COURSEWORK
Growth of a Beans Experiment

Aim: To compare the growth of bean seedlings in a different soil solution.

Background Knowledge:

Plants make there own food by photosynthesis. They need light and CO_2 from the atmosphere and the water absorbed from the soil.

Plants also need very small quantities of minerals for healthy growth. Mineral ions are absorbed through the roots from the dissolved chemicals compounds in the soil. When garden centres sell bottles of "Plant Food" they are selling solutions of some of the important minerals; these can be added to the soil in which the plants are growing. When plants are unable to absorb enough an important mineral they show signs of deficiency.

If to little nitrate, phosphate, potassium, iron, magnesium, sulphate or calcium is absorbed by the plant, its appearance and growth will be affected.
For instance, potassium helps photosynthesis and magnesium is needed for the plant to manufacture chlorophyll. If magnesium is in short supply, the leaves, particularly the old ones become moulted or pale. Iron is part of the chlorophyll molecule and shortage of the mineral will make leaves pale.

A few substances, known as trance elements may even be toxic to the plant. Copper is one of the trace elements.

Nitrate, phosphorus and potassium are the substances which are most frequently in short supply. In soils nitrogen is the most important because it combines with the sugar produced during photosynthesis to form amino acids. These amino acids join together to form large protein molecules. Plants which lack nitrogen grow very poorly.

Sugar + Nitrate → amino acids → Proteins
(From photosynthesis) (From Soil)

General Planning:

- I will take three small pots and fill them full of soil.
- I shall then put one bean seed in each pot 2 inches deep into the soil.
- I shall put one of my pots in each sort of nutrient solution.
- They will be;
- Just water.
- A regular solution of miracle gro.
- And I double regular solution of miracle gro.
- I will measure the bean seedlings on a regular basis.
- The one that grows the most will be the most effective solution.
- They will all be placed on the same window seal so that it will receive the same amount of sun each.

Prediction: I believe that the regular miracle gro solution will out grow the rest, because it is meant to accelerate the growth of plants, I also believe that the double hit of miracle gro will kill of the beans seedlings because the seedling won't be strong

enough to stand such I high nutrient solution. And the plain water solution will grow at a slightly slower rate to the miracle gro solution.

Method and Apparatus:

Apparatus:

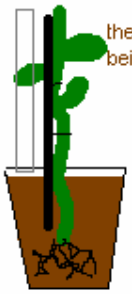
- Three plastic pots
- A ruler
- Miracle gro
- Soil
- Bean seedlings
- A support to the stem of the plant.

The pot being filled with soil

the bean seedling being put 2 inches into the pot.

Method:

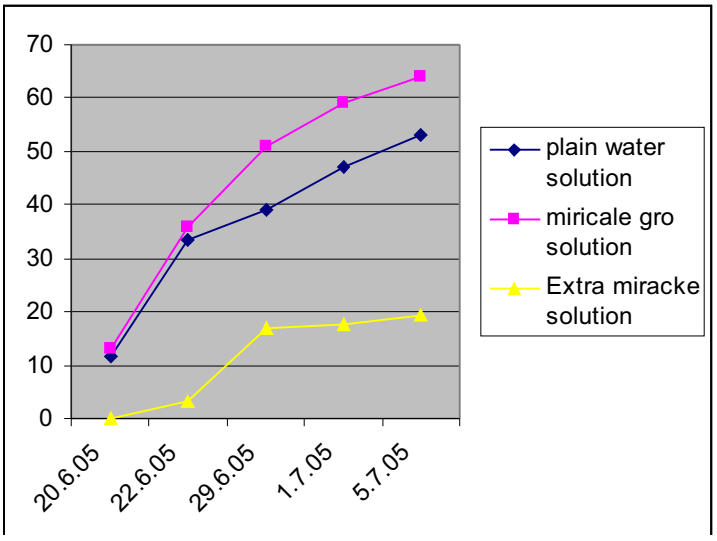
- I'll measure the growth of my seedlings from 0cm till when they are fully grown.

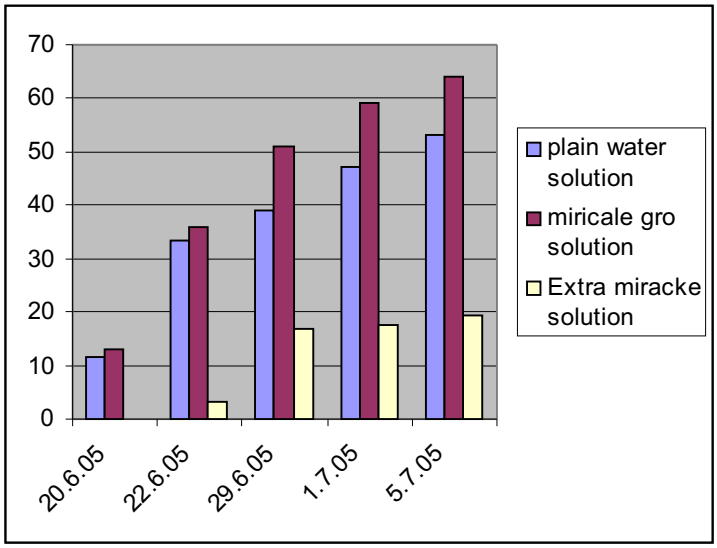


the growth of the bean seedling being measured

Results:

DATE	plain water solution	miracle gro solution	Extra miracle solution
20.6.05	11.5	13 cm	0
22.6.05	33.5	36	3
29.6.05	39	51	17
1.7.05	47	59	17.5
5.7.05	53	64	19.5





These are the results from my experiment on how bean plants growth differs by what nutrients it gets.

Analysis: My results are almost as I predicted. The plain water solution grew at a steady rate of growth. The miracle gro solution grew at a regular rate at start and then started to grow at a rapid rate finishing 11cm taller than the plain water solution. The extra miracle gro solution did grow, which I didn't expect at all, I fort that it would die but it grew to 19.5 cm. my results match the prediction that I gave almost exactly but the extra "miraclegro" solution did grow even the it was unexpected.

There were no anomalies in my results or any peculiar results.

Evaluations:

I think that my experiment worked quite well, it gave me some very good results and went according to my predictions mainly. I believe that my conclusion was satisfactory, and there were no major anomalies.

I think I could improve and extend my experiment in a few ways; I could have 6 bean seedlings, with two in each solution. I could also have six different bean seedlings but have one set in the sun and then, one set in the a bowl only getting watered and given there different solutions. This way I would get different conclusions, it would also tell me how big a difference the sun makes to a growth of bean seedlings.

BY

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