

Statistical Techniques for Agriculture Experiments



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OBJECTIVES

- **To know various statistical techniques used for research.**
- **To understand the knowledge of various statistical software available for analysis of the data**
- **To draw the inference from the analysis.**

OUTCOMES

- **Planning of experiments**
- **Suitable statistical techniques**
- **Writing inference from the analyzed data.**

The Researcher's Problem

- Will the new or different practice affect the outcome of some particular segment of biological enterprises.
- If so, to what extent ?
- Since problem can never be answered with 100% certainty, we must include the risk and cost of making incorrect decision.

The Researcher's Problem

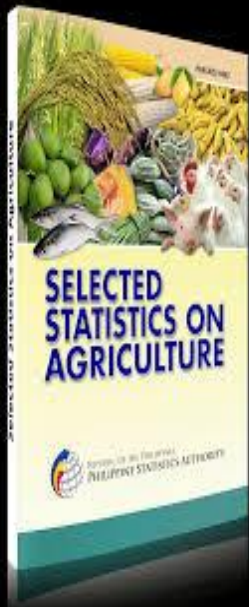
- To answer such a problem, an experiment is required.
- In simplest experiment there may be only two treatments.
- A more complicated experiment might include several rates or methods of applying new practice.

Steps in Research

- **Formulation of an hypothesis**
- **Planning an experiment to test the hypothesis.**
- **Observation and collection of data from the experiment,**
- **Interpretation of experimental results.**

The Three “R’s” of experimentation

- **Replicate**
- **Randomize**
- **Request help-** ask for help when in doubt about how to design, execute or analyze an experiment,



Some Statistical Techniques

1. Assessment of Variability

- Range
- Mean
- Standard Deviation
- Coefficient of variation
- Standard Error
- Skewness
- Kurtosis

Test of Significance

- **t-test**
- **F-test**
- **Z-test**
- **Chi-square test**

Analysis of Variance

- **Completely Randomized Design**
- **Randomized Block Design**
- **Latin Square Design**
- **Factorial experiments**
- **Split/ Strip Plot Design**
- **Augmented Design**
- **Lattice Design**

Association Analysis

- **Correlation**
- **Linear Regression**
- **Non-linear Regression**

Presentation of Research Results

- LSD Test
- DMRT
- Bar Chart
- Line Graph

STATISTICAL SOFTWARE

 STATISTICAL ANALYSIS SOFTWARE



SPSS

- ▶ Central tendency
- ▶ Dispersion
- ▶ Descriptive statistics, grouped frequency tables
- ▶ Cross tabs
- ▶ Compare means, ANOVA, Contrasts
- ▶ ANCOVA, Dissimilarity measures, Similarity measures, interval measures
- ▶ Regression, correlation, covariance
- Curve estimation, trend regression
- Non-parametric test

STATISTICA

- **General ANCOVA/MANCOVA**
- **Stepwise discriminate analysis**
- **Log-linear analysis**
- **Confirmatory/ exploratory factor analysis**
- **Canonical correlation**
- **Survival analysis**
- **A large selection of time series modeling/ forecasting techniques**
- **Structural equation modeling with Monte Carlo simulation and much more.**

SAS

SAS (Statistical Analysis System)

Data entry, retrieval and management
Report writing and graphics

- **Statistical and mathematical analysis**
- **Business forecasting and decision support**
- **Operation research and project management**
- **Application development**

Thanks

How Big Data, Precision Agriculture Will
Feed 9 Billion in 2050 ?

