

Investigating:
The effects of



Fertilisers



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Introduction:

Fertilisers are chemicals that contain nutrients for growth. They can be solids or liquids. A solution is the most bought type of fertiliser but the pellet form is also popular.



Farmers and gardeners use them because they replace lost nutrients from the soil by leading or chap removal and therefore improve the growth of the plants.

There are many two different types of fertilisers. The first is natural fertilisers; the most common one is compost. The second type of fertiliser is the artificial type, this is man made and an example of this is Baby Bio. This is the type of fertiliser we will be using.

Plan

The investigation was conducted to find out the effects fertiliser had on the growth of plants. We will measure the plants weekly so we can compare how they have grown, for each pot there will be at least 5 measurements taken and have 15 seeds growing, in case they do not all grow and then, hopefully, we would have at least 10 seedlings to get our results from. All the seedlings that do grow will be measured then we will find the average (mean) of those measurements. The measurements will be as precise as possible.

There are a few things that could affect the results. Our main concern was the light and the temperature because it isn't as consistent as we wanted it to be. And the temperature was not something we could control constantly because we were only in the lab once a week to look at the plants, the results we have acquired though are good enough and those factors have not changed the results too dramatically.

To make sure that the results are accurate as possible I will use secondary sources such as other people's results. For example if one of the pots had trouble growing I will take some results of off other people and I will compare averages to make sure that the averages are similar to other peoples.

A fair experiment

We will have to keep some things the same to make the experiment fair. Here are the things we will keep the same:

- The place where the plants are kept
- They will be measured every week
- They will be watered with the same amount and strength of fertiliser each week
- There will be the same amount of seeds in each pot
- The types of pot will be the same, each with the same amount of holes in the bottom.
- The temperature will be consistent.

The one factor we will change will, obviously, be the strength of fertiliser.

We will measure with a ruler; we will measure the height of the plant in centimetres. We will use a 100cm³ measuring tube to water the plants with.

PREDICTION:

I wondered upon what the general effect of the fertilisers would be on the plant growth and came upon the decision that it would improve the plant growth because from watching the advertisements and realising that a lot of people do use fertilisers that they must be effective.

If the wheat growing with water, as it would if left to grow naturally, were said to be 100% growth, then using the recommended dose of fertiliser (full strength) would, ideally, make the wheat grow 100% more. So the Full strength fertiliser would make the seeds grow 200% altogether. Presuming that the above predictions are correct it would be correct to say that $\frac{1}{4}$ strength fertiliser made the wheat seeds grow by 125% altogether and $\frac{1}{2}$ strength fertiliser would allow the seeds to grow by 150% altogether. But what about double strength (twice the recommended dose advised by the bottle)? If the normal strength causes the seeds to grow by an extra 100% then it would be logical to conclude that the double strength caused the seeds to grow by 200%. Which would be 300% growth altogether, but I think that this growth would be too great and cause the plant to die and although 200% seems too much I believe that the plant would still grow because of the advertising about fertiliser and the reputation that fertiliser, generally, has of being effective. So I am going to say that my prediction for double strength fertiliser is between 200%-250% because there is a possibility that it may not affect the plants more than the full strength fertiliser.

<u>Fertiliser Strength</u>	<u>Extra growth</u>	<u>Growth altogether</u>
¼	25%	125%
½	50%	150%
Full	100%	200%
Double	150%	250%

We used these apparatus:

- Wheat seeds
- Different strengths of fertiliser
- Water
- Disposable plastic cups
- Ruler
- Compost

Safety is vital so it was important that after handling the fertiliser and compost we washed our hands and extremely important that the fertiliser did not come into contact with the eyes or mouth.

Gathering Information

The results were taken weekly so that we would have good results. The seedlings measured were the tallest ten in each pot. The following results are averages.

Week	¼ strength fertiliser	½ strength fertiliser	Full strength fertiliser	Double strength fertiliser	Water
0	0	0	0	0	0
1	0.8	1.5	2	1.3	2
2	10	13	13.2	10.8	11
3	14.1	15.9	17.8	16.2	13
4	15.7	17.5	21.6	19	16
5	17.7	20.4	23.5	22.1	16.8

My predictions seem to be extremely incorrect. The plants that were sustained on water alone grew to an average of 16.8cm. The full strength fertiliser grew to an average of 23.5cm that is only 29% more than 16.8cm; altogether the seeds grew 129%.

The double strength, one that I was most interested in, grew to an average of 22.1, *less* than the full strength, and 24% more than with water.

Quarter and Half strength were also over-estimated. The quarter strength fertiliser increased the growth by only 6% and the half strength increased the growth by 18%.

Strength of Fertiliser	Extra growth	Complete growth
Full	29%	129%
Double	24%	124%
Half	18%	118%
Quarter	6%	106%

CONCLUSION

When looking at the graph it can be seen that the fertiliser seemed to work best in the second week where the plants grew more rapidly than any other time, the steepness of the line shows this. Before that point it was the plants that were watered with water that were growing the best so this backs up the idea that the fertiliser did not have much effect before week 2. After week 2 they grow slower and eventually they would stop growing. If we look at the plant that lived off of water alone we can see that it's line is beginning to have less of a gradient than the others and this indicates that it had started to stop growing.

Looking at the individual graphs for fertiliser strengths you can see that they take the same patterns as the combined graph of fertilisers. After the first week they start growing extremely fast, this continues for one week and then the pace slows down, we can see this by the gradient.

From this investigation we have found that fertiliser does work but not as well as we are led to believe. The fact that the fertiliser only causes a 30% (rounded to the nearest whole number) is a disappointment because the manufacturers lead you to believe that it will work much better than it actually does.

EVALUATION

Accuracy:

The measuring of the plants was as accurate as possible, as was the watering.

We did not measure the compost to make sure that each pot contained the same amount something we over looked and it would perhaps; have given us more accurate results.

Also some of the seeds grew, but not all. In an ideal situation all the seeds planted would have grown but unfortunately not all of them did.

The results are reliable, in my opinion, there were ways we could have made them more so, but there wasn't enough time to

conduct a very specific experiment. It would have been more accurate to take measurements more than once a week and more accurate if we had perhaps watered them twice a week instead of just one.

Other ways we could have improved this experiment:

- To conduct this experiment during the summer would create better results because of sunlight and warmth.
- To measure, check and feed the plants more than once a week.
- Testing different fertiliser may not have improved the accuracy of the results but it would have increased the range and have being easier to find out which created the greatest increase in growth.
- If the experiment had been done in a natural environment for the seeds. It would have created better results to look at and have produced what would probably happen in a real life situation
- If we had used more seeds we would have had larger results to compare.

I find that the method we used was suitable. We could have watered them more often but that was not possible.