Experiment variations

# Simple

Experiment

Title: Pea growth

Description: How quickly do peas grow?

Text: We are going to measure the height of pea plants once a week to work out how fast they grow at different times of the year.

Hypotheses

None

Conditions

1. Default condition – no details and suppressed in the UI

Variables

Height (meters)

Observation frequency: Weekly

# Multiple conditions

Experiment

Title: Watering peas

Description: How does pea plant growth respond to watering?

Text: We are going to give different pea plants different amounts of water and measure their height once a week.

Hypotheses

None

Conditions

1. 10cl water once a week

Variables

Height (meters)

1. 20cl water once a week

Variables

Height (meters)

1. 30cl water once a week

Variables

Height (meters)

Observation frequency: Daily

# Multiple conditions + sensor readings

Experiment

Title: Watering peas 2

Description: How does peas growth respond to watering?

Text: We are going to give different pea plants different amounts of water and measure their height once a week. We want to work out the best watering schedule taking into account the variation in soil moisture.

Hypotheses

None

Conditions

1. 10cl water once a week

Variables

Height (meters)

Soil moisture (percent)

1. 20cl water once a week

Variables

Height (meters)

Soil moisture (percent)

1. 10cl water twice a week

Variables

Height (meters)

Soil moisture (percent)

Observation frequency: Daily (sensor readings every ten minutes)

# Multiple conditions + hypotheses

Experiment

Title: Watering frequency

Description: Does the watering frequency affect the rate of growth of peas?

Text: We are going to test the hypothesis that watering pea plants more frequently will encourage them to grow more quickly. We will be giving different plants the same amount of water over the course of a week, but we will be varying the rate at which it is provided.

Hypotheses

H0: Watering frequency has no effect on the rate of growth of pea plants

H1: More frequent watering promotes the rate of growth of pea plants

Conditions

1. 14cl water once a week

Variables

Height (meters)

Soil moisture (percent)

1. 7cl water twice a week

Variables

Height (meters)

Soil moisture (percent)

1. 2cl water once a day

Variables

Height (meters)

Soil moisture (percent)

Observation frequency: Daily (sensor readings every ten minutes)

# Multiple conditions + hypotheses + variable roles

Experiment

Title: Soil moisture

Description: Does soil moisture affect the rate of growth of peas?

Text: We are going to test the hypothesis that soil moisture level is positively correlated with the growth rate of pea plants. We will be giving different plants different amounts of water each day and measuring the plant growth.

Hypotheses

H0: Soil moisture level has no effect on the rate of growth of pea plants

H1: The rate of growth of pea plants is positively correlated with soil moisture level

Conditions

1. 2cl water once a day

Variables

Dependent: Height (meters)

Independent: Soil moisture (percent)

1. 4cl water once a day

Variables

Dependent: Height (meters)

Independent: Soil moisture (percent)

1. 6cl water once a day

Variables

Dependent: Height (meters)

Independent: Soil moisture (percent)

Observation frequency: Daily (sensor readings every ten minutes)

Notes

In these examples, the variables are the same for all conditions. They are kept separate in the database for ease of data storage/retrieval. For example, an experiment might define two conditions which are actually implemented in two different levels of the GrowCube. In that case, the variable quantities would be the same, but the soil moisture for one condition would come from one sensor, and the soil moisture for the second condition would come from a different one.

It is conceivable but unlikely that there might be different variables in difference conditions.

Here are some recommended school experiment plans: <https://www.scienceprojects.org/how-does-the-amount-of-water-affect-plant-growth/>

When setting up a new experiment, it should be possible to define the variables for the first condition and the duplicate them as a template for a second condition. If there are any differences, the use can update them before saving.