

Sadie Betz- The Effects of Pesticide on Plant Growth and Development

Question or Problem being addressed: the effect of pesticides on plant growth and development

Rationale: I want to investigate how pesticides affect the development and growth of plants. I have a garden at my house, and we like to experiment with growing different fruit and vegetables for example tomatoes or peppers however we don't use pesticides on our crop, so sometimes we will find that all of our tomatoes or other crop was taken out by other weeds and plant pests, so I want to see if using pesticide is a solution to this problem that won't harm our crop, this information could also be used by farmers and other people growing plants, this could give them information about whether using pesticide is a better alternative, or is it more harmful to their crop, a lot of farmers use pesticide to reduce the amount of crop they lose because of pest, especially with the growing population farmers want to be able to produce as much crop as they can, however I want to investigate to see if using a pesticide will give them this result or if it will end up reducing the amount of crop they produce even more.

Goals/Expected Outcomes/Hypotheses: I believe that the seeds without pesticides sprayed on them will end up growing and maturing faster than the seeds that were exposed to pesticides, the pesticide is a chemical with a lot of toxins in it that could possibly mess up the DNA of the cell or any other important organelles, this would affect the growth of the plant because in order for a plant to grow it needs to undergo the process of mitosis. And in the process of mitosis, one of the first steps in the interphase is to double the DNA of the cell in the nucleus in order to make the chromosomes and if there were any complications that the pesticide caused the cell and the plant would not be able to undergo mitosis therefore the plant would not be able to grow, leading me to believe that the plant that was not sprayed with pesticide would grow taller and much faster, and pesticide will be more harmful to the plants.

Description in detail of method or procedures:

1. Gather all materials
2. Take out your 70 plant pot containers and separate them into groups of ten, (this should leave you with 7 groups with 10 containers in each group)
3. Label each group with a sharpie based on the group number, and the number they are in the group, TG1#1 (test group 1 spray #1), TG2#2, TG3#3, etc. until you have all the pots labeled.
4. Take out your plastic trays and label them on the side with tape, take out a piece of tape and place it on the side of the tray
5. Next label one of the trays "control group"
6. The next tray label "test group 1 spray", then "test group 2 spray", and after that "test group 3 spray", continue till you have all "test group 6 spray"

7. Next, go outside, take out your bag of soil and fill all your containers with around 3 inches of soil (do not press soil down, lightly scoop it into the pot)
8. Place all your pots down on the ground with all the same amount of sprays in one row (it should end up being a 10x7 reangle of pots)
9. Next, take out your hose and set it to "shower"
10. Turn the hose on and sprinkle the water on the pots from about 4 feet away, move the hose swiftly and quickly over the pots not stay in the same spot for too long.
11. Your pots should have water draining from the holes at the bottom and should be very saturated with water, once you achieve this turn the hose off and let the pots drain for 1 minute
12. Because of the watering, some of your pots have lost soil, or the soil has compressed down, so survey your pots and top you pots off with soil for any that need it so all your pot still have 3 inches of soil in them
13. Once you have topped off your pots, repeat step 10
14. Repeat step 10-12 until all pots look uniform and have the same amount of soil
15. After you have watered your pots leave them to sit for 30 mins
16. Once 30mins has passed, sort all your pots into their trays (all the control pots, labeled C#1, C#2, etc. Go in the control group tray, and all the pots labeled TG1 #, go in the tray labeled "test group one spray")
17. Once all of the pots have been sorted into their trays, take the control tray and set it aside
18. With the 6 trays you are left with, spread them out so they are about one foot away from each other
19. Next put on gloves, (for safety reasons this is important because you are going to be handling chemicals, and make sure you are outside for this part)
20. Transfer your "RoundUP" solution into your spray bottle, and shake rapidly for 5 seconds
21. Then you can start to spray your pots, each of the pots in each tray will get the amount that you have written on the label (example: "test group 3 sprays" will receive 3 sprays of Roundup, about 9 MLS (there are around 3 ml in one spray).
22. Once you have sprayed all of your pots with pesticide leave them to sit outside for 30 mins
23. When 30 mins have passed take all your trays (including your control) inside and place them near a window, in the same room, without direct sunlight on any of them, and set your thermostat to 60 degrees fahrenheit)
24. Leave the pots to sit for 24 hours
25. Once 24 hours have passed come back with a pencil sharpie and pea seeds and measuring tape
26. Take the Sharpie and use the measuring tape to mark the pencil at 1 inch
27. Next, take out your gloves and put them on
28. Take the pencil and push it into the soil of your control until you meet the line in the middle of the pot, and wiggle it around so it is big and off to fit the seed
29. Place the seed in the pothole

30. Use one of your gloved fingers to push the soil over the hole so you can no longer see the seed, and then press firmly down with one of your gloved fingers so the seed makes contact with the soil.
31. Repeat for all the pots and move from the lowest concentration of pot to the highest.
32. Leave to sit near the window for 24 hours
33. Check back the next day and record any observations you have
34. Repeat step 33 until day 4
35. Once day 4 happens at the 24 hour mark take a new clean spray bottle filled with water and spray all the pots with one full spray of water (around 3mls)
36. Repeat step 35 through the week, every other day Once day 4 happens at the 24 hour mark take a new clean spray bottle filled with water and spray all the pots with one full spray of water (around 3mls)
37. Repeat step 35 through the week, for the rest of the remaining four days. every other day
38. When the 24 hour mark of day 8 has come
39. Move all potted plants outside and lay out a drop cloth or tarp.
40. Put on a pair of gloves
41. Start removing the seeds/plants from each of the pots by dumping out the soil one by one
42. After you have removed the seed/plant measure the plant from seed to the top of the stem (make sure you are not measuring the root, and your plant's stem is straight and not bent)
43. Repeat for all the plants and record the data into table
44. Once you have measured all the plants properly, dispose of all the pots, tarps and gloves into the trash can.

- **Data Analysis:** Once you have left the seeds to grow and germinate for 8 days, start to dig up all your plants and measure from the start of the stem growing from the seed, all the way to the tip of the stem. Record all data into a data table. This should tell me the effects of pesticide on pea plant growth and development

Bibliography: (MLA)

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