Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# Interspecific Competition and Chemical Warfare

**Purpose**

Water, minerals, space and sunlight are important for plants to grow. Often plants must compete for these resources in a given environment. It may be challenging for a plant to establish a strong root system if minerals and space are lacking, just as it may be challenging for a young plant to grow if it is shaded by taller plants.

Scientists have revealed fascinating information! Some plants are able to manufacture and secrete chemicals into the soil around their roots, which slows or stops the germination of other plants that would compete for resources. The black walnut is one of the plants that is able to secrete these chemicals. The purpose of this lab is to evaluate interspecific competition with chemicals. [[1]](#endnote-1)

**Procedure**

 **Materials**

1. Planting boxes (2)
2. Potting soil
3. Walnut hulls (preferred) or walnuts
4. Sunflower seeds
5. Metric ruler
6. String and tacks (optional)
7. Hammer
8. Balance

**Sequence of Steps**

1. Grind up or smash the hulls of 10 or more walnuts. Make a powder of them, if possible. If hulls are not available, use walnuts instead.
2. Place soil to a depth of at least 5 cm in boxes. Sprinkle the powdered walnut over the soil in one planting box. Mix it thoroughly with the soil. Smooth and gently pack the surface of the soil in both boxes.
3. Using a ruler and the point of a pencil gently lay out a grid system in the two boxes, crisscrossing the surface of the soil 8 cm apart. If the lines do not show up well, use the string and tacks to mark the grid system.
4. Make small holes 1 cm deep at the centers of all the squares marked off by the grid systems.
5. Plant 3 seeds of about the same size in each hole.
6. Water the soil and place the boxes in a warm, bright location. Both boxes must be exposed to the same conditions of light and temperature, and should always be watered with the same amount of water.
7. After the sunflowers have sprouted, select the best seedling at each site. Kill the others by pinching off the growing tip.
8. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Continue the investigation until the results of competition are obvious. Then make the measurements and observation necessary to complete Table 1.

**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()**

 **Observations**

Table 1.

|  |  |  |
| --- | --- | --- |
|  | Box 1 | Box 2 |
| Percentage of plants surviving. |  |  |
| Average height of plants. |  |  |
| Average width of leaves at widest location. |  |  |
| Average length of roots. |  |  |
| Total weight of plant tissue. |  |  |
| Average weight of plant tissue. |  |  |

1. Summarize the effects that the walnut powder had on sunflowers.

2. Some aspects of this investigation are obviously not equivalent to natural conditions. How do you think the process works in nature? (Note: the roots of walnut plants give off the same chemical as the hulls.)

3. According to the theory of natural selection, what types of species would survive around a black walnut tree?

4. What can we, as agriculturists, do to effectively manage this scenario to cause beneficial results?

1. (2008).Interspecific Competition and Chemical Warfare. *Prentice Hall, Inc.* [↑](#endnote-ref-1)