Field Testing For Better Management

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WHEN golf course superintendents get together, it is not uncommon to hear statements like, "I can't believe how this new fertilizer has improved rooting, drought tolerance, and disease resistance in my greens," or, "when I applied that material, the grass just headed south." Such disaster stories could be avoided, and the many jubilant claims substantiated, if these superintendents would follow through with an objective field testing program.

Field testing seems to be a lost art in today's hectic golf course environment, yet it can be a very effective means of sorting out new fertilizer or pesticide products, and determining at what rates those products are most effective under local conditions. Testing also allows the superintendent to become familiar with adverse or unusual product effects prior to wide-scale application to his course, and it can be an effective demonstration tool when new equipment or management programs are being considered. Membership support for programs is often easier to obtain following a successful demonstration.

The testing of various products and practices has always been a part of golf course management. Green Section publications dating from the 1920s and 1930s provide excellent accounts of golf course field tests for turf varieties and various insecticides, fungicides, and herbicides. The bentgrass "pie trials," conducted at many prominent golf courses beginning in 1939, were critical to the development of vegetatively propagated creeping bentgrasses of that period. The majority of today's testing, unfortunately, is left to universities and commercial entities. Results of these tests are very useful, but the information is not always applicable to conditions faced in the field. Financial and resource limitations also limit the amount of testing that can be done at most universities. Following are some basic guidelines and insights to consider when field testing new products on your golf course.

Field testing programs can vary from extensive, elaborate experimental designs to a simple comparison between products, equipment, or cultural practices. Limiting the test to a simple design in which one or two products or practices are tested is recommended because it simplifies the analysis of the results. The actual test should be thoroughly planned. It is important to design the test to provide specific data or results that satisfy the particular objective of interest to you or the club. Once the test has been formulated, a basic plot plan and site selection can be completed.

Selecting a good site for your test is critical. The site should be representative of the golf course, and if a pesticide product is being tested, the site should have a history of pest activity. Comparison tests between various materials or practices should be conducted on uniform sites to limit the variability that could affect the results. If several sites on a course are used for comparison testing, products or variables should be tested at each site. For example, if two pesticides are being compared, be sure both products are tested at each site; never compare the performance of a product applied to one site to a second product applied to a different site. Replicating a simple test on several sites (for instance two greens or several fairways) provides a more accurate representation as long as the sites are similar in turf composition, soil types, and microenvironments.

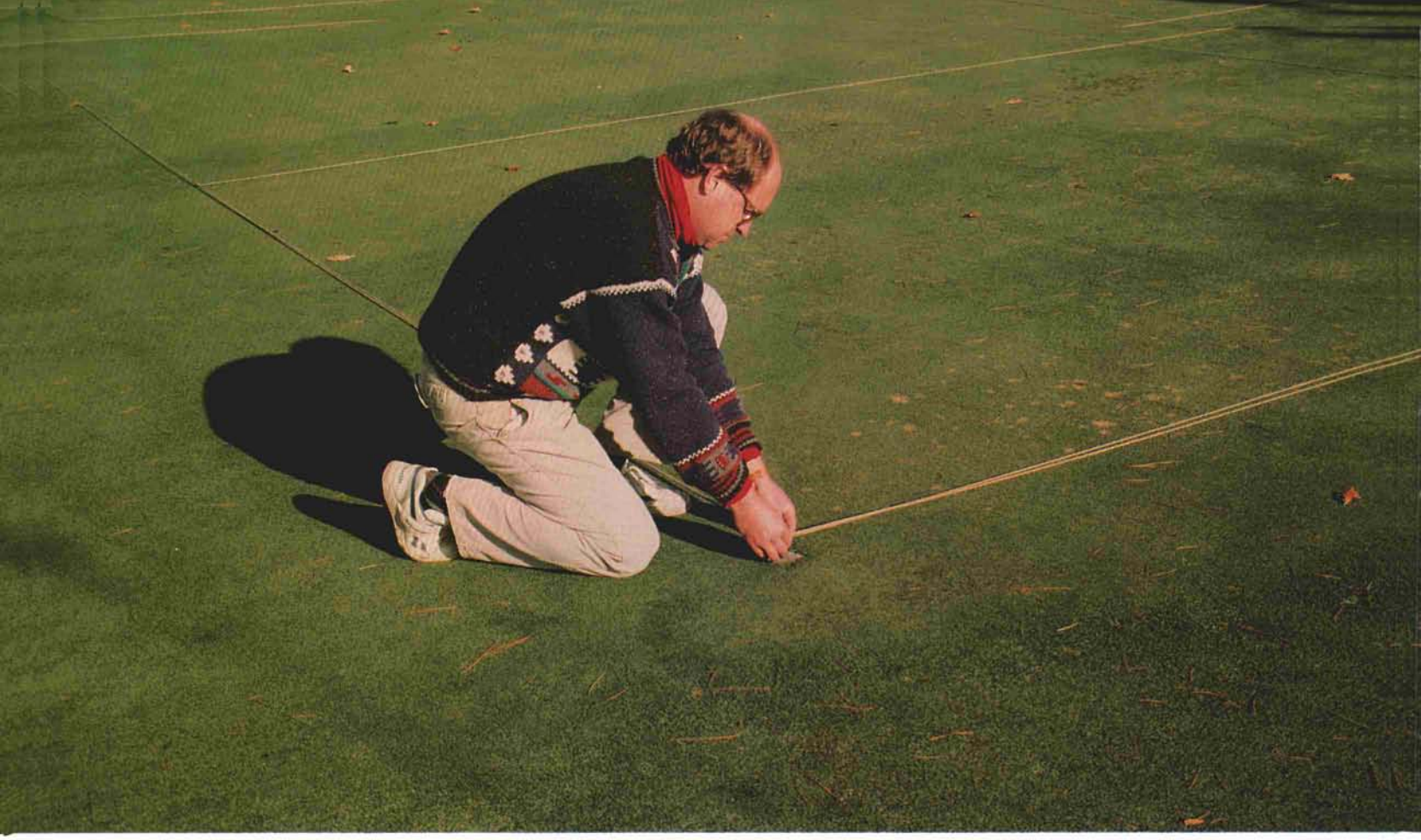
It is not recommended that herbicide or growth regulator testing be done in highly visible locations or on heavily trafficked areas where turf loss cannot be tolerated. Likewise, common sense suggests that initial testing work not be done on greens in play if the playability of the turf might be adversely affected. Instead, these tests should be done on a practice green or putting green nursery.

Once a site has been selected, a map or plot plan can be designed simply by dividing the selected site into separate equally sized areas designated as treatment plots. A basic plan might divide a green, approach, tee, or fairway area in half, treating one section consistently while leaving the other as a control (not treated). However, even better results could be achieved by dividing a sampling site (green or fairway) into a series of smaller plots and then replicating the treatments. The design for such a test might include two or three plots for each treatment, including control plots.

It is important to include control plots as part of the design. Control plots receive no treatments and serve as a basis for comparison. All treatments should be assigned randomly (e.g., pick numbers from a hat) to the various plots. Assigning the treatments is completed on the plot map before any applications are made. Several copies of the plot map and designated treatments should be made to serve as application and reference guides during the life of the field test. Test plots can be sized to match the width of a spray boom, spreader pattern, or any practical dimension. A 6″ to 12″ buffer zone separating the plots eases treatment applications and simplifies final observations.

After the plot design has been mapped, the site itself can be clearly marked to avoid confusion with applications and evaluation work. Many good trials have been destroyed because of unclear marking or poor communications. There are a number of markers, inconspicuous to the golfer, that can serve as permanent boundary guides.

An effective, commonly used marker is a small, square aluminum plate containing a center hole. The small marker plate is located at the soil-thatch interface at the plot corners along the site boundary and secured with a 6″ spike. Pressure-treated wood pegs also serve



(Above) Plot boundaries are marked with twine or string fastened to spikes that protrude through corner markers.
(Opposite page, top) Control plots are required for any objective comparison.
(Opposite page, bottom) A disaster that could have been avoided with an initial trial application.

as effective markers. The brightly painted wooden markers can be implanted flush with the soil. They can be installed in rough areas, adjacent to putting greens and other closely cut turf, to avoid interfering with play or maintenance activities.

Permanent markers are helpful as application guides and for observation and photographic purposes. String or twine is most often used to line plots from marker to marker, providing a definite outline of the treatment or demonstration site, as well as each individual plot.

Once the plots are marked and the treatments initiated, it is important that the sites be uniformly maintained. Staff communications are very important at this point to avoid misapplications or practices that might affect the test results.

Application rates and treatment frequency depend on the specific products or practices being tested. Pesticide products should be applied according to label rates and instructions. Fertilizer comparisons should be based on rates that provide the same nutrient concentrations in the field, and the applications should be patterned after a typical program. If a new product is to be tested, the applications can be varied between high and low label rates to determine which rate is most effective under the specific test conditions.

Analyzing the trial correctly is also important to obtain useful information. If at all possible, have other parties not familiar with the applications complete the review as well. Their observations are sometimes more objective. It is also helpful to maintain a written record of various observations (weather conditions, unusual pest activity, etc.) during the test. The analysis can be a simple visual comparison of turf quality, or it may require estimating percent damage or pest number per plot. Other trials or demonstrations may not require any formalized analysis or observations, as the goal of the test is to determine the program's overall effect on turf quality or play (e.g., lightweight mowing programs or growth regulator trials). An open line of communication should be maintained with the membership throughout the testing period. Solicit membership or committee opinions and cooperation in examining the test's results.

Finally, when product results are compared, it is important to closely analyze the findings to determine the validity of field observations and results. Consider possible variables that may have influenced the trial. Repeating the trials through another season might be considered if the results are inconclusive.

In summary, many golf course superintendents would benefit from applying a few simple scientific principles when evaluating new products or programs. The tests do not have to be elaborate or complex to be effective. Additional information concerning specific field testing procedures can be obtained by contacting university faculty or county extension agents. Graduate students, too, are often willing to cooperate with superintendents in practical field research and testing. The wealth of information obtained from these tests can be extremely beneficial, and will help you and your course get the most for every maintenance dollar.