Data collection procedure of Agronomic crops

Mirza Hasanuzzaman, *PhD*
Professor
Department of Agronomy
Sher-e-Bangla Agricultural University
E-mail: mhzsauag@yahoo.com

In research studies involving many individuals or items, it may not be possible to observe and record data on all of them. Often, observations may be confined to representative items only. The larger group is called a *population,* and the representative portion from which information is collected is called a *sample.* The procedure of selecting a representative sample from a big mass of population is called *sampling*.

A population is a group of individuals having one or more characteristics in common. In some cases, you may attempt to obtain information from all the elements of a population or complete enumeration of a population as in a *census*. A researcher, however, attempts to conduct a census, only if the population is sufficiently small. When the population is large, it is impossible to collect information from all the members of a population, and the researcher has to plan for some shortcuts.

The process of sampling enables us to draw generalizations based on careful observations. A measured value based on sample data is called a *statistic*. You can use this statistic to estimate the characters of a population. A population value inferred from a statistic is a *parameter*.

Sampling Methods

Sampling methods are classified as *probability sampling* and *non-probability sampling*. In probability sampling, each constituent of the population has a known probability of being selected. Because of this character, sampling error can be estimated—a major advantage of probability sampling. When extrapolating data from samples to that of population, values are presented plus or minus the sampling error.

Sampling may be of following types:

(1) Simple Random Sampling***
(2) Stratified random sampling*
(3) Purposive sampling*
(4) Systematic sampling*
(5) Cluster sampling*
(6) Multistage sampling
(7) Double sampling
(8) Area sampling
(9) Quota sampling
(10) Mixed sampling

Sample size

The **number of elements selected for a sample** is known as the sample size. A sample of size less than 30 is termed as a small sample and that having 30 or more elements is termed as a large sample. Statistic changes with sample size.

Objectives of sampling

1. Sampling is more useful for taking **timely and quick** decision
2. It saves **money**
3. It ensures the **accuracy** of results
4. It **represents population** if can be properly done.
5. It creates a **greater scope**.
6. Large **population problems** can be avoided

Data collection for Agronomic Research

Meteorological data

- Latitude, longitude and altitude of the location of the study
- Daily meteorological parameters
    - Solar radiation
    - Rainfall
    - Maximum and minimum temperature
    - Sunshine hours
    - Wind speed
    - Relative humidity

Crop data

- Phonological observation: Date of sowing, emergence, floral initiation, anthesis, physiological maturity
- Agronomic observations: The agronomic observations to be recorded at all the phonological stages of crop include plant population, number of leaves/plant, maximum leaf area of individual leaf, LAI, diurnal leaf water potential, diurnal leaf temperature, PAR, plant height, leaf weight, culm weight, dry matter, head/ear weight, grain weight, etc.
- Final grain yield and yield components.

Soil data

Soil type, soil depth, structure, texture, water holding capacity, soil profile structure, bulk density, salinity, alkalinity, pH, EC, microbial content, soil productivity, available soil moisture, wilting point, permanent wilting point and available moisture at different stages of crop.

Management data

Amount of irrigation, fertilizer quantity, herbicide quantity, data and mode of application, insecticide quantity and date of application, etc.

Biometric observations in field crops

It is important to collect data on various **growth and yield parameters** which may facilitate to interpret the results in a better way. Generally, growth parameters such as **plant, height, tiller production, leaf area index and dry matter production** are recorded. In addition, yield parameters may also be recorded. The growth and yield parameters may be recorded at different growth stages viz. **tillering, primodial initiation, flowering and at harvest.** Observations can also be taken at 20, 40, 60, 80 and 100 days after planting or sowing. Appropriate method of sampling and proper measurement are important to get a valid data. The growth and yield parameters that should be recorded for important field crops are given below:

Rice

1. Plant height
2. Leaf area index (LAI)
3. Tiller production
4. Dry matter production
5. Days to flowing and maturity
6. Number of panicles/m^2
7. Length of panicle
8. Number of grains/panicle
9. Filled grain %
10. 1000-grain weight
11. Grain yield
12. Straw yield

Wheat

1. Plant height
2. Leaf area index (LAI)
3. Tillers/m row length
4. Dry matter production
5. Days to flowering and maturity
6. Effective tillers/m row length
7. Length of spike
8. Number of spikelets/spike
9. Number of grains/spike
10. 1000-grain weight
11. Grain yield
12. Straw yield

Maize

1. Plant height
2. Dry matter production
3. Days to tasseling and silking
4. Cob length
5. Cobs/plant
6. Cob weight
7. Grains/cob
8. 1000-grain weight
9. Grain yield
10. Stover yield

Millets

1. Plant height
2. Number of effective tillers/hill
3. Dry matter production
4. Length of spike
5. Days to flowering and maturity
6. Spikes/panicles
7. 1000-grain weight
8. Grain yield
9. Straw yield

Pluses

1. Plant height
2. Dry matter production
3. No. of branches/plant
4. Pod length
5. Days to flowing maturity
6. Number of pods/plant
7. Number of seeds/pod
8. 1000-seed weight
9. Grain yield
10. Stover yield

Groundnut

1. Plant height
2. Dry matter production
3. Days to flowering and maturity
4. Number of nuts/plant
5. Mature nuts/plant
6. Immature nuts/plant
7. Nut weight/plant
8. 1000-kernel weight
9. Nut yield
10. Haulm yield

Rapeseed-mustard

1. Plant height
2. Number of branches/plant
    - Primary
    - Secondary
    - Tertiary
3. Dry matter production
4. Days to flowering and maturity
5. Numbers of siliquae/plant
6. Number of seeds/siliqua
7. Length of silique
8. 1000-seed weight
9. Seed yield
10. Stover yield

Sunflower

1. Plant height
2. Dry matter production
3. Days to flowering and maturity
4. Head diameter
5. Seed weight/plant
6. 100-seed weigh
7. Seed yield
8. Stover yield

Soybean

1. Plant height
2. Number of nodules
3. Dry matter production
4. Days to flowering and maturity
5. No. of branches/plant
6. Number of pods/plant
7. Length of pod
8. Pod weight/plant
9. Number of seeds/pod
10. 1000-seed weight
11. Seed yield
12. Stover yield

Sesame

1. Plant height
2. No. branches/plant
3. Dry matter production
4. Days to flowering and maturity
5. No. of capsules/plant
6. Length of capsule
7. Seeds/capsule
8. 1000-seed height
9. Grain yield
10. Stover yield

Jute

1. Plant population/m^2
2. Plant height*
3. No. of branches/plant*
4. Number of leaves/plant*
5. Leaf area index*
6. Diameter of stem*
7. Fibre yield*

8. Stick yield*
9. Total capsules/plant**
10. Length of capsule**
11. Diameter of capsule**
12. Seeds/capsule**
13. 1000 seed weight**
14. Seed yield**
15. Stick yield**

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*data for fibre purpose; **data for seed purpose

Specific additional data required for the following crops along with general parameters:

Cotton

1. Number of monopidials and sympodials
2. Number of bolls/plant
3. Seed cotton weight/boll
4. Seed cotton yield
5. Lint yield

Sugarcane

1. Length of milleable cane
2. Number of internodes/cane
3. Diameter of the cane
4. Cane weight
5. Number of milleable canes/m^2
6. Cane yield

Tobacco

1. Total cured leaf yield
2. First grade leaf
3. Leaf yield

Forages

- Green forage yield

Green manures

- Biomass production/unit area