LESSON PLAN PACKET

College and beyond

Undergraduates, master gardeners, land managers, and anyone planning a planting.

> **Big idea:** The primary data is open. Use it.

This packet holds a 45-minute lesson, a reproducible student handout, and answer keys. It is built from the same data as the free games and tools on pollinatehappiness.com, a student-led project on Long Island where brothers Aidan and Ben Ellis have installed five native pollinator planters.

Lesson at a glance (45 minutes)

Time	Activity	What students do
0-5 min	**Framing**	Name a planting decision you face. What evidence would change your mind?
5-15 min	**Species profiles with sources**	Read one invasive and one native profile. Trace a claim to its cited reference and judge its strength.
15-30 min	**Raw data endpoints**	Pull one JSON endpoint (a dataset or a zip-code query) into a spreadsheet or notebook. Summarize one pattern.
30-40 min	**Seed saving and propagation**	Use the Seed Saving Calendar for your zip code to compute a stratification start date for one species.
40-45 min	**Share-out**	Each person states one finding, its source, and the date retrieved.

Extensions (another day, or early finishers)

- **Replicate the project:** The planter bench guide has real costs, dimensions, and a care sheet.

Learning objectives

By the end of the lesson, students will be able to:

1. Trace at least one factual claim in a species profile to its cited source and assess the source's reliability.
2. Retrieve a JSON dataset or zip-code endpoint and summarize one pattern, citing the source, radius, and retrieval date.
3. Calculate a cold-stratification start date or winter-sowing window for a native species from local frost dates.

Materials and prep

Materials

- Laptops with a spreadsheet program or a notebook environment (Python, R, or similar).
- The handout from this packet for notes.

- Optional: the planter bench guide for anyone planning a build.

Before class

- Confirm the JSON endpoints load on your network (for example, /api/data/natives).
- Choose a zip code for the group, or let each participant use their own.
- Decide whether participants will cite in APA or another style; the closing page gives a suggested citation.

Online activities (free, no sign-up)

- **Species profiles with sources:** https://www.pollinatehappiness.com/invasives
- **Raw data endpoints:** https://www.pollinatehappiness.com/educators#data
- **Seed saving and propagation:** https://www.pollinatehappiness.com/tools/seed-saving
- **Replicate the project:** https://www.pollinatehappiness.com/guides/how-to-build-a-native-pollinator-planter-bench
- **How to cite this site (printable):** https://www.pollinatehappiness.com/educators#cite

Vocabulary

Word	Meaning
Native species	A species present in a region before European colonization, without human introduction. Our planters favor straight species (wild types) over cultivars, with a few compact selections and, at the sensory and school planters, some non-invasive ornamentals.
Invasive species	An introduced species that spreads and causes ecological, economic, or health harm. New York maintains prohibited and regulated lists.
Cultivar	A plant variety selected and propagated for traits such as color or form. Some cultivars, like double-flowered coneflowers, offer less to pollinators.
Ecotype	A population adapted to local conditions. Local-ecotype seed is preferred for restoration.
Host plant	A plant on which a particular insect's larvae can develop.
Keystone plant	A plant genus that supports a disproportionate share of local caterpillar species, such as oaks, cherries, and goldenrods.
Cold stratification	A period of cold, moist conditions that some seeds need before they will germinate.
Research-grade observation	An iNaturalist record with media, a date, a location, and a community-agreed species ID.

Discussion questions

Each question is followed by what a strong answer sounds like.

1. **Which profile claim was hardest to verify, and why?**
   Strong answer: Names the claim, the reference, and whether the source is primary research, an agency, or secondary.

2. **What biases are built into community-science observation data?**
   Strong answer: Observer effort, accessibility, charismatic species, season, and identification difficulty all skew counts.
3. **How would you test whether a new planting increased pollinator visits?**
   Strong answer: Baseline counts, a comparison site, standardized timed observations, and repeat sampling across seasons.
4. **When is a cultivar acceptable in a pollinator planting?**
   Strong answer: When it keeps the flower structure and color pollinators use; avoid doubled flowers and altered leaf color in host plants.
5. **What would it take to replicate one of these installations in your community?**
   Strong answer: A host site, a funding source, a care plan, and a plant list matched to site conditions, as in the bench guide.
6. **How should frost-date estimates be used in planning?**
   Strong answer: As averages with uncertainty; plan with a margin and watch the forecast and soil temperature.

Standards touchpoints

This band is not mapped to K-12 standards. It suits college courses, master gardener training, and community workshops.

STUDENT HANDOUT | free to copy

Working with the Open Data

Name _____ **Date** _____

Notes for this session. Cite everything you use.

1. Profile read, claim checked, cited source, and your assessment of its strength:

2. Endpoint used (full URL), date retrieved, and the pattern you found:

3. Sketch a chart of your pattern.

4. Species, zip code, frost date, stratification days, and your computed start date:

EXIT TICKET

One finding and its source:

One limitation of the data you used:

One thing you will do differently in your own planting:

Answer keys

Games that draw random questions list the full pool they draw from. Games built live from local data or random recordings have no fixed key, so the teaching point is given instead. A printable set of all keys is at https://www.pollinatehappiness.com/educators/answer-keys.

No game answer keys

This band's sequence is open-ended research, so there are no game keys. For a quick field-identification check, the native and invasive lookalike tells from Spot the Lookalike follow.

Spot the Lookalike: the tell

Invasive species first, native lookalike second.

Invasive	Native lookalike	The tell
Tree-of-heaven	Staghorn sumac	Sumac leaflets are toothed all along the edge and the twigs are fuzzy; tree-of-heaven leaflets are smooth with a notch at the base and smell like rancid peanut butter.
Oriental bittersweet	American bittersweet	American bittersweet fruits only at the branch tips; the invader has fruit strung along the stem at every leaf.
Black swallow-wort	Common milkweed	Milkweed stands upright with thick leaves and big flower clusters; swallow-wort twines, with small glossy leaves and tiny dark flowers.
Purple loosestrife	Blue vervain	Vervain flowers are tiny, violet-blue, and open in a ring moving up the spike; loosestrife spikes are solid magenta.
Porcelain berry	Virginia creeper	Virginia creeper has five leaflets; porcelain berry has single grape-like leaves and speckled turquoise berries.
Japanese honeysuckle	Trumpet honeysuckle	The native has red tubular flowers and the top leaves fused around the stem; the invader has white-to-yellow paired flowers and black berries.
Multiflora rose	Virginia rose	Native roses have pink flowers and straight thorns; multiflora rose has clusters of small white flowers, hooked thorns, and fringed stipules.
Norway maple	Sugar maple	Snap a leaf stem: Norway maple bleeds milky sap, sugar maple runs clear. Norway maple's fall color is a late plain yellow.
Callery (Bradford) pear	Serviceberry	Serviceberry petals are narrow straps, the twigs have no thorns, and the June berries are dark purple; Callery pear petals are rounder, wild pears often have thorny spur shoots, and the fruit is small, hard, and brown. Scent varies: serviceberry can be lightly fragrant, while pear usually smells unpleasant.
Autumn olive	Northern bayberry	Bayberry leaves are aromatic and not silvery beneath; autumn olive leaves are silver-scaled underneath with silver-flecked red fruit.
Bush honeysuckles	Spicebush	Spicebush twigs are solid and smell of allspice when scratched; bush honeysuckle twigs are hollow and odorless.
Yellow flag iris	Northern blue flag	Blue flag is violet-blue; yellow flag is the only tall yellow iris in New York wetlands.

Invasive	Native lookalike	The tell
Lesser celandine	Marsh marigold	Marsh marigold has five to nine broad, petal-like yellow sepals (it has no true petals) and grows in wet ground; lesser celandine has eight or more narrow petals and invades lawns.
Asian longhorned beetle	Whitespotted sawyer	The native sawyer is bronzy with a single white spot at the top of the wing covers; the invader is glossy black with many white spots and banded antennae.
Emerald ash borer	Six-spotted tiger beetle	The tiger beetle is larger, runs on bare ground, and has white spots; emerald ash borer is a slender bullet found on ash.
Spongy moth (formerly gypsy moth)	Eastern tent caterpillar	Tent caterpillars have a white stripe down the back and build silk tents; spongy moth caterpillars have blue and red dots and no tents.
Common reed (non-native Phragmites)	Saltmeadow cordgrass	Cordgrass is knee-high and forms cowlicked meadows; invasive Phragmites is a 15-foot reed with plumes.
Chinese silver grass (Miscanthus)	Switchgrass	Miscanthus leaves have a white midrib stripe and silvery plumes; switchgrass has no stripe and airy golden seed heads.

Visit a real planter

Pollinate Happiness has five native pollinator planters on Long Island. Most of each planting is native perennials; the art museum's sensory planter and the high school planter also include some non-invasive ornamentals. All are at public or publicly accessible sites; check each site's hours before a visit. Bloom usually peaks July through September.

Wawapek Preserve

Cold Spring Harbor, NY 11724 | Suffolk County

Installed June 2021. Host: North Shore Land Alliance. Wawapek Preserve is open to the public from dawn to dusk. Park in the small lot off Shore Road and follow the meadow trail.

Field-trip sheet: https://www.pollinatehappiness.com/installations/wawapek/field-trip

Hicksville Public Library

169 Jerusalem Avenue, Hicksville, NY 11801 | Nassau County

Installed October 4, 2023. Host: Hicksville Public Library. The planter is in the front garden facing Jerusalem Avenue and can be seen any time the grounds are open.

Field-trip sheet: https://www.pollinatehappiness.com/installations/hicksville-library/field-trip

Theodore Roosevelt Sanctuary & Audubon Center

134 Cove Road, Oyster Bay, NY 11771 | Nassau County

Installed November 23, 2024. Host: Audubon New York. The sanctuary grounds and trails are open daily; the center building has posted hours.

Field-trip sheet:
https://www.pollinatehappiness.com/installations/theodore-roosevelt-sanctuary-audubon-center/field-trip

Nassau County Museum of Art

1 Museum Drive, Roslyn Harbor, NY 11576 | Nassau County

Installed Fall 2025. Host: Nassau County Museum of Art. The sensory planter is on the patio near the Manes Center; the nest boxes are along the meadow edge of the William Cullen Bryant Preserve.

Field-trip sheet: https://www.pollinatehappiness.com/installations/nassau-county-museum-of-art/field-trip

Syosset High School *(newest)*

70 South Woods Road, Syosset, NY 11791 | Nassau County

Installed September 28, 2026. Host: Syosset High School Environmental Club. The planter is at the front of the school beside the red Syosset High School sign on South Woods Road, visible from the sidewalk without entering the campus.

Field-trip sheet: https://www.pollinatehappiness.com/installations/syosset-high-school/field-trip

> **Field-trip sheets:** Each planter has a printable field-trip sheet at pollinatehappiness.com/installations/<slug>/field-trip with the address and host, what is planted, a look-for checklist that changes with the month, a five-question student worksheet, and a QR code back to the planter page.

Credit and sharing

You may copy and share this packet for classroom use. If you adapt it, please keep the credit line below.

How to cite

> Ellis, A., & Ellis, B. (2026). *Pollinate Happiness: native pollinator planters and tools for Long Island*. Retrieved from https://www.pollinatehappiness.com

For a specific species profile, add the page title and URL. For tool results, add the zip code, radius, and the date you retrieved them, since they change daily. Underlying observations should be credited to iNaturalist and its contributors; weather data to Open-Meteo.

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About Pollinate Happiness

Pollinate Happiness is a student-led project founded in 2021 by brothers Aidan and Ben Ellis, who started it in 5th and 6th grade. They have installed five native pollinator planters on Long Island and built free games and zip-code tools from public data so any class can use them.

Questions, corrections, or a request for a grade-specific version:
https://www.pollinatehappiness.com/contact

All activities by grade band: https://www.pollinatehappiness.com/educators