

## How to Design an On-Farm Trial

So, you've come across some interesting information that you would like to try on your farm. Perhaps you want to try a new product or make a change to your normal processes. The first step is determining whether this new change, process or product will add value to your farm - economically, environmentally or otherwise. Because the environment (e.g., the weather) can greatly influence farm outcomes every year, simply using a new product or implementing a new practice and comparing your results to results from previous years will not always give you an accurate understanding of whether the product/practice made the impact. A great way to tease out the effects of the practice or product is by conducting a trial.

### Getting Started

#### *A Good Trial Starts with a Clear Question*

Having a clear question will help work out the details of your experiment. The following are some steps you can take to help you clarify:

- **Talk with Other Producers.** There may be other producers that have tried a similar product or practice. Others may have tried the same experiment in the past. What worked for them? What would they have done differently? Was their context similar to your own (location, weather, etc.)?
- **Is Your Trial Small Scale?** Having a small scale trial will ensure you do not “bet the farm” on your trial.
- **Product Evaluations.** When testing a product you can run a trial at 100%, 75%, 50%, 25%, and 0% (or similar numbers) of the “recommended rate”.
- **Aim for a Yes/No Comparison when Testing a Practice.** It is best to work with simple comparisons as they will give you clear results. Having multiple variables can quickly cloud your conclusions.
- **Clarify Your Goals.**
  - Write down both the question you are trying to answer and the goal you have. If you aren't able to articulate your question, you are unlikely to be able to answer it.
  - Are you comparing apples to apples? (ie: product applied to one strip and not the other)
  - Are the strips or fields truly similar? Your test area and control need to be as close to the same as possible. Differences in soil, etc. will skew your results.
  - Don't forget to consider replication. Comparing strip A to strip B only tells you the difference between the two strips which may result from unknown variables. Replication addresses this.

- Are you challenging an assumption or testing a new idea? This will help you to frame your experiment.
- Is this a short-term or long-term question? This will inform the level of commitment and the resources needed.
- **Connect to a Regenerative Principle.** In regenerative agriculture, we are working within a natural system where making changes in one area can change other parts of the system (cascading effects).
  - Does the experiment relate to energy cycle, water cycle, diversity, livestock integration, some/all of the above, or another principle?
  - Understanding regenerative principles can help design a meaningful test.
- **Define Success of the Trial Results.**
  - Did the product or practice have the desired effect?
  - How much of an effect do you need to see in order to make the practice or product worthwhile?
- **List Your Metrics.** You need to know what you are measuring in order to monitor changes. Some examples are: yield, Brix, water infiltration, compaction, plant growth, plant timing, etc.
- **Check Your Tools.** Do you have what you need to measure what you want? (ie: refractometer to test Brix, penetrometer to measure compaction)

## Choosing Your Testing Site

Generally, it is best to conduct experiments with small manageable areas. This can typically be accomplished in your garden or field test strips. It is critically important to have a control area (no experiment done or baseline), experiment area, and at least one replication area. Replication areas of the experiment can help determine if there are unknown variables affecting the experiment (scientific studies require 3+ replications) and are important if you want to use the findings of the trial to inform decision-making at the farm scale. When selecting a location, when all other site characteristics are considered equal, locate your trial plots as near to your home or farmyard as possible or along frequently travelled routes. The closer at hand they are, the easier they are to access and the more likely you are to take note of any anomalies and make better observations as to what is going on in your plots.

### Garden Testing

- Great for testing techniques.
- Usually close to home (easy access).
- More control and fewer variables.
- Not suitable for measuring long-term field change.

### **Field Test Strips**

- Ideal when trying to effect change in a specific location/field.
- Ideal for testing practices in a real field scenario.
- It is important to consider equipment width when designing test strips.
- Beware of running trials in “marginal” or poor sites, unless you are specifically looking to address a question related to marginal land. The results you get will not necessarily reflect the true effect that the product/process would have on the rest of your farm. Use a representative area for your trials.

### **Site Identification**

Now that you know what you want to do, it is time to prepare for the test area. It is important to remember that consistency and repeatability start with a good setup.

#### **Know Your Land**

Before beginning any experimentation, it is important to clearly define the land you are working with:

- Land location, field name, nickname/alias, or legal land description
- Land orientation, features, other points of interest
- GPS coordinates will help return you to the exact spot later
  - Turn on GPS on your phone. This will make future locating easier.
- Take photos early and often. This will reduce the chance of missed details you may notice at a later date.

### **Creating a Benchmark**

It is essential to take initial measurements before conducting your experiment. This is known as a benchmark or baseline. This will help you identify changes over time and is known as a BACI (before, after, control, impact) experiment. Depending on the question being asked, you may want to benchmark through: soil testing, plant counts, Brix readings, water infiltration tests, plant health photos, etc.

### **Conducting Your Experiment**

It is crucial to be consistent when conducting your experiment, as it will prevent anomalies from skewing your experiment. Also, consider which (environmental or management) variables could impact your metrics. Here are some further things to consider:

- Same time of day for measurements.
- Same weather conditions, if possible.
- Always measure in the same locations.
- Same light conditions if measuring Brix.

## Gathering Data

### Observations

- It is really important in designing a trial or experiment to determine from the get-go what your question is (precisely) and which data you will need in order to answer that question.
- Ensure you are taking notes based on the question you are trying to answer as you do not want to lose sight of important information that may get lost or overwhelm the trial, thereby making it “undoable” or getting dropped altogether.
- Record any anomalies, surprises and strange things as they often explain unexpected results.
- More observations are better than less. Include weather, moisture and anything else you can think of.

### Photos

- Photos help you see patterns you might miss in the moment.
- Take many photos and use a ruler for scale if needed.
- Make sure GPS and date are included.
- Take the time to organize your photos so that you know what you are looking at when you review the photos at a later date. What is obvious to you now may be obscured when you look at the photos in a year's time.

### Record Measurements

- Use a datasheet or notebook.
- Accurately record measurements based on the question you are answering.

## Iteration Cycle/Theory of Change

Regenerative agriculture is an ongoing system of change that challenges our assumptions. It is important to be able to pivot and change things as context or external factors come into play. The cycle is as follows:

1. Plan
2. Assess
3. Monitor
4. Evaluate
5. Repeat

Each cycle builds understanding and improves your land-stewardship decisions.

Trials can play an important role in informing the iterative process that we undertake when we seek to address a new challenge or implement a new process. Although we often have to change plans and make adjustments to meet environmental conditions or capacity issues, it is important to be consistent and thoughtful in our approach to our trials to ensure that we are in fact answering the question that we originally posed.