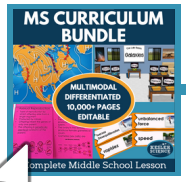
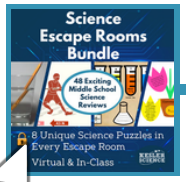
What Can Kesler Science Do for You?

4th - 8th grade science teachers love our Life, Earth, and Physical Science materials! With these easy and engaging materials, teachers can save planning time and put their focus back on the teaching that really matters.



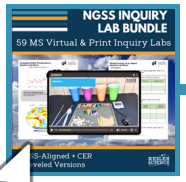
5E LESSONS

Two-week lessons with over 100 topics



ESCAPE ROOMS

Engaging activities for review



INQUIRY LABS

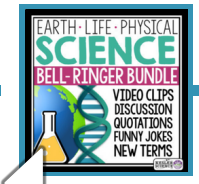
Three different levels to fit every student

AMAZING ANCHORS

Anchoring phenomenon to book-end your lessons

SUB PLANS

Never worry about planning for a sub again.



WARM-UPS

Bellringers for the entire year

STATION LABS

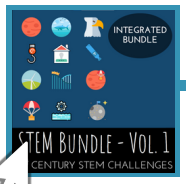
Student-led exploration

INTERACTIVE NOTEBOOKS

Bring science journals to life.

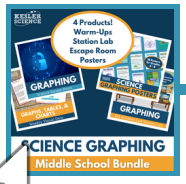
WIKI TICKETS

Quick formative assessments



STEM CHALLENGES

Real-world STEM problem-solving

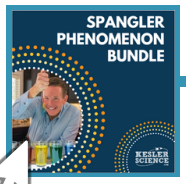


GRAPHING

Table and charts and graphs ... OH MY!

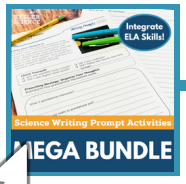
SCIENCE READING COMPREHENSION

Leveled reading passages with mini-activities



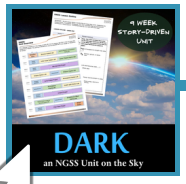
SPANGLER COLLABORATION

Exclusive Steve Spangler lessons and videos



WRITING PROMPTS

Writing activities covering 100+ topics



EXPLORIES

Story-driven units with integrated activities

The Kesler Science Professional Learning Network (PLN) group on Facebook has a huge community of engaged and supportive science teachers - come join us!

KESLER SCIENCE

Name: _____

Date: _____

Strangest Symbiosis Ever

A pitcher plant

Anyone who has raised a puppy knows how exhausting house-training a new dog can be. Whenever nature calls, you lead the little furball outside before there's an accident. If the puppy does its business where you want it to, it gets a treat. After a few weeks of positive reinforcement, the dog starts to get the idea, and you can skip the treats.

With all the work that goes into training a dog, how hard do you think it would be to potty-train a totally wild critter? Nearly impossible? You're not going to believe this, but there's a plant in Indonesia that's figured out how to do exactly that.

We would have to travel to the island of Borneo to see this unusual relationship in action. This tropical habitat is home to many exotic flora, including carnivorous pitcher plants. Like Venus fly traps, pitcher plants trap and digest insects to make up for the lack of nutrients in their soil.

Most pitcher plants attract prey with bright colors and tasty nectar released from the pitcher's lid. Insects are drawn to the bowl-shaped pitcher, where they land on the super slippery rim. They tumble into the bowl, which is filled with liquid that breaks down the insect to feed the pitcher plant.

Some pitcher plants in Borneo have developed a unique strategy for taking in extra vitamins and minerals. When full-grown, the plants release a nectar on the inside of the pitcher lid that is delicious to a local small mammal, the tree shrew. Tree shrews love this stuff and will hop onto the pitcher to lick the nectar from the lid.

What's weird about these pitcher plants is the way they're shaped. Their odd shape means this species of pitcher plant is pretty terrible at catching insects. But when the tree shrew hops on top, that cup is positioned directly below the shrew's backside. The pitcher plant looks remarkably like ... a ***toilet***! 😱

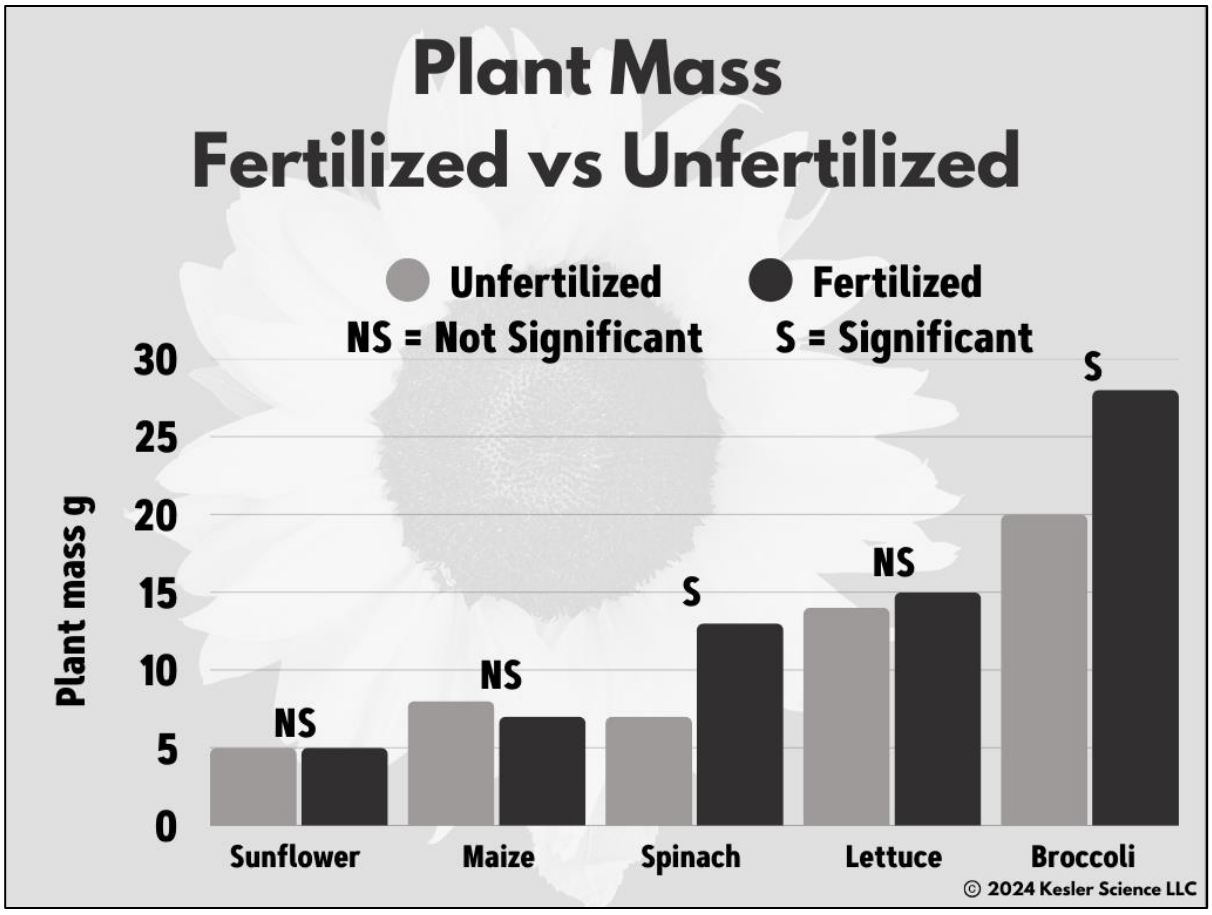
The pitcher plants are almost perfectly designed to receive shrew feces instead of insects. Animals like the tree shrew will poop on and around valuable objects as a way of marking their territory, and a great supply of nectar is very valuable. When the tree shrew is eating the nectar, it is also "using" the pitcher plant bowl!

The shrews get tasty nectar from this relationship, but what does the pitcher plant get? Manure! Shrew feces contains the same nitrogen and phosphorous that other carnivorous plants bring in from digested insects. It's great fertilizer for the plant.

While scientists have video recordings of this wild example of mutualism, there is still a lot about this relationship they still don't know. For example, there must be some signal to alert the shrews that a pitcher plant is "ready for business." If a shrew perched on top of a young pitcher, it would crush it. And what attracts the tree shrew to the pitcher plant in the first place? Is it the bright purple color of the pitcher lid or some other cue that we haven't identified yet?

How big of a role does fertilizer, like shrew poop, play in the growth of a plant? Surprisingly, it seems to depend on the type of plant we're talking about! On the next page, check out the results of a 42-day experiment on the impact of fertilizer on root and shoot mass of some familiar plants.

Strangest Symbiosis Ever



1. Which type of plant has the greatest difference in growth due to fertilizer? How many grams more did the fertilized plant grow?

_____

_____

2. Looking at the graph, is it true that all plants grow more in the presence of fertilizer? Use graph data to justify your claim.

_____

_____

3. Scientists want to make sure their results are real, not produced by chance. If the data is "statistically significant," it is less likely to be caused by random chance. What do you notice about the plant data labeled "significant" versus "not significant"?

_____

_____

_____

_____

Blog Link: https://blog.keslerscience.com/phenomenon-and-graphing/strangest-symbiosis-ever

Strangest Symbiosis Ever

A pitcher plant

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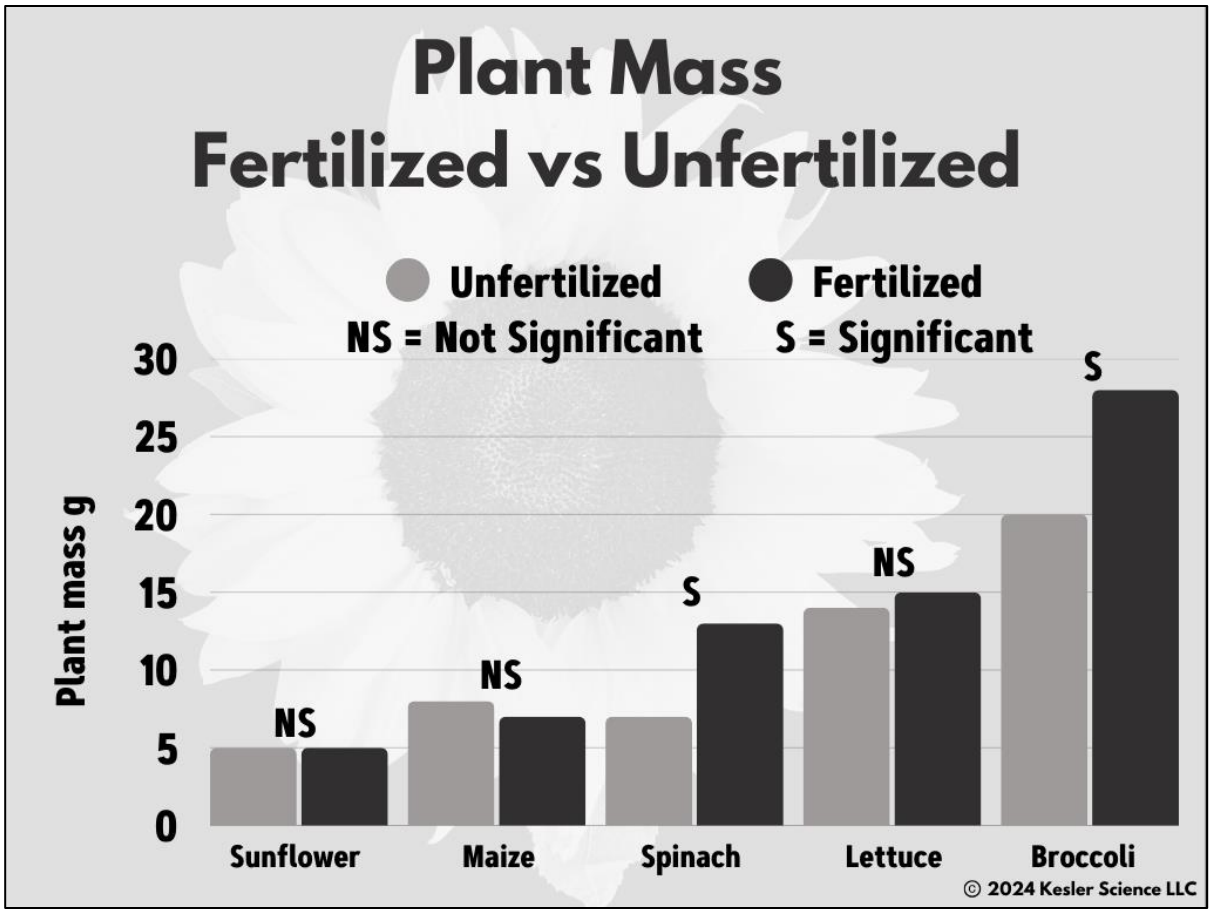
Weekly Phenomenon Graphing Activity Teacher Key

Strangest Symbiosis Ever



1. Which type of plant has the greatest difference in growth due to fertilizer? How many grams more did the fertilized plant grow?

   The broccoli has the largest biomass difference between fertilized and unfertilized plants at about 7g.

2. Looking at the graph, is it true that all plants grow more in the presence of fertilizer? Use graph data to justify your claim.

   The graph shows that not all plants grow more in the presence of fertilizer. The sunflower data shows no difference in biomass between fertilized and unfertilized shoots. Maize shows that the unfertilized plant is about 1g more in biomass compared to the fertilized plant.

3. Scientists want to make sure their results are real, not produced by chance. If the data is "statistically significant," it is less likely to be caused by random chance. What do you notice about the plant data labeled "significant" versus "not significant"?

   The results for lettuce, maize, and sunflower are not significant according to the graph. For these plants, the fertilized and unfertilized plant sizes are not far apart, which means the differences between the two groups could easily be caused by other random factors. The data for broccoli and spinach are labeled statistically significant. There is a considerable difference between the fertilized and unfertilized plant masses. That difference is less likely to be caused by chance.