Zayndu

SEED EVALUATION

- Pathogen load testing
- Germination analysis
- Growth rate evaluation
- Bespoke treatment protocol optimisation

Zayndu operates a seed testing facility to demonstrate the performance of the Activated Air treatment on seed-pathogen pairs and germination.

We generate quantitative data, comparing the level of infection, germination and growth rates for a seed batch before and after the treatment.

Seed testing is performed using highly sensitive tests within controlled environments and in accordance with the International Seed Testing Association's (ISTA) updated guidelines and protocols.

Different methods are employed for detection of bacterial or fungal contaminations as noted.

PATHOGEN LOAD TESTING

For bacterial pathogens we employ Colony Forming Unit (CFU) methods with specific sample sizes, media, growing conditions and grow timing defined and standardized by the ISTA guidelines, depending on the specie of interest.

With fungal pathogens we use a broad-spectrum approach which typically does not isolate a specific pathogen; the tests detect any fungus present, by placing the seeds on rich growing media adapted to emphasize fungal development.

A selection of growing media are used for testing and selected depending on the species being tested.

Comprehensive photograpic and data reports are provided.

GERMINATION TESTING

Replicating growing conditions as closely as possible, we test and document the seed germination rates versus untreated seed batches.

Full photographic and quantitative data reports are provided.

GROWTH RATE EVALUATION

Replicating growing conditions as closely as possible, we test and document the seed germination rates versus untreated seed batches.

Full photographic and quantitative data reports are provided.

PROTOCOL OPTIMISATION

Using data collected our team continues to work with clients to optimise treatment protocols and ultimately results.

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SAMPLING & ANALYSIS METHOD

The following describes the sampling and analysis methodology typically used in Zayndu's labs, and used for generating the white paper examples.

GERMINATION RATE

To assess germination percentage, we analyse 3 x 200 seeds/treatments (3 independent replicas of 200 seeds each that equates to 600 seeds/treatment) per run. The treated seeds are compared against an equal amount of untreated material.

Each running protocol is validated by repeating the same test conditions for 3 independent runs.

The germination conditions may vary depending on the sample.

FUNGAL LOAD ANALYSIS

Fungal analysis is carried out as follow: from each run we sample 4 x 100 seeds/treatment (4 replicas of 100 seeds each that equates to 400 seeds/treatment).

The treated seeds get compared against an equal amount of untreated material. As above each running protocol gets validated by repeating the same run conditions for 3 independent runs.

STATISTICAL ANALYSIS

Statistical analysis follows a simple pipeline depending on the experimental design.

We perform pairwise comparisons using either t-tests or Mann-Whitney U-tests when comparing untreated control vs treated. The choice between t-test or Mann-Whitney is influenced by the result of a preliminary Shapiro-Wilks test to assess the sample distribution.

We use ANOVA or Kruskal-Wallis one way when we compare Untreated Control vs Treatment1 vs Treatment2 vs ...Treatment n. Both ANOVA and Kruskal-Wallis Anova are always followed by a Tukey HSD test.

As before in the case of multiple comparison tests a preliminary Shapiro-Wilks is run to assess samples distributions in order to choose the subsequent test.

We always design our experiments to have only one variable at a time.

The data we present always have a $p \leq 0.05$.

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