invasion. From an integrated pest management standpoint, which stresses prevention of the pest, cultural practices such as proper fertilization to encourage a vigorously growing turf as well as overseeding to reduce gaps are better approaches than use of herbicides to restore the turf once invaded. In 2007, in a similar study funded by the Slosson Foundation, we found that there were no differences among treatments in soil N (as measured by NO_3) even though the treated plots were fertilized according to recommendations on the labels. This was not sufficient to bring the site up to adequate N for good turf appearance and N level was likely too low to see potential differences in weed suppression due to the non-chemical treatments (Wilen and Henry, 2007).

The overall objective of this study was to evaluate the effectiveness of overseeding and fertilizing at recommended intervals on reducing the weed population turf. We compared these treatments to commercial weed and feed products applied in the spring and fall.

Materials and Methods

Treatments and Experimental Design. The plots were located at the UC South Coast Research and Extension Center in Irvine. Each plot was 12'X24' (288 ft^2) planted with established tall fescue (*Festuca arundinacaea*) of mixed varieties. Plots were irrigated by turf sprinklers using an irrigation controller to maintain 100% Et cool-season turf replacement. Plots were mowed as needed, generally every 1-2 weeks. Weeds at the initiation of the study included cudweed, cinquefoil, spurge, oxalis, clover, fleabane, and crabgrass. The weed pressure was low to moderate and turf quality (on a scale of 1-9 with 1 being very poor and 9 being excellent) was 3 to 5 before treatments were imposed.

The experimental design was a randomized complete block design with 6 treatments[1] as follows:

1. Untreated control

2. Scotts Turfbuilder Lawn Fertilizer plus 2% Iron, 29-3-4 as indicated from leaf N test.

3. Scotts Turf Builder With PLUS 2 Weed Control, 28-3-3 + 0.21% 2,4-D, 0.61% Mecoprop, applied in May and October applied at 2lb N/1000ft^2 per year (Note: amount of N that can be applied is constrained by the herbicide in the formulation), supplemented with Scotts Turfbuilder Lawn Fertilizer plus 2% Iron, 29-3-4 as indicated from leaf N test.

4. Scotts Liquid Turf Builder with Plus 2 Weed Control, 25-1-2 + 2,4-D 2.29%, Mecoprop 1.15%, Diclorprop 1.13%, applied in May and October applied at 3.2lb N/1000ft^2 per year (Note: amount of N that can be applied is constrained by the herbicide in the formulation), supplemented with Scotts Turfbuilder Lawn Fertilizer plus 2% Iron, 29-3-4 as indicated from leaf N test.

[1] Scotts products were selected because they are the most common brand available to home users.

5. Overseed with Scotts Turf Builder Tall Fescue Blend in summer (June 2008) and fall (October 2008).

6. Overseed with Scotts Turf Builder Tall Fescue Blend in summer (June 2008) and fall (October 2008) + Scotts Turfbuilder Lawn Fertilizer plus 2% Iron, 29-3-4 as indicated from leaf N test.

Data Collection

Turf quality and weed control: Turf quality was accessed by visually scoring the turf in for color and vigor using a 1-9 scale where 1=the worst quality, 5= minimally acceptable and 6-9 are increasing levels of turf quality and vigor. Since turf quality is rather subjective, we also used a Turf Color Meter (TCM 500, Spectrum Technologies) to quantitatively determine turf color. Turf quality measurements were taken at the same time as weed cover was assessed. All weeds in each plot were be identified and noted for presence/absence monthly, with the exception of January 2009. Weed cover was rated on a scale of 1-5 where 1=0-10% cover, 2=11-25% cover, 3=26-40% cover, 4=41-59% cover, and 5= >59% weed cover. Additionally, every 2 months, weeds were counted in a 16 ft linear transect in each plot. Leaf N was tested every 2 months to determine the N levels in the turf and fertilizer was applied as indicated from the results. Soil samples were tested very 3 months for NO_3 level.

Gap analysis: Gaps in turf are difficult to measure. We used high resolution digital photos of the turf and processed the images using SigmaScan software to identify and measure gaps.

Results and Discussion

There are strong indications from the results that fertilizing alone (Treatment 2) or overseeding alone (Treatment 5) is not sufficient to reduce weed pressure. Our data indicate that fertilizing combined with overseeding (Treatment 6) did provide the same level of weed control as using weed and feed products supplemented with fertilizer (Treatments 3 and 4) (Table 1). While we are still analyzing the monthly data collected, we can show that the number of species (Richness) were fewer in the herbicide and the fertilizer/overseed treatments than the others (Table l1). Turf rating and turf meter reading followed similar trends (Table 1). In addition, we also found that the number of different species of weeds and weed rating decreased with increasing green area (Figures 1 and 2, respectively).

Table1. Comparison of treatments (see text for details) after one year. Means are separated by LSD. Means followed by the same letter are not significantly different at P=0.05 level.

Treatment	Weed rating		Richness		Green area		Turf rating		Turf meter reading	
1	2.5	b	8	b	623.856	a	2.375	a	6.18	a
2	1	a	7.5	b	865.107	c	7.125	c	6.7125	bc
3	1	a	5.25	a	811.359	bc	7	c	6.55	b
4	1.25	a	5.25	a	781.896	b	5.375	b	6.565	b
5	2.75	b	8	b	657.146	a	2.875	a	6.2375	a
6	1.25	a	6	ab	864.13	c	6.875	c	6.8875	c

Figure 1. Regression species richness (S) versus the area of green cover in each plot. Lower S values indicate fewer number of species; S=1 is a monoculture. P=0.0274, Correlation Coefficient = -0.450, R-squared = 20.232 percent.

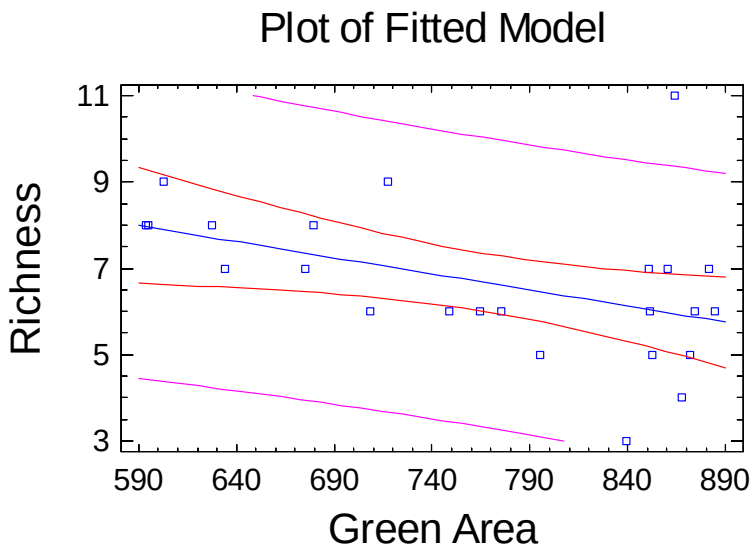
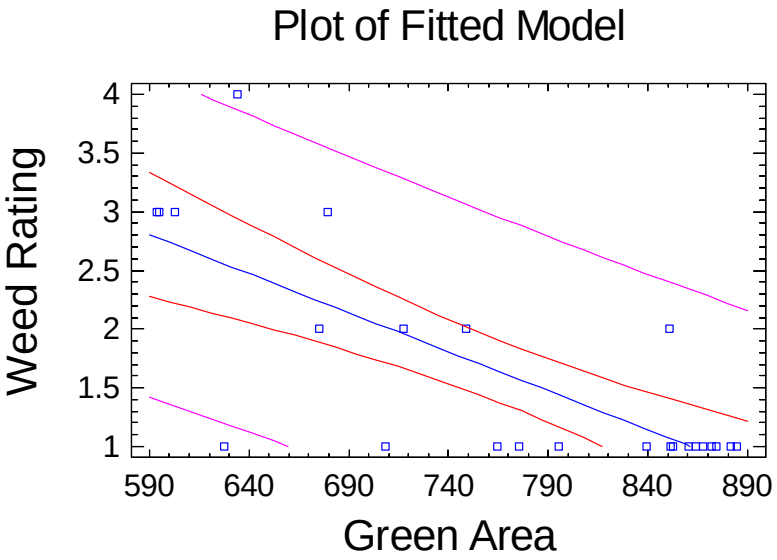


Figure 2. Regression species weed rating (see test for rating scale) versus the area of green cover in each plot. Lower weed rating values indicate lower weed pressure. P=0.000, Correlation Coefficient = -0.754, R-squared = 56.810 percent



Conclusion

Weeds can be managed by improving turf competitiveness by reducing gaps in the turf (increasing green turf cover). However, fertilizing alone or overseeding alone is not sufficient to accomplish this. Overseeding combined with appropriate fertilizer levels will provide broadleaf weed control equivalent to that of using weed and feed combination products also supplemented with fertilizer.

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