Biology Prac Notes

Definitions:

Control variable

Definition

noun, plural: control variables

A variable that remains unchanged or held constant to prevent its effects on the outcome and therefore may verify the behaviour of and the relationship between independent and dependent variables.

- Tests the validity of the results
- A control group is subjected to the same procedures as the experimental group but does not receive the treatment of the independent variable. In the control group all variables are held constant. It is used as a baseline measure. This helps determine whether any of the resulting effects of the experimental group are due to the independent variable treatment and not to the actions involved in providing the treatment.

Independent variable - X

Definition

noun, plural: independent variables

(1) The variable in a functional relation whose value is independent, or is not affected by other variables.

(2) The variable that is manipulated in an experiment.

(3) The factor that affects the value of variables dependent to it.

For example:

An experiment is designed to see if a newly developed drug is effective in treating patients with cough. Some of the patients were given the drug while others the placebo. To determine if the drug is effective, the recovery of patients taking the drug is monitored and compared against that of the patients taking the placebo. If the patients taking the drug are able to recover faster than the patients taking the placebo, it could mean that the drug is effective against cough. If patients taking the drug and the placebo have the same rate of recovery, the drug may not be an effective treatment for cough.

In this case, the independent variable is the treatment given to patients with cough (i.e. the drug or the placebo).

Dependent variable - Y

Definition

noun, plural: dependent variables

(1) The variable in a functional relation whose value is dependent upon, or influenced by, an independent variable.

(2) A factor whose value changes when the independent variable is changed.

(3) The variable whose value is measured to determine the extent of the effect of another variable to it, as in an experiment.

In this case, the dependent variable is the rate of recovery in patients with cough.

An Example of an experimental write up:

The effect of Coca-Cola on the growth of plants

Aim

To investigate the effect that Coca-Cola has upon growing plant seedlings.

Hypothesis

It is expected that plants watered with Coca-Cola will grow poorly, compared with those given pure water. This is because Coca-Cola contains acid, and plants are sensitive to acidity in the soil.

Method

-   Two young bean seedlings were grown.
-   One was watered twice every week with 200ml of pure water; the other was watered twice every week with 200ml of Coca-Cola.
-   The heights of the seedlings were measured using a ruler every three days, and the results were recorded.
-    To ensure that the experiment was fair, both plants were kept at the same temperature and given the same amount of light.
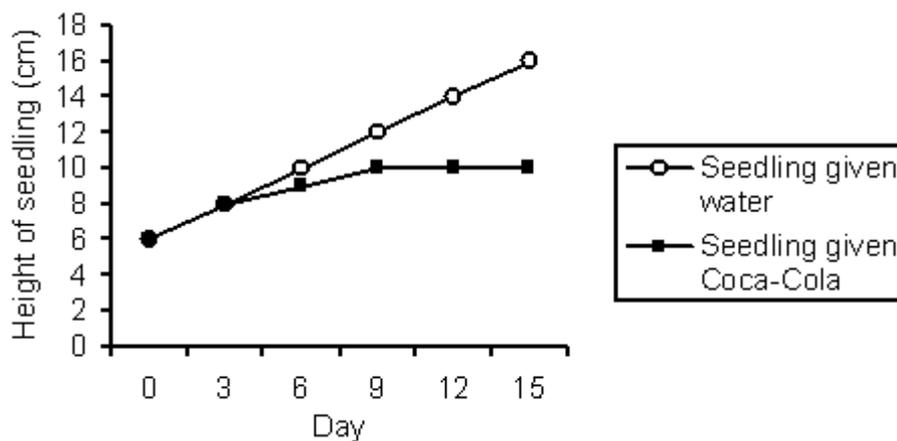
Results

The heights of the two seedlings are shown in the table below.

Day	Height of seedling given pure water	Height of seedling given Coca-Cola
0	6 cm	6 cm
3	8 cm	8 cm

6	10 cm	9 cm
9	12 cm	10 cm
12	14 cm	10 cm
15	16 cm	10 cm

Analysis of results

The seedling given pure water grew at a steady rate throughout the experiment. However, the growth of the seedling given Coca-Cola slowed down, and it stopped growing completely after 9 days. This is illustrated by the graph below.

Conclusion

The results of this experiment clearly support the hypothesis: the seedling given pure water grew better than the seedling watered with Coca-Cola.

Evaluation

The experiment produced a reasonably clear result. However, to ensure that the result is valid, it would be a good idea to repeat the experiment with several different seedlings, instead of only using two. Future experiments could also be carried out in which seedlings were given a pure solute of dilute acid instead of being given Coca-Cola. This would help prove that the plants are being damaged by the acid in the Coca-Cola and not by some other ingredient (such as the sugar or the caffeine).

How to Improve Experiments

- Repeat
- Reduce variables
- Increase sample size
- Do random sampling

Note: a bar graph has gaps/ a histogram doesn't