T-test

A one-sample t-test is a statistical tool used to assess whether the average value (mean) you observe in your sample data significantly differs from a predetermined value. This predetermined value could be based on theory, previous research, or some set standard.

Steps involved:

1. **Formulate your hypotheses:**
    - Null hypothesis (H0): The average growth rate in the sample (exposed to fertilizer) is the same as the predetermined average growth rate (unexposed plants).
    - Alternative hypothesis (H1): The average growth rate in the sample is different from the predetermined average growth rate.

2. **Calculate the test statistic:** This statistic, represented by 't', considers the difference between the sample mean and the predetermined value, along with the variability (spread) of the data in your sample. We use the following formula to calculate the test statistic t:

$$t = (x - \mu)/(s/\sqrt{n})$$

where:

- **x:** sample mean
- **μ0:** hypothesized population mean
- **s:** sample standard deviation
- **n:** sample size

3. **Determine the critical t-value:** This value depends on your chosen significance level (alpha) and the degrees of freedom (which is the sample size minus one). You can find critical t-values in t-distribution tables available online or through statistical software.

4. **Interpret the results:** Compare your calculated 't' value with the critical t-value.
    - If the calculated 't' is greater than the positive critical t-value or less than the negative critical t-value, you reject the null hypothesis (H0). This suggests a statistically significant difference between the sample mean and the predetermined value.
    - If the calculated 't' falls within the range defined by the critical t-values, you fail to reject the null hypothesis. There's not enough evidence to say the sample mean is statistically different from the predetermined value.

T-distribution

When the degrees of freedom (df) exceed 30, it approaches a standard normal distribution.