

Pests Stay Out! Smelling Your Way to a Healthier Garden

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Grades: 3-5

National Science Standards:

- Organisms and the environment
- Behavior of organisms
- Abilities to do scientific inquiry
- Understandings about scientific inquiry

Entomology Literacy Element(s):

- **Element II-** Develop abilities to use insects in inquiries and provide examples of insects' investigative value.
- **Element III-** Agriculture and Food Supply: Natural enemies (insect parasitoids, predators, and herbivores) are used for biological control of pest insects and plants. Some insect are pests of crops and stored food.
- **Element IV-** Insects shouldn't be controlled without considering risks and benefits.

Observations:

Many students have observed slugs, snails and other insect pests entering and damaging the plants in their family gardens. They may have also seen their parents using both natural (beer, salt) and chemical-based (insecticides) ways of getting rid of these pests. In either case, students may be thinking about, concerned, and/or saddened by the impact that killing these creatures is having on the local environment/ecosystem.

Question: What household scents will keep slugs, snails and other insect pests *out* of gardens without harming them?

Hypothesis Hints: Think about what already established methods of garden pest control might smell like. For example, what does beer smell like? Since this is a smell that draws pests in, what types of smells might keep these creatures away? What types of non-harmful, household items could be mixed with water and sprayed into and around gardens to create a scent barrier?

Example: If garden pests smell (garlic, pepper, lavender, orange juice, vinegar), then they will avoid the area where the plant is growing because the scent is unappealing and distracting to them.

Materials Needed:

- 3 to 5 common household items that can be turned into a spray when mixed with water (i.e. spices, lemon juice, vinegar, dish soap, soda, fruit juices, milk)
- tap water
- measuring cups and measuring spoons
- 3 to 5 spray bottles (one for each household item chosen)
- 1 spray bottle for plain water (“Control” plants)
- masking tape and marker for labeling
- 6 to 10 (approximately 4 inch) plants in individual pots (two for each tub)
- 3-5 clear plastic rectangular tubs with lids (Rubbermaid style or something similar)
- hammer and nail
- slugs, snails, or other insects that could be considered garden pests
- Optional: A variety of Essential oils can be purchased and tested using the same procedures (baking extracts might be a more affordable alternative).

Procedure:

1. Gather the household items you would like to use.
2. Label each spray bottle with the name of the household item using the masking tape and marker. Label the last spray bottle “Control” and fill it with plain water.
3. Gather clear plastic tubs. Poke holes in the lids of the tubs using the hammer and nail.
4. Place two plants in each tub. Plants should be kept in their individual pots. Label one plant with the name of the household item and the other” Control.” Plants should be placed on opposite ends of the tub.
5. Create spraying solutions by adding 1cup water to each spray bottle. Then, add 1 tablespoon of your chosen household item to each bottle.
6. Spray the soil around each labeled plant the same number of times. For example, I might decide that I am going to spray the soil 3 times. That means, I will spray each plant’s soil with its designated solution 3 times.
7. Using the spray bottle with plain water in it, spray the soil of your “Control” plant the same number of times.
8. Add one slug, snail, or other insect to the very middle of the tub and close the lid. You can collect insects from your own garden, a nearby forested area, or use the insects that come in a classroom science kit. Be sure to use the same type of insect in each tub.
9. Leave tubs for several hours.
10. Observe and record the location of the insects after several hours have passed. You might need to look for evidence that insects visited a plant in the event that they are no longer on it.
11. Repeat spraying plants and observing insects for at least three separate time periods. This will give you at least 3 trials of data. Calculate the mean of your data to determine your overall results.

Results:

- In what tubs did the insects prefer the “Control” plants over the sprayed plants?
- Were there tubs in which the insects went to the sprayed plants over the “Control” plants?
- What did the location of the insects tell you about scents that attract insects and scents and keep insects away?

If a creature chose a sprayed plant over a “Control,” it can be assumed that the scent

attracted the insect to the plant. If a creature chose a “Control” plant over a sprayed plant, it can be assumed that the scent kept the creature away. Any tub in which the creature stayed in the center of the tub and did not visit either plant or visited both plants, should be re-tested with a different creature or a different type of plant.

Discussion:

A good starting point for this portion of the project would be to think about what new questions you have now that you have collected some scent data. For example, if there were tubs in which the creature didn't visit either plant, why was that? Maybe it was a type of plant that did not interest the creature to begin with so conducting this same experiment with a different type of plant might give you more accurate results. Also, did spraying the soil with something other than pure water impact the growth of the plant? Keeping pests out of your garden is only beneficial if your plants continue to grow. If plants were negatively impacted, is there another way to distribute the scent so that pests stay away, but plants can still grow? Once you have thought of some new questions, you have a starting point for another experiment.

References:

- Learn more about the creatures you are using in your experiment
Snails and Slugs: <http://www.biokids.umich.edu/critters/Gastropoda/>



Slug



Snail

Insect Pests: <http://www.garden.org/pestlibrary/bugs.php#small>



Aphids



Caterpillars



Colorado Potato Beetle

- Video about natural gardening practices: <http://video.nationalgeographic.com/video/environment/going-green-environment/green-home-makeover/garden-pests-gg/>
- Essential Oils and Gardening: <http://www.gardenguides.com/77485-use-essential-oils-gardening.html>

Estimated Time: 5 to 10 days (dependent on how many days you would like to continue spraying and observing creature placement)

- two 40-60 minute periods to set-up experiment (tubs with labeled plants, make spray bottles, write-up scientific method, etc.)
- 10 to 20 minutes each day to observe tubs and re-spray plants

Estimated Cost:

- Tubs: \$1-\$3 each
- Spray bottles: \$1 each
- Plants: \$1 each (you can save money on plants if you plan ahead and grow them from seeds)

Total: \$31

Optional: Essential oils: \$6-\$10 per bottle (this could get pricey and may not be in your budget- a cheaper alternative might be to use baking extracts- \$1-\$5 per bottle)

Please feel free to contact me at kirbyt@issaquah.wednet.edu with any questions.