Investigation Planning and Result Sheets

Student name:

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| * **Investigation** **Purpose** (your aim, testable question, prediction or hypothesis)   Which fert. Is best?  Does nitrogen, phosphorus or compost grow plants from seed better?  That fertilizer does not impact growth rates of a young seedling because nutrients are not required during the initial stages of growth. | |
| **Collect and Record Data**  **Independent Variable**  Which variable will be changed? (e.g. the independent variable?)  **The fertilizer applied to the soil, in order to measure the effect of different fertilizers on the growth rates in germinating seeds and growing seedlings over a three week period.**  How will the independent variable be changed?  **Each group of 8 punnets will have a different fertilizer in it.**  Give a suitable range of values for this variable  **3 different groups of punnets, one with compost fertilizer, one with liquid fertilizer and one with nitrophoska fertilizer each with the same amount (weight) applied. 8 punnets in each group to give a greater overall idea of growth** | |
| **Dependent variable**   * Fair Test   Which variable will have to be measured or observed in order to get some data or information from the investigation? (the dependent variable)  The growth in height and root mass of the seedlings, mass (weight) of seedlings at end of 3 week test.  How will the dependent variable be measured or observed?  Measured by cutting and weighing the seedlings at the end of three weeks and by measuring each plant and creating an average overall height for each group.  Seeds roots must be included in the test as some fertilizers will help the growth of leaves and some roots, so the test must include the entire plant. | |
| **Other variables that need to be controlled to make your results more accurate** | |
| **Variable** | **How will this variable be controlled or measured?** |
| heat | All plants must be grown in the same temperature, so must be grown together in one place an kept at a good temperature to ensure growth |
| water | Amount added must be the same and at the same time each day. |
| Sunlight | All plants must have the same access to light to ensure fair growth by each group. |
| Seed depth | All seeds must be sown to the same depth to ensure equal growing opportunities. Use a tool to prepare hole to same depth for each seed. |
| Soil consistency | All seeds must be gown in the same soil consistency to ensure equal growing opportunities. Potting mix |
| Pest/animal attacks | Keep all animals away from interfering with the samples. |
| Amount of fertilizer | Each punnet must get the same measured amount of fertilizer applied. |
| **How will you make sure that your results are reliable?**  **By taking extra care to ensure each seed is planted in the same soil, to the same depth, water the same amount with the same temperature and sunshine so they only difference is the fertilizer.**  **I will measure the plants in each punnet to get an average height.**  **I will weigh the plants after removing all soil carefully from each plant (washing and drying) to determine overall mass of each group.**  **By having 8 punnets in each group to allow for some plants that may not grow,**  **If one group only has 6 growing seeds I will remove two from each of the other successful punnets.** | |
| **Notes from your trials**  Perhaps I should have planted 12 punnets for each group to allow for a lesser ‘strike’ of seeds germinating and growing.  Group A is hardly growing  Too much fert? | |

Method

Use the information on your planning sheets to write a detailed step-by-step method.

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| **Step 1**  **Fill all punnets with the same potting mix/soil to ensure equal soil growing conditions** |
| **Step 2**  **Make a hole to the same depth in each punnet so each seed has the same depth to growth through** |
| **Step 3**  **Plant a seed (lupin) in each punnet and cover.**  **Add equal amount of fertilizer to each punnet. 3 different types to 3 groups of 8 punnets take photos of the 3 types of fertilizer, make notes on what the fertilizer contains ie. N.P.K ratio** |
| **Step 4**  **Measure and add same amount of water to each punnet.** |
| **Step 5**  **Place all punnets in the same temperature environment, use a thermometer to measure temperature. Make sure light is consistent for all plants so none are disadvantaged** |
| **Step 6**  **Water same measured amount to each punnet each day, check growth and do not disturb for 3 weeks. Take photos of process.**  **Check temperature** |
| **Step 7** *(add extra steps as necessary)*  Take punnets out and measure height from soil to top of each plant. Total each group and divide by 8 to get an average height.  Wash the roots of each plant carefully in water to remove dirt. Weight each group to get total mass of each group. |
| **Step 8.**  **Graph height and weight.**  **Write conclusion based on what fertilizer worked best and why.**  **Research extra knowledge on effect of fertilizer on germination…too much fert?** |
| Changes made to the method  Allow for 4 weeks growth? One more week added to give more measurable data  Giving each plant more water after 2 weeks.  Giving each plant a top up of fertilizer after 2 weeks  Measure height after 2 weeks to see if there is any initial differences in growth. Recording data of height every week.  Observations. |

Findings Report Sheet

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| Recorded data:  How much fert was added and type.  Group 1 1 tsp of nitrophoska N 18 P 13 K 0  Group 2 1 tsp ‘biogro’ N 4 P5 K 6  Group 3 Organic potting mix  How much water added daily 10m/l  Weight of each group after 3 weeks; total weight of group divided by amount of cells ie. 1200gms/6= 200gms average plant weight  A =  100 gms  b=  c=  Average group height after 3 weeks: total mm divided by amount of cells  A=  B=  C= |
| Processed data |
| Interpretation of data  Group A: grew worst at ? grams of mass and ? cm height  Group B: grew well after one week with ? mass and ? heaight  Group c: grew best earlier, in first week but less once seeds had established roots, 2 weeks. |
| Conclusion  Group A, using the Nitrophoska fertilizer did not grow very well, as it caused the seed to not germinate, perhaps ‘burning’ it. The best group was the potting mix, growing more over the first week, the biogro grew ok, but seemed to have the best effect from week 3 onward.  Conclusion: Fertilzer is unnecessary in the early germination and growth stages of plant growth. It is only necessary later once the plant has established roots and can in fact be detrimental, and that I had applied too much…causing damage to the seed and poor germination rates. |
| Evaluation of the method and data  I think next time extend the investigation an extra week to get more growth data.  Method worked fine, though I over applied the Nitrophoska and had detrimantal effects, next time apply less Fert. |