

Variation

Interspecific variation: *When one species differs from another species.*

Intraspecific variation: *When members of the same species differ from each other.*

Sampling: This involves taking measurements of individual, selected from the population being investigated. If these individuals are representative then the measurements can be relied upon.

Sampling bias: *The selection process may be biased. The investigators may make unrepresentative choices.*

Chance: *The individuals chosen may be not representative.*

The best way to prevent sampling bias is to eliminate human involvement in choosing the samples. This can be achieved by random sampling.

- 1) Divide study area into a grid of numbered lines.
- 2) Using random numbers obtain a series of coordinates.
- 3) Take samples at the intersection of each pair of coordinates.

We cannot remove chance completely but can minimise its effect by:

- **Using a large sample size:** The more individuals selected the smaller the probability that chance will influence the result. The greater the sample size the more reliable the data.
- **Analysis of the data collected:** The data can be analysed using statistical tests to determine the extent chance has influenced the data.

Variation is the result of two main factors: genetic differences and environmental influences.

Genetic differences

These are due to the different genes that each individual organism possessed. These change from generation to generation. Genetic variation occurs as a result of:

Mutations: These sudden changes to genes and chromosomes may be passed to the next generation.

Meiosis: This form of nuclear division forms the gametes. This mixes the genetic material before it is passed to the gametes.

Fusion of gametes: In sexual reproduction, offspring inherit some characteristics of each parent. Which gamete fused with which a random process adds to variety.

Environmental influences

- Light
- Climatic conditions
- Soil conditions
- pH
- Food availability