
Kind words are like
HONEY
Sweet to the soul and healthy
for the body


© Laura Seiger

John Seiser

- 4th, 5th, and 6th Grade Science and Social Studies teacher
- Owner of Treasure Acres Farms. http://www.treasureacres.com/
- Labor contractor for Monsanto/Dekalb
- Owner of a property maintenance company.

Growing Minds

Where this all began

Which led to this…

Which grew into this…

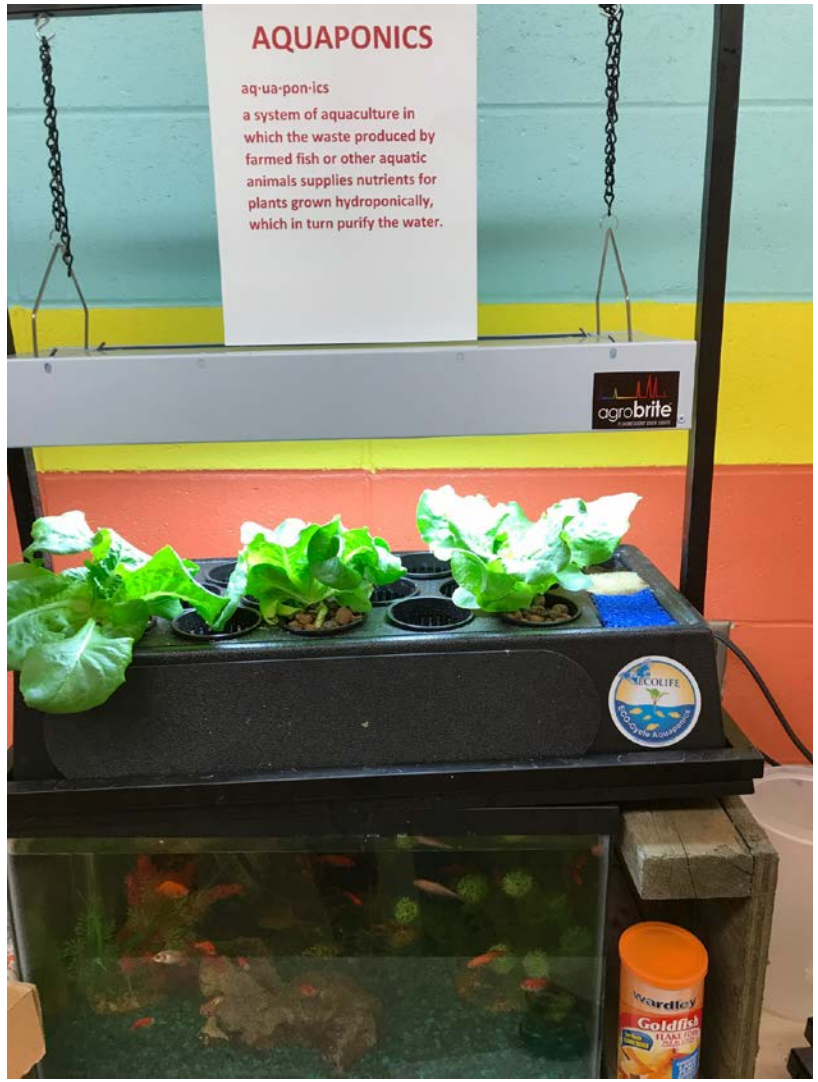

Purple Podded Pole beans
4/20/15


Tomato and Pepper plants
4/20/15


Great week
of germination!

Hydroponics

Aquaponics

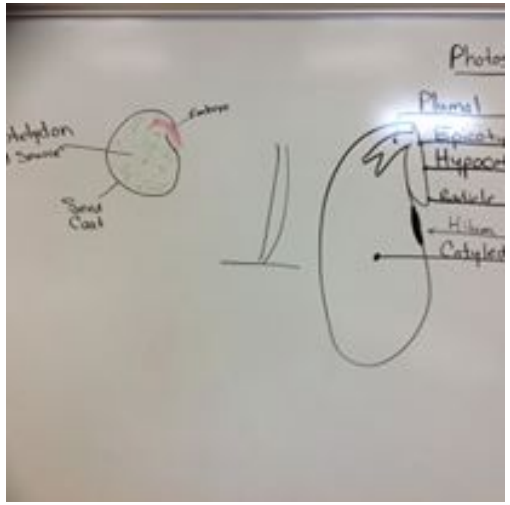

AQUAPONICS
aq·ua·pon·ics
a system of aquaculture in which the waste produced by farmed fish or other aquatic animals supplies nutrients for plants grown hydroponically, which in turn purify the water.
agrobrite
ECOLIFE
wardley
Goldfish


agrobrite
Heyyy!


Brayden


Planting Pole Beans
the "bean" talk challen


HEALTHY
PLANT!


Seed Coat

http://www.thescienceofsoil.com/

Composting


Nitrogen (food scraps)
into Composter


Gathering carbon


Nitrogen! Food scraps
leftover from lunch.

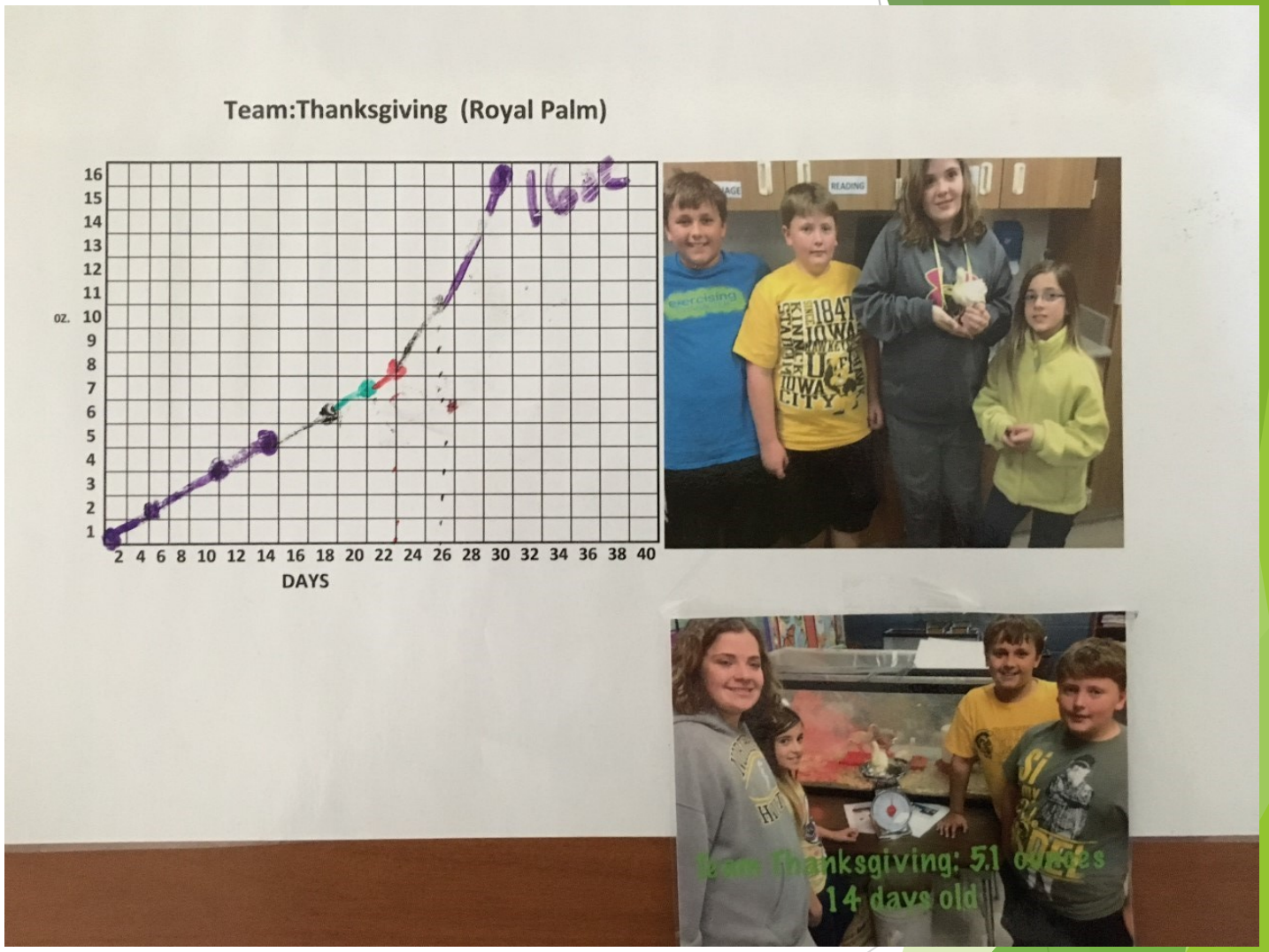

68 degrees in greenhouse
118 degrees in compost bin!

Vermiculture (Worm composting)

Not so Happy Meal

Turkey Farmers


Team Hunter: 4.9 ounces
14 days old


Team:Thanksgiving (Royal Palm)
16
oz.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40
DAYS
14 days old

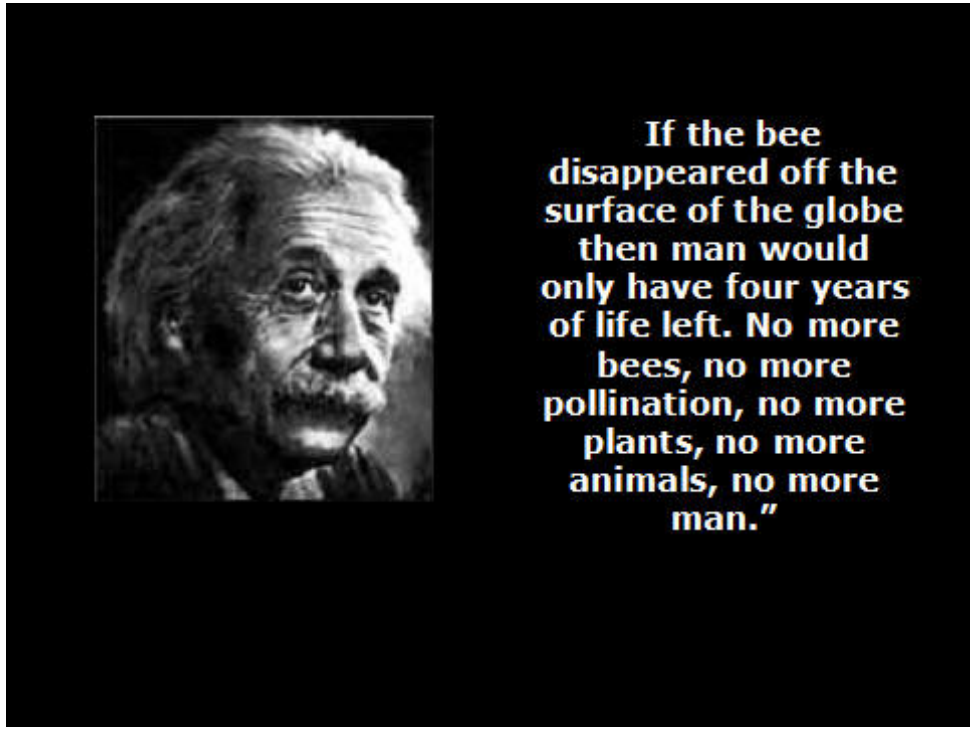

Turkey Eggs
5/01/15


urkey Project 2014/15

NEH Farms “Life Lab” fall of 2017

- New greenhouse
- Solar grow light setup
- Wind turbine
- 40’ x 40’ Classroom
- Observation Bee Hive Room with “BEE CAM”
- Raised bed for pollinator plots (Monsanto/Dekalb)
- Pollinator garden (Bayer Science)
- Native Prairie Plot (Neil Smith Wildlife Refuge)

WHY? BEEcause we need them!



The most significant reason that all species of bees are important is because:

a) They make honey.
b) They pollinate plants, which provide humans and wildlife with food, and ensure biodiversity.
c) They are pretty.
d) If there were no bees, the companies selling beehives and empty jars for honey, would go out of business.

Correct answer

- a) They make honey.
- **b) They pollinate plants, which provide humans and wildlife with food, and ensure biodiversity.**
- c) They are pretty.
- d) If there were no bees, the companies selling beehives and empty jars for honey, would go out of business.

Our lives – and the world as a whole – would be a much different place if bees didn't exist.

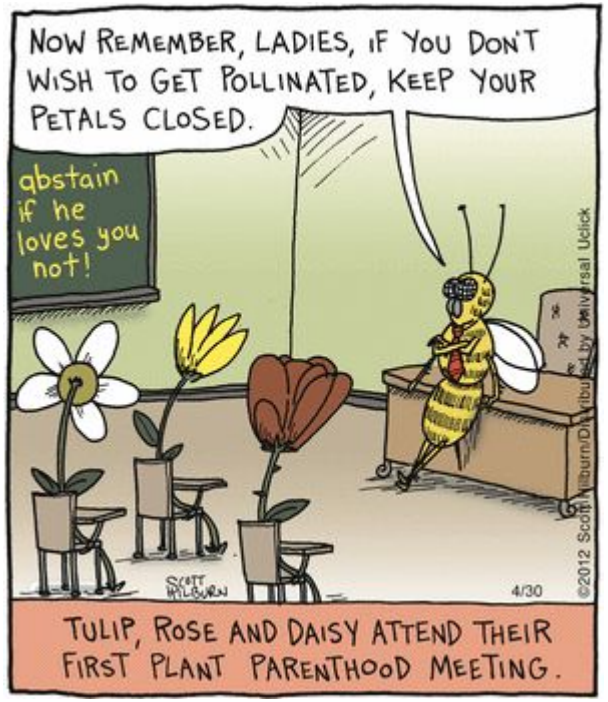
- Honeybees and the other pollinators and the invaluable pollinating services they provide us with helped produce approximately $20 billion worth of agricultural crops in the U.S. alone every year.
- That's estimated to be one-third of everything we eat!
- To say we rely on the pollination efforts of bees (and other animals) to sustain our modern food system is an understatement.

70 of the top 100 human food crops are pollinated by bees….

Pollination – How it Works & Why it's Important

- What is pollination? Simply put, it is the transfer of pollen from the male part of the flower, the anther, to the stigma, which is the female part of the flower. Upon the two's meeting, a plant's seed, nut, or fruit is then formed.
- Some plants rely on animals to assist with their pollination process, while others can pollinate themselves or rely on the wind to do it for them.

Plant Parenthood Meeting



Why are bees the best pollinators?

- Bees also tend to focus their energies on one species of plant at a time. By visiting the same flowers of a particular species in one outing, much higher quality pollination occurs – rather than spreading many different pollens to different plants which are not being pollinated, all plants of one species are getting an even distribution of vital pollen from others of its same species.

What would happen without pollinators?

- Pollination is essentially plant reproduction. Without help from animal pollinators, our everyday food supply would look much different – at least one third of our staples we've come to rely on would no longer be available.


COLORFUL DINNER
WITH POLLINATORS
WITHOUT POLLINATORS
M. Rel Scamparelo 2015
Bumblebees increase tomato and pepper yields, especially in greenhouses. Squash bees pollinate zucchini, squash, and cucumbers, and avocados rely on honey bees. Mustard greens are grown from seed produced by insect pollination as well.

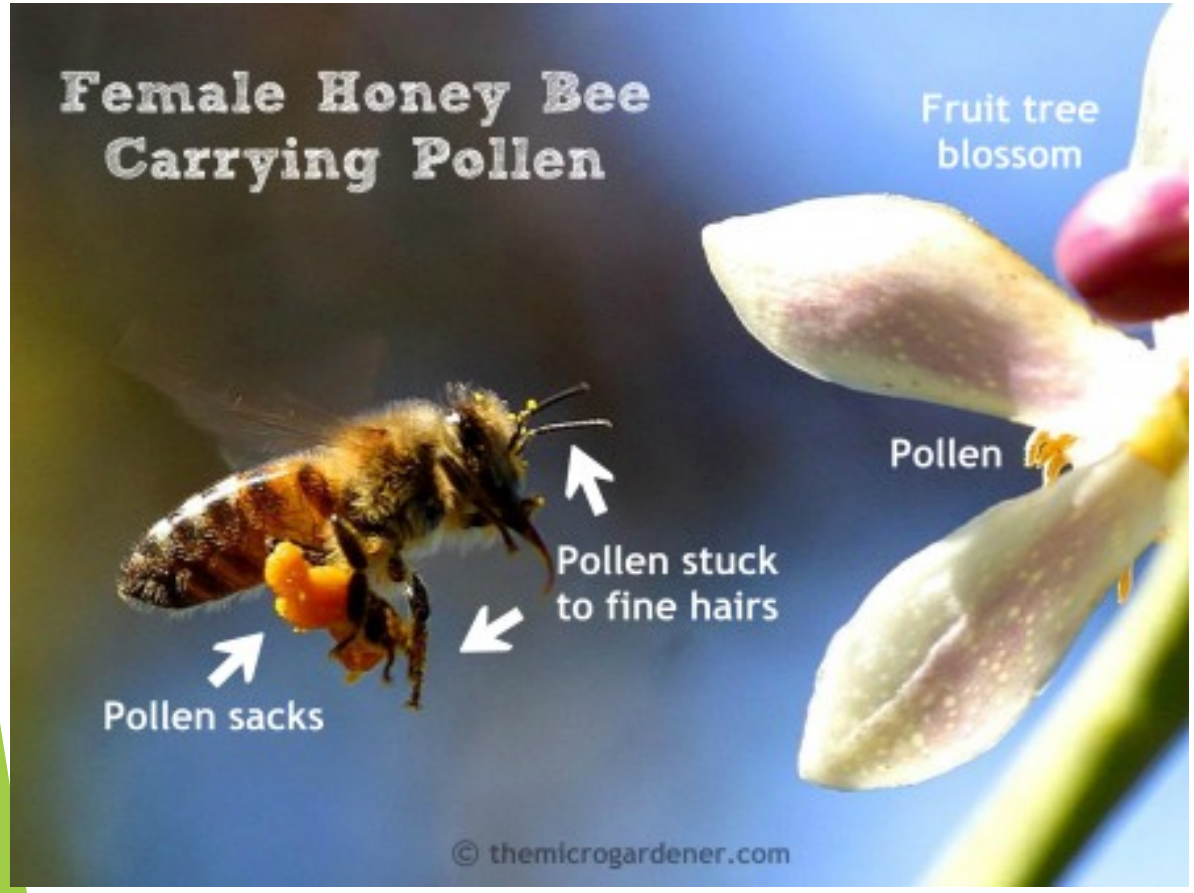

This is what your grocery store looks like
WITHOUT BEES
Your produce choices with bees
Your produce choices without bees

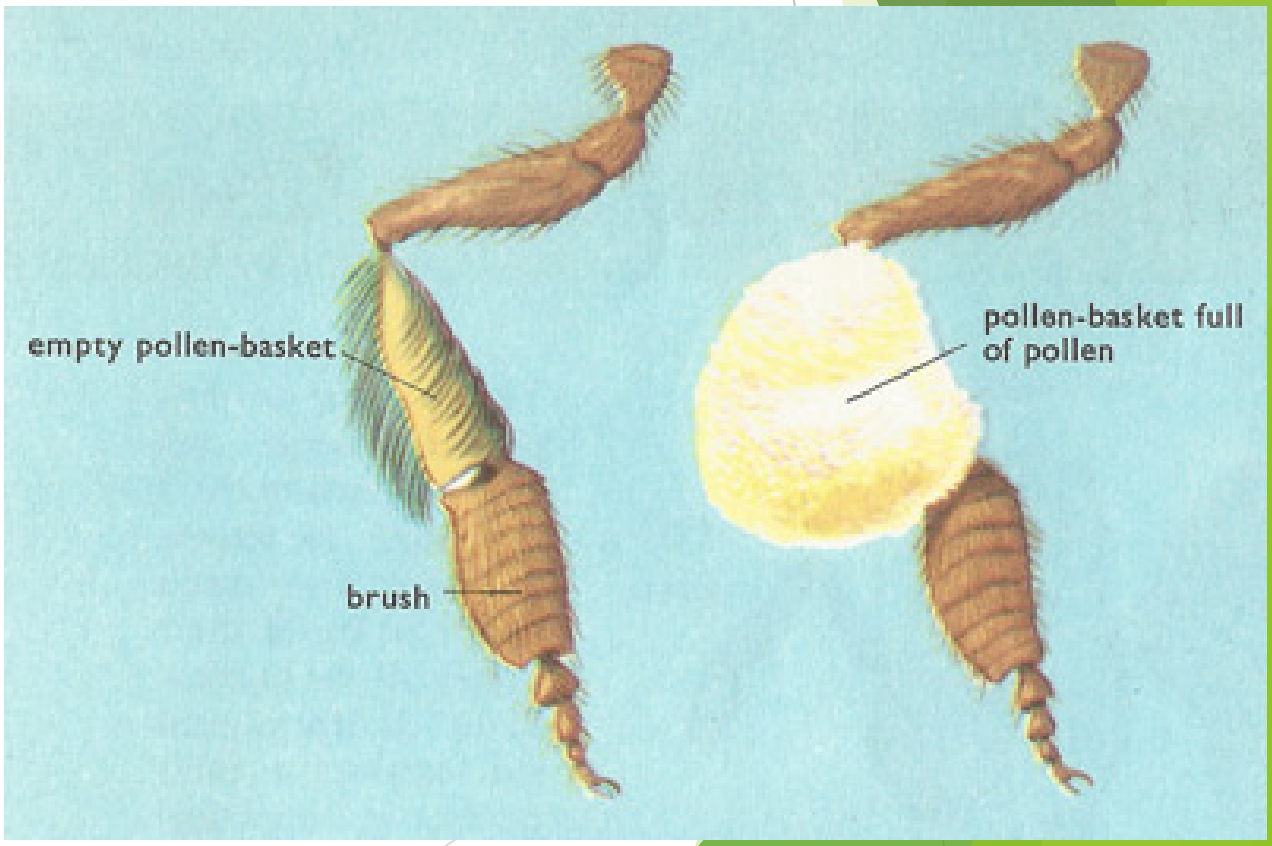
Things you would no longer have

- A few examples of the foods that would no longer be available to us if bees ceased pollinating our agricultural goods are: broccoli, asparagus, cantaloupes, cucumbers, pumpkins, blueberries, watermelons, almonds, apples, cranberries, and cherries.

Not enough pollinators

How do bees pollinate?





How it works

Bees have their own electric charge generated by the friction of their wings beating in the air.

This creates a charge of static electricity around the Bee (negative charge) and as the Bee Flies onto a flower, the positively charged pollen is attracted to the Bee

Busy as a bee...

DID YOU KNOW?

An industrious worker bee may visit 2,000 flowers per day.

Enviro Safe Pest Control

Why are the bees dying

- https://www.youtube.com/watch?v=rKQNx0av7eY

What is colony collapse disorder?

- Colony collapse disorder (CCD) is the phenomenon that occurs when the majority of worker bees in a colony disappear and leave behind a queen, plenty of food and a few nurse bees to care for the remaining immature bees and the queen.

What causes colony collapse disorder?

- There have been many theories about the cause of CCD, but the researchers who are leading the effort to find out why are now focused on these factors: Increased losses due to the **invasive varroa mite** (a pest of honey bees). New or emerging diseases such as Israeli Acute Paralysis virus and the gut parasite Nosema
- https://www.youtube.com/watch?v=6Y2t81Y8I2Q


WE POLLINATORS ARE MAKING A BEELINE OUTTA HERE!
OVERKILL
PESTICIDES
NEONICOTINOID
DAVE GRANLUND © www.davegranlund.com

How Do Neonicotionids Harm Bees?

- The majority of soybean, corn, canola and sunflower seeds planted in the U.S. are coated with neonicotinoid pesticides
- When treated with neonicotinoids, all parts of the plant become potentially toxic to insects
- This occurs because the pesticides are taken up through the plant's vascular system as it grows and, as a result, the chemical is expressed in the pollen and nectar of the plant.

It's simply a pollen diagnosis.

“Big Ag” is not alone in this

- The highest levels of contamination in pollen came from pyrethroid insecticides, which are often used as repellents for mosquitoes and other household pests.

- Both phenothrin, used to repel ticks and fleas, and prallethrin, used primarily for targeting wasps and hornets, were detected in the pollen, as was the common mosquito repellent DEET (N,N-diethyl-meta-toluamide).

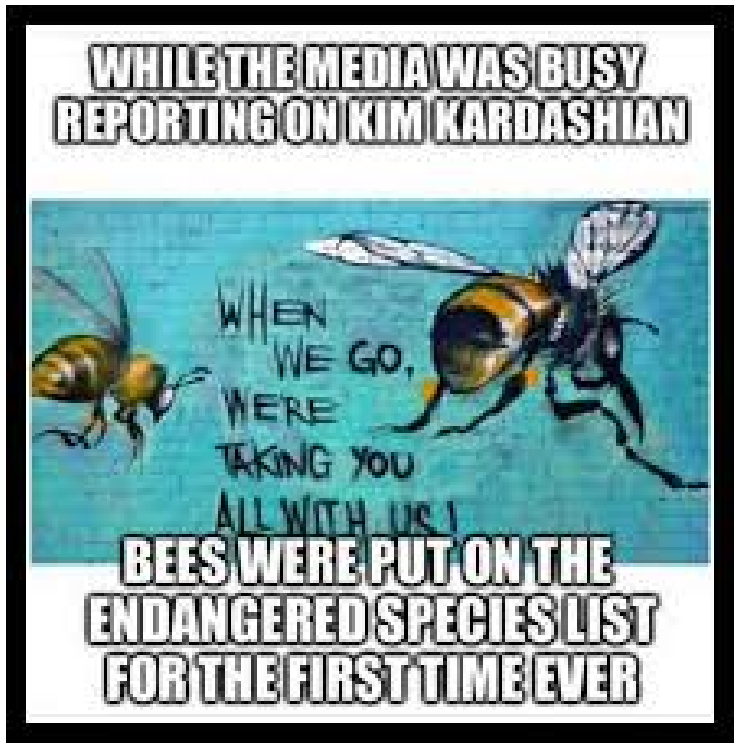
Even ‘Bee-Friendly’ Plants May Contain Bee-Killing Pesticides

- Some “bee-friendly” plants sold at major retailers like Home Depot, Lowe’s, Ace Hardware, True Value and Walmart still contain neonicotinoid pesticides that may harm bees
- Looking on the bright side, the chemicals were found in far fewer garden-store plants than they were just a few years ago. The report found a significant decrease in neonicotinoid-containing plants sold by major retailers, from 51 percent in 2014 to 23 percent in 2016

Other factors

- Malnutrition caused by changing land use patterns are taking a toll, especially among commercial beekeepers.
- Many backyard beekeepers don’t have any varroa control strategies in place

We need change our thinking in the US!



BEE Better USDA and NRCS

- ://nrcs.maps.arcgis.com/apps/Cascade/index.html?appid=9cac2235d56e41c38d7fea58a0ba07ea

What can we do?

Best Things We Can Do

Become a beekeeper

Beekeeping is a most enjoyable, fascinating and interesting hobby – and you get to eat your own honey too.

Help to protect swarms

Swarming is a natural process when colonies of honeybees can increase their numbers. If you see a swarm contact the local authority or the police who will contact a local beekeeper who will collect the swarm and take it away.

Plant your garden with bee friendly plants

In areas of the country where there are few agricultural crops, honeybees rely upon garden flowers to ensure they have a diverse diet and to provide nectar and pollen.

Encourage local authorities to use bee friendly plants in public spaces

Some of the country's best gardens and open spaces are managed by local authorities.

Learn more about this fascinating insect

Beekeeping is fascinating. Honeybees have been on this earth for about 25 million years and are ideally adapted to their natural environment.

Bee friendly

When kept properly, bees are good neighbors, and only sting when provoked.

Educate others!

What are we doing at NEH Farms to help the bees?

Observation Bee Hive

Why put an observation hive in a school classroom?

- **An observation hive is a unique exhibit to see every day because it shows an entire population of animals in its true environment. It shows a superorganism, the Honey Bee carrying out all of its daily operations: food and water gathering, cleaning, thermoregulation, communication, and reproduction.**

Are observation hives safe? What about allergies?

- **As a secure and self-contained habitat, our observation hive design is never opened with students in the classroom and no bees can escape from it. When the hive is broken down, bees are kept locked in their individual units. Schools already have extensive safety and first aid protocols in place for food and insect allergies. Therefore, students with known bee venom allergies are always identified.**

What are the most exciting things about an observation hive?

- **Students enjoy watching the queen bee lay eggs, as well as the worker bees communicate by doing the “waggle dance”, fly in and out of the hive, and taking care of the bee larvae. There is so much to see and enjoy!**

MATH

- Practice calculating volumes, areas, and perimeters of geometric shapes to determine why bees use hexagons to build their honeycomb. What geometric shapes would give them the most storage space? Which would use the least amount of wax to build? Which tessellate? What is the ideal honeycomb shape? Develop equations and expressions to prove your answers.
- Learn about the use of geometric angles in the worker bee's Waggle Dance

Biology

- Examine an observation hive and draw a bee. Record how many legs they have, how many antennae they have, how many segments their body has (older kids), what colors they are, how long they are, what they are doing

- Learn about pollination and how bees help plants reproduce while collecting pollen and nectar for food. Plant a bee oasis of flowers (in a cup/can or garden in the community).
- Learn about the honey bee colony as a superorganism
- Learn about all the things workers do and make a chore chart
- Learn about the role of bee salivary enzymes in making honey
- Identify what biomolecules are in honey and pollen. What makes them such healthy bee nutrients?
- Test the antimicrobial properties of honey and propolis
- Learn about bee genetics via sexual reproduction (for female offspring- “workers” and “queens”) and asexual parthenogenesis
- Learn about bee illnesses: symbiotic relationships with pathogenic tracheal and varroa mites, as well as bacterial and viral diseases. Learn about exponential growth to explain why they harm colonies so quickly. Learn about how they are linked to the decline of bee populations.
- Find out how monoculture and pesticide use is linked to the decline of bee populations.
- Learn about another species of bee (there’s ~30,000 of them!)
- Learn about the symbiotic relationship between orchid bees and fragrant orchid flowers

Chemistry

- Create different types of liquid and solid feed. Record what the bees prefer or avoid.

- Expose bees to different chemicals and pheromones and document any behavioral changes, such as waggle dancing, aggressive interactions (behind glass!), clustering, or perhaps something entirely new!

Physics

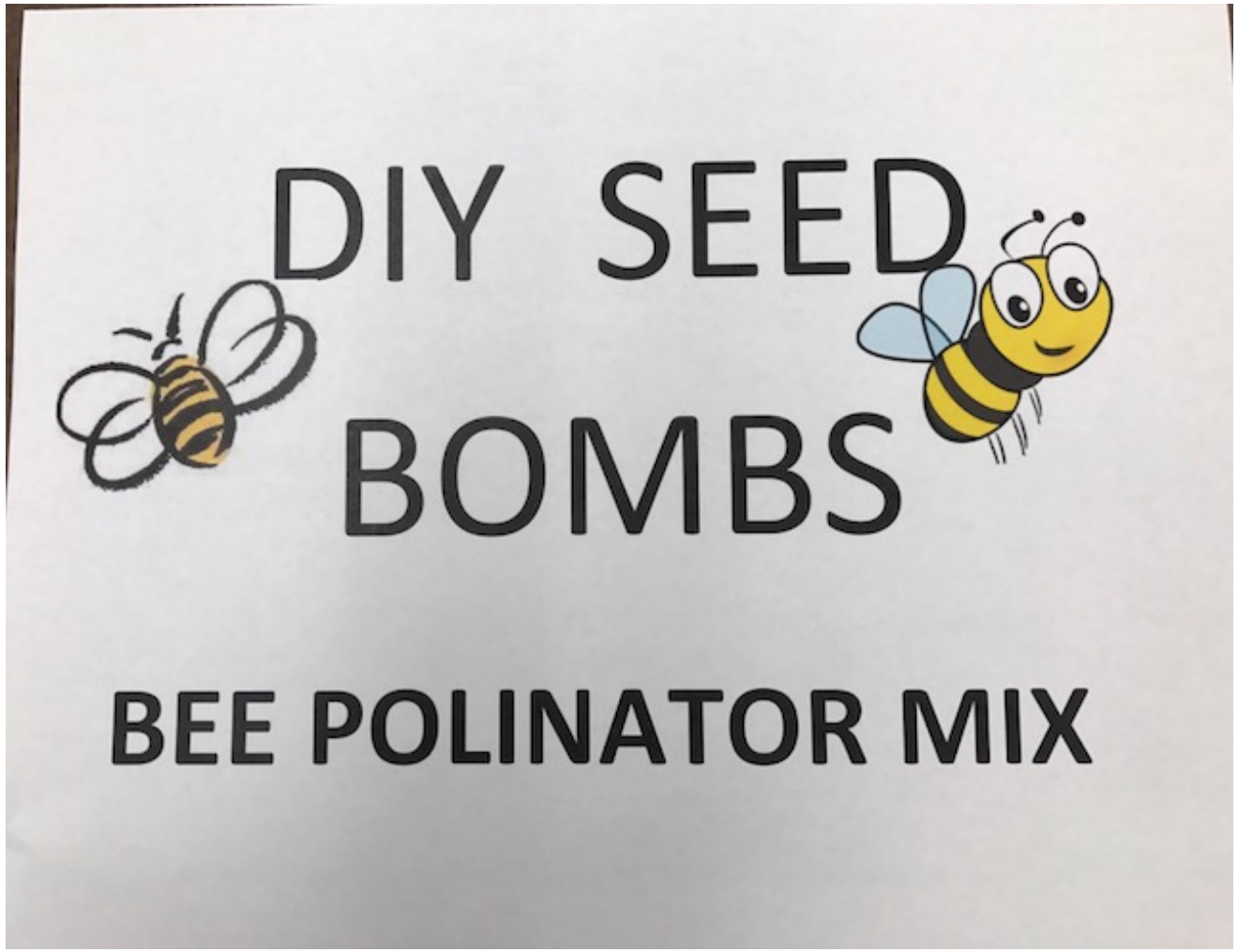
- Learn about the role of magnetism and possibly quantum mechanics in bee navigation
- Learn about how bees vibrate their wing muscles and use thermodynamics to keep their hive warm in the winter
- Use red, white, and “black” (safe near-UV) light on an observation hive to see how bees act in their natural habitat (honey bees cannot see red, but they can see UV!)
- Experiment with an observation hive by changing basic variables such as temperature, light, noise, or vibration, and then observe and record bee behavioral changes.

History & Art

- Learn about the history of honey harvesting and beekeeping from hunter-gatherer times up through the modern age. How did the agricultural revolution affect beekeeping? How did ancient cultures keep bees?

- Carefully observe and draw different castes of bees (worker, queen, drone). Did you observe something you never noticed before? Draw a mutant bee!

Provide Food Sources for Bees

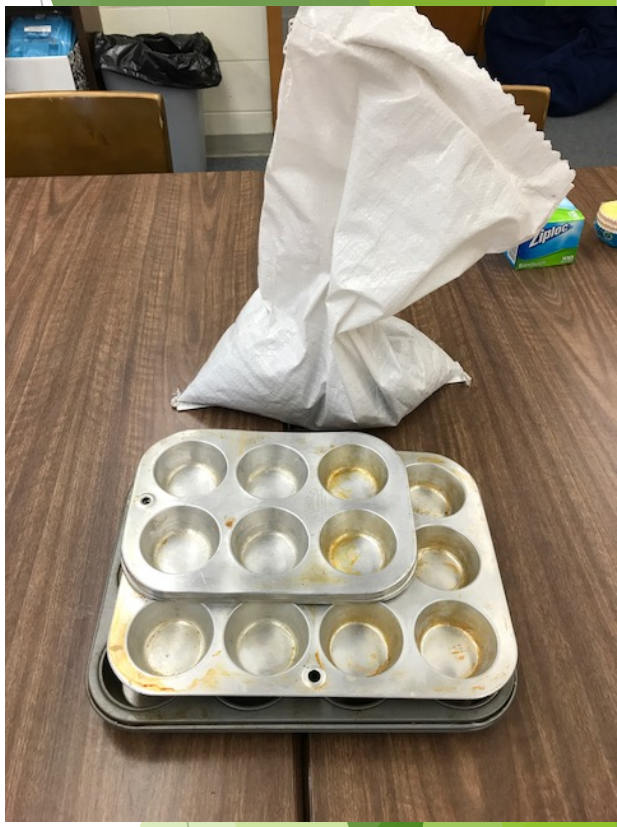


Schoolwide project

- https://www.youtube.com/watch?v=N3tbZguBzG8


Hefty
STORAGE


UNDER ARMOUR
ATHLETICS
DIY SEED BOMBS


Ziploc

School Pollinator Garden

Raised Observation Garden Beds (Monsanto)

Encourage flowering tree and bush planting (DNR)

Red Bud
High Bush Cranberry
Wild Plum


HAWKEYES

State of Iowa Honeybee Queen Carly Raye Vannoy

National Honey Queen Miah Jaycox

Thank You

- John Seiser
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