



**In-house trials do not need to be unduly time consuming to establish or monitor but can provide a great deal of useful information when assessing the effectiveness and performance of products. Ideally any trial area should be flat, unimpeded by shade and have a consistent soil type**

Undertaking small in-house trials can provide a wealth of information if turf managers are looking to embark on a new management practice or switching turf cultivars. In this instalment of Tech Talk, AGCSA senior agronomist Andrew Peart looks at establishing such trials and how to get the most out of them.

**Depending on why the trial has been undertaken there can also be quantitative assessments undertaken such as surface hardness or ball roll**

# Trial and error

With more and more new products being introduced to the turf market, the ability to assess their attributes within one's own environment should be viewed as being very important. Whether it's assessing a new grass cultivar, an alternative fertiliser or even the efficacy of different wetting agents, a trial in your own grounds will provide you with the best available data.

Most companies supplying new products would have or should have undertaken independent trialling of their own, however, the situation where it was trialled may have been totally different to yours. In large areas where large quantities of a product are required, such as a fairway fertiliser, a small in-house trial would be an excellent idea before applying large quantities to the entire fairway. Not only could a proposed new fertiliser be tested against a non-fertilised area, but against the existing fertiliser previously used and at different application rates to assess its response and longevity.

It is also important when evaluating any trial data that results are from a replicated trial where statistical analysis has been performed and a least significant difference result (LSD) is stated. If trials are undertaken with just one replicate they are often referred to as an 'observation trial' which provide an indication of the result that could be expected from that product, but its response may be hindered or enhanced based on its locality.

The most valuable trial should have a minimum of three replicates so that any variations within a site are minimised and that statistical analysis can be undertaken. As well as the replication the trial should have an untreated control as one of the treatments. The untreated control provides an indication of what would have happened if nothing was applied. As well as untreated control plots, sometimes, depending on what is being trialled, an 'industry

standard' may also be included when comparing new products/cultivars.

## SITE REQUIREMENTS

There are a number of aspects which need to be considered when choosing an appropriate trial site. These include:

- Uniformity of the site;
- Presence of reliable irrigation;
- The continuing availability of the site;
- Ability for it to be well maintained;
- An appropriate site to test for the desired outcomes; and
- Ample area to facilitate the required number of products (treatments) and replicates;

Ideally any trial area should be uniform in terms of being flat, unimpeded by shade and having a consistent soil type, and depending on what is being trialled a mono-stand of vegetation. Generally in-house product trials may only run for a couple of months, however, if a cultivar trial was to run for a couple of years the area would need to be secured. It is no good setting up an area that may be disturbed prior to the completion date.

Irrigation is the key to all turf management and particularly with trial sites. Even if a drought tolerance trial is being undertaken with different turf cultivars or a dry down trial with wetting agents, there is more than likely a need for irrigation prior to the start, if not during, the trial. Ideally a uniformity test should be conducted on the system beforehand.

Generally an individual plot size may not have to be greater than 1.5m x 2.0m for turf cultivar, fertiliser or wetting agent type trials. However, if a trial was to assess differing aeration techniques the plot size would need to be large enough to facilitate the piece of machinery to be used in its normal fashion.

## TRIAL ESTABLISHMENT

Before establishing the trial, the total area must be ascertained by multiplying the number of



treatments (products and possibly different rates of that product) by the area of each plot by the number of replicates. For a scientific replicated trial ideally there should be a minimum of three replicates.

For example if you were conducting a simple fertiliser trial using four products, each at a single rate, that would be five treatments due to the inclusion of an untreated control. An individual plot size of 1.5x2.0m (3m<sup>2</sup>) and three replicates would be a total of 45m<sup>2</sup>. For scientific purposes more replicates are better than greater plot sizes.

The layout of the trial area ideally should be square, that is having two sets of parallel sides and in a block formation, where the longer side contains one replicate.

To ensure the trial area is square it is important to measure the length of the diagonal distance from one edge of the plot to the opposite edge. This is the hypotenuse and can be calculated using Pythagoras theory or otherwise known as a 3-4-5 triangle. Figure 1 illustrates a basic trial layout with eight treatments and three replicates. The length of the diagonal in this instance is 13.42m.

### ASSESSING THE TRIAL

Considerable information can be gained from a trial site from simple visual observations with a subjective rating system of 0-9, where 0 is equivalent to none or very poor and 9 being equivalent to totally or excellent. This type of rating is used extensively in all the NTEP turfgrass cultivar trials for assessing turfgrass colour, density and overall quality. Although subjective, if it is undertaken by the same person on a regular basis the results can be very accurate.

Depending on why the trial has been undertaken there can also be quantitative assessments undertaken where actual numbers are recorded, whether it be thatch depth (measured in millimetres), ball roll (measured in centimetres), surface hardness (measured in gravities) or salinity (measured in decisiemens).

Generally there can be considerable information gathered without having to undergo more expensive off-site testing, however, sometimes this may be required. For example, testing the effectiveness of products/methods to reduce organic matter accumulation should not just be a subjective assessment or even a measurement of its depth within the profile using a ruler, but should involve the use of laboratory equipment to assess a percentage of organic matter using a loss on ignition test.

### COLLATING THE DATA

The reason for undertaking a scientific trial, that is one with multiple replicates, is to undertake statistical analysis to accurately state whether one product or treatment is better than another by obtaining a significant difference in their performance.



Individual results from each plot must first be recorded for each assessment date and then the results of each treatment must be grouped together so that they can be statistically analysed. For example, if there were eight treatments and three replicates (as shown in Figure 1) there would be 24 individual plot results for any one assessment date. Those 24 results would then be grouped into eight lots of three representing the results for each treatment. Once grouped into their treatments they can be statistically analysed.

Undertaking an Analysis of Variance (ANOVA) test will determine whether the results from each treatment are significantly different from each other, or not, depending on the confidence level being sought. The confidence level is an indication of the likelihood the result was as a result of the specific treatment rather than by chance.

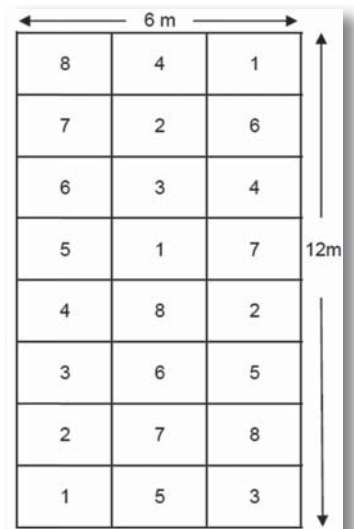
Generally a confidence limit of 95 per cent is used, meaning that if the P value is less than 0.05 there is a significant difference between treatments. If the P value is greater than 0.05 there is no significant difference between any of the treatments for that assessment date.

The LSD figure can be calculated if  $P < 0.05$  which will determine what treatments are significantly different to each other. For a significant difference between treatments the difference between their two averages must be greater than the LSD figure. For example, if the average for Treatment 1 is 7.2 and Treatment 2 is 7.8 and the LSD figure is 0.4, then there is a significant difference between those two treatments. However, if the LSD was 0.6 there is no significant difference.

### CONCLUSION

In-house trials do not need to be unduly time consuming to establish or monitor but can provide a great deal of useful information when assessing the effectiveness and performance of products. With so many new products in the market place and most claiming to provide better results than previous products, in-house trialling can provide the best method for assessing their performance in a turf manager's own environment. 🌱

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**Figure 1: A basic trial layout with eight treatments and three replicates. The layout of the trial area ideally should be square, that is having two sets of parallel sides and in a block formation, where the longer side contains one replicate**