

## PRACTICAL RESEARCH IN THE FIELD

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Having listened to many research reports from turfgrass scientists, I always had two basic questions: 1) will this work at my golf course, and 2) why can't you test this product/practice/system in the real world of golf? We've all heard about promising products that looked good in lab tests but failed in plot research, and other ones that did well on the plots but failed to perform consistently under acute field conditions. Because of my curiosity and skepticism regarding the research claims of biostimulants I decided some formal, field evaluations were in order before spending a lot of time and money on these products.

Originally, I simply wanted to evaluate biostimulant performance at The Meadows Golf Club. Along the way I learned about lab and field research techniques, field sampling, evaluation procedures and statistical analysis. The old saying "bite off more than you can chew" summed up my feelings once I initiated these field trials.

Considering all the variations found on any golf course (turf health, turf species, soils, microclimates, drainage, irrigation, etc.) it seems extremely difficult to emulate plot trials performed at research facilities. But we can overcome these difficulties and generate good data to help ourselves make accurate, objective decisions on products to use on our courses. Because of space/time constraints I cannot possibly describe all aspects of this research. My goal is to help you ask the right questions and identify the complications in designing a valid field study at your place.

Before setting up field trials consider the time required. This is time outside your already busy schedule. The amount of time you are willing to give will influence all the other decisions in your project, especially the evaluation routine.

Once you have made the time commitment there are four basic questions to address. (1) Identify which products to evaluate (try limiting yourself to three). (2) Determine test plots to use, including check(control) plots. (3) Choose evaluation criteria and rating scale. (4) Decide the timing and frequency of evaluations.

### **Products**

Choose products that function in a similar manner. Or claim a similar benefit, i.e. "biostimulant", snow mold control, "increases greenspeed", etc. Carefully examine product ingredients. Some biostimulants products, for example, include nutrients. Even minor amounts may enhance growth under low fertility conditions, regardless of biostimulant effect. The addition of iron may result in an immediate green-up response, falsely increasing a color rating. Evaluations become more difficult when considering these types of influence.

### **Test Plots**

Next, determine your test plots including the absolutely crucial check (or control) plots. Consider "good" areas vs. Problem spots, microclimates, traffic patterns. Is the soil (rootzone) similar? What about grass species/cultivars and turf stand composition? These variances can be handled by including each one with every product you test. Remember, every variance complicates the evaluation process. Check (control) plots are used so we can see the "normal" turf condition without the addition of the test products. In testing biostimulants on greens I wanted large plots to minimize localized problem areas. My test plots consisted of whole greens. Instead of randomly choosing which greens received what product, I considered microclimate, traffic patterns and size in selecting test plots for the treatments. This allowed me to include both healthy and "weak" greens in each treatment. Research facilitates use computer programs to randomize treatments among test plots. Because of their diverse locations, one-half of two greens in each treatment were used as control plots, as well as four whole greens.

### **Evaluation Criteria**

What do you want the product to do for you? How can you tell if it is performing? Be as specific as possible when answering these questions. Evaluation criteria should measure those qualities you wish to test. Also consider what you have the ability to measure. Some biostimulants used in our trials claimed to enhance microbial populations in the soil. Our association with Grand Valley State University allowed access to lab facilities and personnel that could measure soil microbes. Because of our pure sand root-zone I was very interested in microbial populations. Since bacteria are the most numerous microbes and important in various physical and chemical activities, I chose to count colonies as one evaluation method. Color, density, weeds, greenspeed, root length, etc., are all possible criteria.

After selecting criteria choose a rating scale. This numerical scale will help compare different products to each other and to check plots. A scale of 1 to 9 is commonly used. Define the numbers for each of the criteria, i.e. color: 1 = dead, 9 = excellent; density: 1 = bare soil, etc. Keep in mind these are subjective ratings that can be influenced by personal bias and emotions. Counting microbe colonies or disease patches and measuring greenspeed are examples of objective criteria. Cost-of-product-per-thousand square feet is another example of objective criteria especially important in field research.

When all evaluations are complete the data will need to be subjected to statistical analysis. This process will determine the true differences between treatments. Without this step you cannot scientifically compare your products. It is important to consider this analysis during the earliest phase of your project. A good statistician can help you avoid errors associated with plot size, sampling and evaluations. If possible, consult with professional statisticians or the stats department at the local college. Frequently, statistics students are available to assist you and can use your project as part of their class work. There are also some computer programs available that can do the number crunching.

#### **Timing and Frequency of Evaluations**

How often can you reasonably evaluate your plots? Do you need to evaluate every test plot or can you pick a sampling from each treatment? What about time of day? Will rain affect your ratings? Evaluations should be done often enough to consider seasonal changes in turf health. If you are evaluating snow mold control you might do one rating immediately after snow melt in spring and again after the third mowing. Since one of my products contained iron, I evaluated plots just prior to an application to avoid confusing iron color response with biostimulant effects. I also found my perception of turf color varied with time of day. Because the evaluations required significant time I rated only three of six plots for each treatment.

#### **Conclusion**

Undertaking field research at your course will require a time commitment and dedication to the project (demands that are familiar to all superintendents). The information gleaned will enable you to make solid decisions among the myriad products available to us. This research may enhance your professional status with your supervisor, your peers and in your community. It teaches the complications associated with "real world" research, and gives you a greater appreciation for the difficulties involved in all research. It also can be fun and satisfying!

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