Development of Model System for Testing Foliar Fertilizers, Adjuvants, and Growth Stimulants

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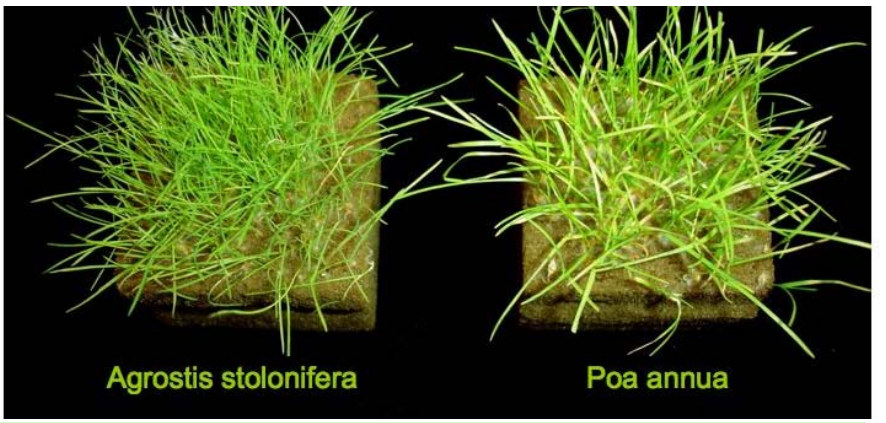
Objectives:

1. Develop a model system for testing the efficacy of a broad range of foliar materials.
2. Conduct preliminary tests of nutrient and non-nutrient foliar materials.

Start Date: 2006
Project Duration: two years
Total Funding: $6,000

Foliar fertilization and the application of foliar stimulants, adjuvants, and other non-pesticide materials (foliar chemicals) have become a central practice of many turf producers. Our understanding of these products is remarkably poor and for the majority of foliar materials used the turf industry there is very little independent information on efficiency and return on investment.

Foliar chemicals are used for a number of reasons. Some have a clear physiological and production rationale ,while others are of doubtful utility. Valid reasons for the use of foliars include the correction of low nutrient availability in soils (e.g. Fe deficiency in high pH soils), overcoming excessive nutrient demand during times of maximal growth and demand, and rapidly reinvigorating turf following periods of stress or prior to critical use.



*Creeping bentgrass (*Agrostis stolonifera*) and annual bluegrass (*Poa annua*) under restricted P fertility.*

Five separate experiments have been completed to verify the efficacy of a range of common Zn foliar fertilizer products. A mixture of commercial and single salt products were tested. We have contrasted replicate experiments using a relative ranking which represents the degree to which the material differed from the control treatment within the same experiment. Treatments with different rankings within a single experiment, differ significantly ($p>0.05$).

Treatment	Ranked Efficacy			
	Exp. 1	Exp. 2	Exp. 3	Exp. 4
no applied Zn	1	1	1	1
Zn oxide			1	1
Zn phosphate				2
Zn oxide				2
Neutral Zn	1	2		
Zn nitrate (A)				
Zn organic (A)	1	3		
Zn sulfate	2	4	2	2
Zn organic (B)	3	4	2	
Zn bio-org (A)			4	3
Zn bio-org (B)			4	4
Zn bio-org (C)			4	4
Zn bio-org (D)			4	4
Zn bio-org (E)			5	3
Zn nitrate/urea			4	4
Zn organic (F)	3	5	5	4
Zn chelate	4	5	5	

Treatments with different rankings within a single experiment, differ significantly ($p>0.05$).

Table 1. *Ranked efficacy of several common Zn foliar fertilizer products*

While not all materials were replicated in all trials, it is clear from Table 1 that there is a remarkable consistency in materials ranking between replicate experiments. Formulations differ in their efficacy from highly effective to no difference from the non-treated control.

We have contrasted the effect of foliar P and paclobutrazol on growth and metabolism of *Poa annua* and *Agrostis stolonifera*. Species response to P clearly illustrates that *Poa annua* is strongly inhibited under conditions of low P availability, while *A. stolonifera* was not inhibited by low P. Application of paclobutrazol also resulted in inhibition of *P. annua* growth but had no effect on *A. stolonifera.*

Summary Points

- The development of small model system has allowed for the rapid determination of the relative efficacy of a broad range of foliar materials in a short time frame.
- There is substantial difference in the relative efficacy of foliar Zn products with higher efficacy associated with chelated, complexed, or multi-consituent materials.
- Initial trials with a grass-based model system suggests that *P. anuua* has a greater sensitivity to low P and to paclabutrazol than does *A. stolonifera*. These results may provide guidance for *P. annua* control in greens.