What Affects Cress Growth?

Instructions for a multifactor designed experiment

Have you ever been told that you are only allowed to change one thing in an experiment, and you must keep everything else the same?

What if I said you can learn more by changing lots of things at the same time?

Let me show you how to get started with a multifactor designed experiment to find out what affects the growth of cress.

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You Will Need…

- ❏ 1 packet of garden cress seeds (any cress variety is okay)
- ❏ 2 empty egg boxes (or you could use 12 small plants pots or other containers)
- ❏ Some compost (or garden soil)
- ❏ Some cotton wool (or absorbent paper)
- ❏ A small measuring ruler
- ❏ A small box or a dark space where you can put one of the egg boxes
- ❏ The experimental design template table
- ❏ Digital camera or camera phone (optional)

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The Experimental Design Template

Pot	Light	Surface	Soak	HtDay3	HtDay5	HtDay7
1	Sunlight	Compost	No			
2	Sunlight	Compost	PreSoak			
3	Sunlight	Cotton	No			
4	Sunlight	Cotton	PreSoak			
5	Sunlight	Compost	No			
6	Sunlight	Cotton	PreSoak			
7	Dark	Compost	PreSoak			
8	Dark	Cotton	PreSoak			
9	Dark	Compost	No			
10	Dark	Cotton	No			
11	Dark	Compost	PreSoak			
12	Dark	Cotton	No			

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Setting Up The Experiment

1. The night before you plan to start the experiment, take half of the seeds and leave them to soak in a small amount of water

2. The next day, start by numbering the individual pots 1 to 12 using the inside lid of the egg boxes

3. Fill pots 1 to 12 with either compost or cotton wool according to the design template table. Try to fill them all to the same height and do your best to not spill compost into the other pots.

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Setting Up The Experiment

4. Carefully water all the pots so that the compost and cotton wool are damp (don't use a big watering can like I did). You might need to add more soil or cotton wool to the pots to fill them back up again to the same level.

5. Following the template, sow either the soaked or dry seeds on the surface of the soil or cotton wool. Spread the seeds out as evenly as you can, with about the same amount of seeds in each pot.

6. The egg box with pots 1 to 6 should be put somewhere with lots of sunlight: a window sill would be a good place. The egg box with pots 7 to 12 should be kept with a small box over the top or in a dark cupboard.

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Running The Experiment

7. Check on all the pots each day and make sure they don't dry out. How much water and how often will depend on how hot and dry it is where you are. Once per day is usually okay.

8. Take photos each day, if you like.

9. Record in the table the height of the tallest plant in each pot after 3 days, 5 days, and 7 days. Record any other data that you think might be useful or interesting.
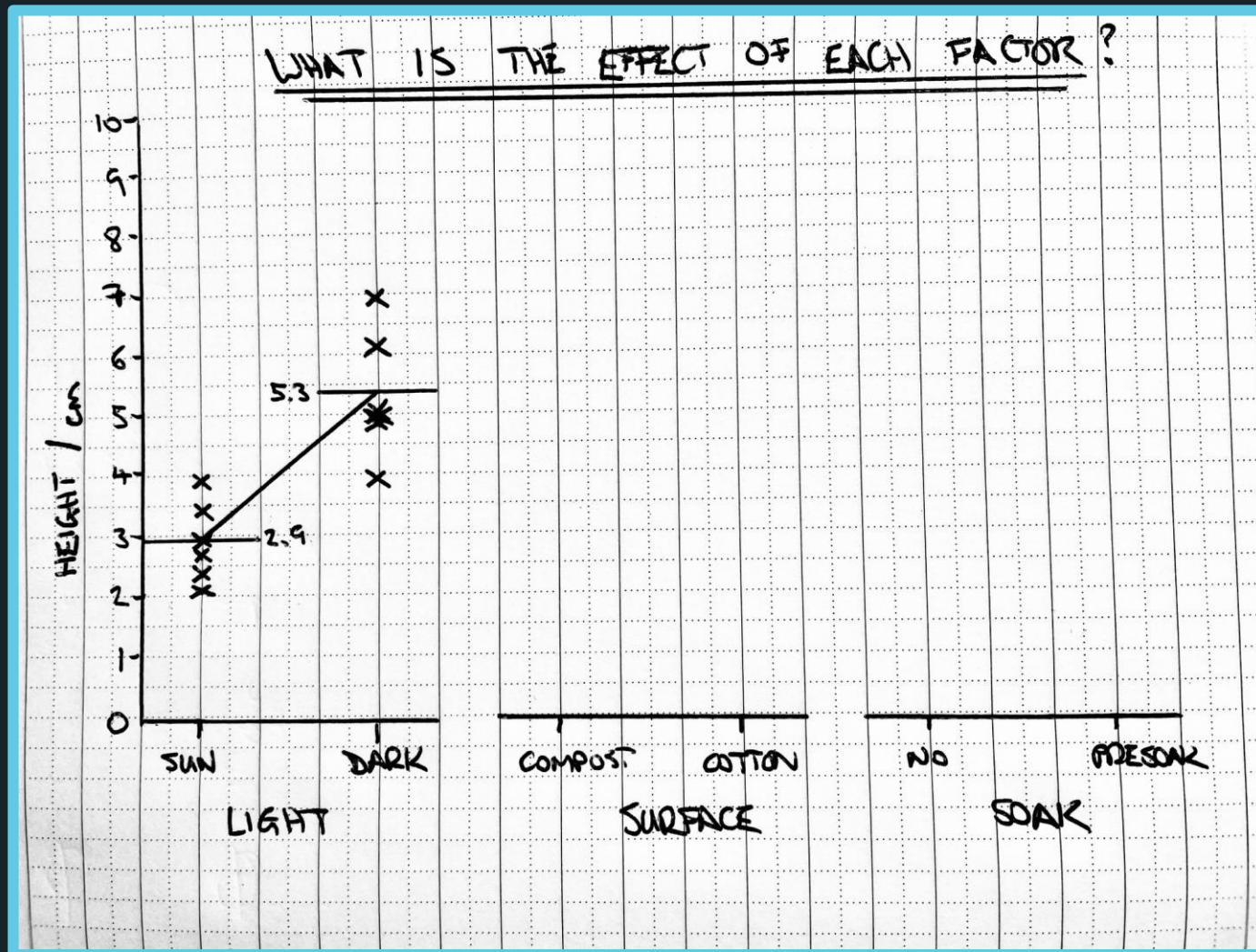
Looking At The Results After 3 Days and Beyond

10. Look at the difference between the cress grown in the dark and the cress grown in the sunlight.

11. Look for differences between the cress grown on compost and the cress grown on cotton wool.

12. Look to see if the differences between compost and cotton wool is the same in Sunlight and in Dark.

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Now Plot The Data…

Now Plot The Data

13. On graph paper plot the heights for the 6 pots grown in sunlight and the heights for the 6 pots grown in the dark. Use a × for the height in each pot.

14. Work out the average height after 3 days growing in sunlight by adding up the heights for pots 1 to 6 and dividing by 6.

15. Do the same for pots 7 to 12 to work out the average height in the dark.

16. Add the averages for sunlight and dark to your graph as horizontal lines.

17. Connect the averages with a straight line to show the effect of light conditions. You should now have something like the plot on the page before.

18. Using the same idea, plot the effects of Surface and Soak.

19. Compare the effects of Light, Surface, and Soak. Which factors have the biggest effects on height?

20. If you like, you can repeat for 5 days and 7 days to see if the effects are different.

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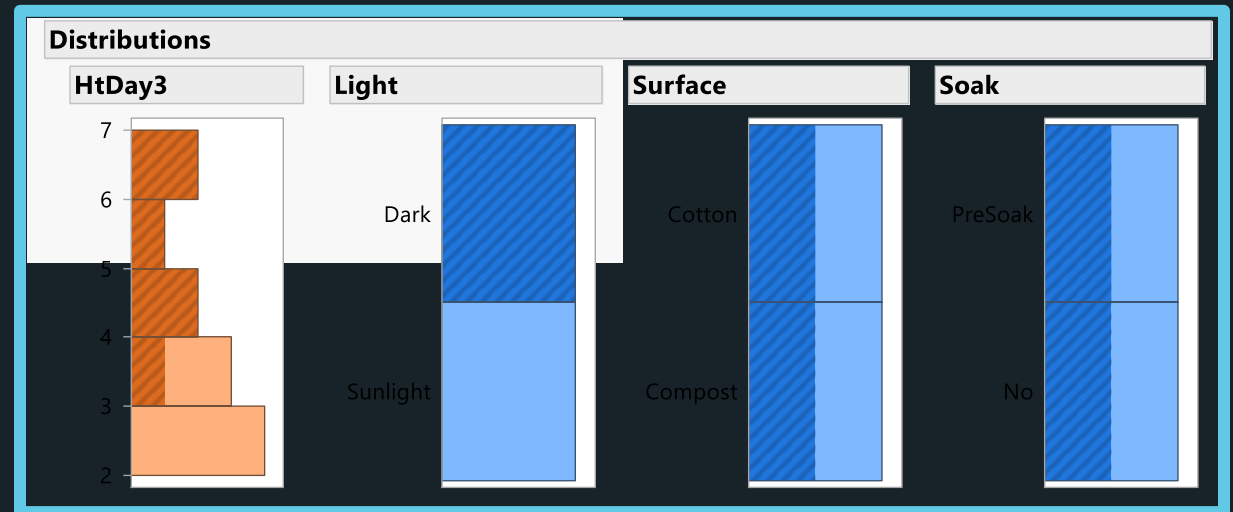
Analysis in JMP

You can interact with the Distributions analysis by selecting bars on the plots to explore relationships