Experimental stages

A) Experimental planning

It is the process of determining the place, time, materials and the random distribution of the levels of the variable factor (treatments) on the experimental units. The most important first step in planning the experiment depends on choosing the appropriate experimental design, because the scientific experimental results are related to the accuracy and validity of experimental design, to test the hypotheses of the experiment. In order to draw the experimental structural plan, the researcher must to answer for some agricultural experiments questions:

1) The number of variable factors whose impact is to be studied.

2) Is there an order in studying the influence of these factors?

3) What is the nature of the experimental conditions? Will the experiment be carried out in controlled conditions (in the lab) or in uncontrolled conditions (in the field)?

Not\

*The basic rules for designing the experiments are randomization, repetition, identification and control of experimental units.

* Requirements for a good experiment include less experimental error, accuracy, and broad validity of the results, simplicity, and estimation of standard error.

Stages of conducting the experiment:

1) Set the problem.

2) Determine the purpose of the experiment.

3) Review the sources.

4) Provide the supplies for the experiment.

5) Choose the appropriate design for the experiment.

6) Carry out the experiment.

7) Collecting data.

8) Statistical analysis of the data.

9) Discuss the results.

10) Recommendations.

11) Publication of search results.

12) Communicating the results of scientific research to the beneficiary.

B) The design

The design is how the different treatments are randomly distributed on the experimental units. This is the second stage of the research. Experiment design (simply) means the science that put the scientific foundations for the experiment after that planning, implementing, collecting results, analyzing and interpreting and giving recommendations.

Design essentials for conducting the experiment:

1) The number of experimental units and the characteristics studied.

2) Experimental method.

3) The random method.

4) Mathematical model of the experience.

Not\ the random distribution of treatments on the experimental units is differs according to the statistical design used, so any design has random distribution that differs from the distribution of other designs, and this is one of the foundations that distinguish statistical designs from each other.

C) Analysis

Analysis means the method of collecting and arranging data then statistical tests, in order to make decisions related by the objectives to be studied. After doing the experiment and design, comes the analysis stage. The analysis has three stages:

1) Data collection, tabulation and arrangement.

2) Statistical tests.

3) Discussing the results and making decisions.

Measures of Central Tendency

Measure of central tendency is a single value that tries to describe a data by finding the central position within that set of data. As such, measures of central tendency are sometimes called measures of central location.

The mean, median and mode are all valid measures of central tendency, but under different conditions, some measures of central tendency become more appropriate to use than others.

Mode: the most frequent value.

Median: the middle number in an ordered data set.

Mean: the sum of all values divided by the total number of values.

Mean ($\bar{x}$) $=\frac{\sum X_i}{N}$

Measures of variability

Variability describes how far apart data points from each other and from the center of a distribution. Along with measures of central tendency, measures of variability give you descriptive statistics that summarize your data. Variability is also referred to as spread, scatter or dispersion. It is most commonly measured with the following:

Range: the difference between the highest and lowest values.

Range = maximum – maximum

Variance: average of squared spaces from the mean.

$$\text{variance} = \frac{\sum (X_i - \bar{X})^2}{N-1}.$$

Standard deviation: average space from the mean.

$$\text{standard deviation} = \sqrt{\text{variance}}$$