

MODULE 3

Ornamental Plants & Ecosystem Services

Sections 3.1 & 3.2: Woody Plants and Herbaceous Plants

Cornell Cooperative Extension | Master Gardener Volunteer Training

Module Overview

This module introduces Master Gardener volunteers to ornamental plants and the ecosystem services they provide. Section 3.1 covers woody plants (trees and shrubs), including site assessment, plant selection using Cornell's Woody Plant Database, and best practices for establishment. Section 3.2 covers herbaceous plants — annuals, biennials, perennials, bulbs, and ornamental grasses — with a focus on site planning, garden design, soil preparation, and propagation.

Learning Objectives — By the end of this module, trainees will be able to:

- Describe the characteristics and differences between woody and herbaceous plants
- Conduct a site assessment to inform plant selection decisions
- Use the Cornell Woody Plant Database and herbaceous plant resources to select appropriate plants
- Explain best practices for planting and establishment of trees, shrubs, and herbaceous plants
- Describe the ecosystem services provided by ornamental plants
- Recognize the three purchase forms of trees/shrubs and how each is planted differently
- Identify types of herbaceous plants (annuals, biennials, perennials, bulbs, corms, tubers, ornamental grasses)
- Apply basic propagation techniques for herbaceous plants
- Understand the role of hardiness zones in plant selection for the Northeast

Section 3.1 — Woody Plants

Woody plants — trees and shrubs — form the backbone of ornamental landscapes. Beyond their visual appeal, they provide critical ecosystem services: stormwater interception, carbon sequestration, urban heat island mitigation, wildlife habitat, and air quality improvement. Selecting the right woody plant for a given site requires understanding both the plant's requirements and the site's conditions.

Key Concept: The Four-Step Establishment Process

Dr. Nina Bassuk (Cornell Urban Horticultural Institute) frames successful landscape establishment as four sequential steps — getting any one wrong can undo all the others:

Step 1: Site Assessment	Evaluate soil, drainage, light, temperature extremes, pH, compaction, salt exposure, and rooting space before selecting any plants.
Step 2: Plant Selection	Match plant requirements to site conditions. Site conditions drive the choice, not aesthetics alone.
Step 3: Site Modification	When conditions are limiting (compaction, poor drainage, construction damage), remediate the site before planting.
Step 4: Proper Transplanting	Even after doing everything else right, improper planting technique — desiccated roots, wrong depth, wrong season, insufficient water — can cause failure.

Site Assessment for Woody Plants

A thorough site assessment evaluates:

- Soil type, structure, and organic matter content
- Drainage and aeration — standing water = oxygen deprivation = root death
- Soil pH (affects nutrient availability)
- Compaction — common after construction; roots cannot penetrate compacted layers
- Light: full sun, part shade, full shade
- Cold hardiness zone (USDA) and summer heat exposure
- Salt exposure from deicing, road spray
- Available rooting space: between pavement, overhead utility lines, proximity to foundations
- Existing vegetation: what is thriving tells you what the site supports
- Water drainage patterns — observe during rain if possible

Key Principle: Soil is More Important Than the Tree

A beautiful tree in a parking lot island with no drainage will die. Oxygen deprivation from waterlogged soil is one of the most common causes of urban tree failure. Matching the tree to the drainage conditions — or remediating the drainage before planting — is essential.

Plant Selection: Natives, Exotics, and Cultivars

The native vs. exotic debate is nuanced. Required pre-reading (Urban Habitats: "Moving Beyond the Natives-Exotics Debate") challenges trainees to examine their assumptions. Key discussion points:

- Native plants evolved with local ecology and support native wildlife, especially insects and birds
- Not all non-native plants are invasive — many are well-behaved in the landscape
- Cultivars of native species ("nativars") may have reduced ecological function compared to straight species
- Site conditions, climate change, and urban stressors may make some non-natives better performers in challenging sites
- The best approach is informed, site-based decision-making — not a blanket rule

Discussion prompt: Did the reading change your perspective on native vs. non-native plant use? What surprised you?

The Cornell Woody Plant Database

A critical resource for plant selection — trainees should bookmark and practice using this during training. Search by:

- Plant name (common or scientific)
- Site conditions: soil type, drainage, light, pH, salt tolerance
- Plant form: tree, shrub, groundcover, vine
- Size: large tree, small ornamental tree, shrub height
- Season of interest: spring flowers, fall color, winter fruit/bark

The database includes over 450 plants with photos, cultivar evaluations, invasiveness ratings, disease susceptibility, and site condition requirements. Dr. Bassuk's Recommended Urban Trees booklet (available on same site) highlights selections for challenging urban conditions.

Additional Cornell Resources for Woody Plants

- Cornell Woody Plant Database: search.cornell.edu (search "Cornell woody plant database")
- Dr. Nina Bassuk — Urban Horticultural Institute: plant selection and cultivar evaluations
- Dr. Don Rakow — pruning reference
- Arbor Day Foundation — general tree care
- Cornell Garden-Based Learning website

Urban Tree Selection: Four Core Principles (Bassuk, 2018)

Dr. Bassuk's framework identifies four principles that guide every urban tree selection decision. Master Gardeners advising homeowners in suburban and urban settings should apply the same thinking:

1. Pest Resistant & Stress Adapted

Trees must tolerate reflected heat from pavement and buildings (surface temp extremes can reach 100–120°F on a 75°F day), drought stress despite normal rainfall (impervious surfaces limit infiltration), soil compaction, salt exposure, and waterlogged

	soils. Urban trees face compounding stresses that rural trees typically do not.
2. High Diversity; No Invasives	Monocultures are catastrophic when a pest arrives. Eastern US urban forests are ~40% maples — a significant vulnerability. Dutch Elm Disease, Emerald Ash Borer, and Asian Long-horned Beetle all demonstrate how single-species dominance leads to mass canopy loss. Plant a diverse urban forest to distribute risk. Avoid locally-listed invasive species (invasiveness is regionally variable).
3. Meet Functional & Design Objectives	Trees must serve a purpose: shade, screening, structure, seasonal interest. Large-canopied trees provide the greatest stormwater, energy savings, and carbon sequestration benefits. Flowering diversity across spring–fall maximizes pollinator support.
4. Match Management Limitations	Consider maintenance capacity. A tree that requires heavy pruning to fit under utility wires, or that drops messy fruit on a sidewalk, creates ongoing conflicts. The best tree is one that can grow to its natural form in the allotted space with minimal intervention.

The Compaction Problem: The One Stress No Tree Tolerates

Compaction is the single most limiting factor in urban tree survival — and unlike drought, heat, or salt, no tree species has adapted to it. Compaction:

- Physically prevents root penetration — roots cannot push through densely packed particles
- Eliminates air-filled pores — oxygen deprivation kills fine roots
- Reduces water infiltration — runoff instead of root uptake
- Is an inevitable byproduct of construction — heavy machinery compacts soil in a wide radius around any building or road project

When compaction is present, site remediation must occur before planting. Options include: removing and replacing compacted soil, structural soil systems (CU-Structural Soil developed at Cornell), suspended pavement systems, or at minimum, deep tillage to fracture the compaction layer combined with organic matter amendment.

Teaching Point: Where Are the Roots?

Using air excavation tools, Dr. Bassuk's group has mapped root systems in urban settings. In narrow street tree pits, tree roots frequently escape under the sidewalk — finding accessible soil in adjacent lawns or vacant lots. This is why sidewalks heave from root growth, and why trees in tiny pits can still become large. The roots go where the soil is, not where we planted the tree.

This is a compelling visual teaching point: the planting pit is not the tree's world — accessible soil volume determines what the tree can ultimately become. Restricting roots restricts the whole tree.

Native vs. Non-Native: Moving Beyond the Debate

Required pre-class reading: Bassuk & Sutton, "Moving Beyond the Natives/Exotics Debate" (Urban Habitats). This article is the core of the Section 3.1 opening discussion and deserves careful attention. Key themes are summarized below.

The Cornell Library Garden: A Case Study in Natives-First Gone Wrong

A new planting at a Cornell library addition used a natives-only approach: white oak (*Quercus alba*), flowering dogwood (*Cornus florida*), and native viburnums. All declined or died within the first growing season — not because they were native, but because:

- The site was heavily disturbed: topsoil stripped, subsoil compacted to dense blue-gray clay
- White oak planted in compacted clay: essentially planted in a pot — no root penetration possible
- Native viburnums (adapted to acidic sandy soils) placed in concrete-contaminated clay at pH 8.0 — extreme mismatch

The lesson: nativeness confers no site tolerance. A native plant in the wrong conditions will fail just as reliably as an exotic. Site assessment and remediation must come before plant selection — regardless of provenance.

The Remediation-First Framework

When the Cornell horticulture department took over the failed library garden, the approach changed completely:

- Compacted clay soil remediated with Cornell-generated compost (farm manures + kitchen scraps), incorporated by hand with shovels to 18 inches depth
- Target amendment rate: at least 1/3 organic matter by volume in the resulting planting mix (1/2 organic matter in the heaviest clay soils)
- Standard rototilling (top 8–10 inches) was considered insufficient — deep incorporation to 18 inches was the goal
- Compost reduced compaction, increased soil volume for roots, and created organic matter veins into which roots could grow

After remediation, significant site challenges remained: seasonal standing water, high pH (8.0), and variable shade. Plant selection had to work around those remaining constraints.

The "Appropriate Plants" Framework (SITES Initiative)

Bassuk & Sutton advocate for replacing the native/exotic binary with the concept of "appropriate plants," drawn from the Sustainable Sites Initiative (SITES) — a certification program for landscapes analogous to LEED for buildings. An appropriate plant:

- Is adapted to or tolerant of the actual site conditions
- Is not invasive (as defined by local/regional groups)
- Meets the design intent and functional objectives of the planting

Under this framework, native plants earn their place on merit — not birthplace. And non-native plants are eligible on the same basis. This is a practical, site-driven approach rather than an ideological one.

What the Library Garden Actually Got Planted

After remediation, the replanted garden used a pragmatic mix. Note how each choice was driven by site conditions, not origin:

- Yellowwood (*Cladrastis kentukea*) — native; tolerates seasonally wet disturbed soils; attractive bark and flowers
- Freeman maple (*Acer x freemanii*) — native hybrid; handles wet feet
- Ninebark 'Diablo' (*Physocarpus opulifolius*) — native cultivar; handles poor soils, wet feet, partial shade
- Red-twig dogwood 'Baileyi' (*Cornus sericea*) — native cultivar; non-suckering selection for tidy garden use
- Magnolia 'Ann' — non-native hybrid; seasonal beauty
- Japanese garden juniper (*Juniperus procumbens* 'Nana') — non-native; selected over native junipers due to disease resistance (*Phomopsis* and *Kabatina* tip blight) and appropriate size
- Forsythia 'Gold Tide' — non-native; selected after ruling out native alternatives (sweet pepperbush bakes in sun; Virginia sweetspire uncertain at pH 8.0; fragrant sumac overused on campus)
- Nonnative willows (*Salix* spp.) — no invasive reputation; beauty and wet soil tolerance

Also noted: Two "bad actors" were already at the forest edge — Wych elm (nonnative) and boxelder (native). Not every native is ecologically benign in a disturbed setting.

Demythologizing Arguments for Natives-Only Planting

The article directly addresses four common arguments for native-only planting:

<p>"Natives are easier to care for — they evolved here"</p>	<p>True only when matched to appropriate site conditions. Native plants fare no better than exotics if mismatched to a site. Some exotics actually perform better in disturbed urban sites because their environments of origin resemble the altered conditions — and their pest/disease predators are often absent.</p>
<p>"Natives increase plant diversity"</p>	<p>Diversity is not the exclusive domain of natives. Ithaca's urban areas contain more than 250 tree species (natives + exotics), outnumbering diversity in nearby woodlands. Diversity — whatever the provenance — makes plantings more resilient to pest and disease pressure.</p>
<p>"Natives are better for wildlife"</p>	<p>Generalist wildlife (including deer) readily use exotic plants. Some non-invasive exotics provide valuable food for birds. The nuance: if you want to support specialist native insects and animals, you do need their specific native host plants.</p>

<p>"Natives are available and practical"</p>	<p>Not always. Native hickories (shagbark, bitternut) would be excellent street trees but are nearly impossible to source at usable sizes — production bottleneck. Availability is a real constraint that sometimes makes non-native selections more practical.</p>
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The article's conclusion: No one disputes that native plants have an important role. We want plantings to tell us where we are — to ground us in a region. But the argument for natives-only breaks down under scrutiny. The appropriate plants framework — site-driven, non-invasive, functional — produces better outcomes than provenance-based rules.

Quantifying Tree Benefits: The Case for Upfront Investment

Research consistently shows the cost of proper tree establishment and care is outweighed by ecosystem services returned:

- Stormwater: canopy interception reduces runoff volume and peak flows
- Energy: summer shading reduces cooling costs; winter wind buffering reduces heating costs
- Carbon: larger-canopied trees sequester disproportionately more carbon than small trees
- Pollinators: diverse flowering times across species maximize benefit to bees and other insects
- Air quality: leaf surfaces capture particulates; some gaseous pollutant uptake

Master Gardeners can use this framing when helping communities understand why doing the site work upfront — better soil preparation, right tree, right place — is worth the investment. Benefits are measurable and documented.

Tree and Shrub Purchase Forms

Trees and shrubs are sold in three forms, each requiring a different planting approach. Trainees must know all three:

Form	Description	Key Planting Considerations
Bare Root	Dormant plant with roots exposed; no soil. Lightweight, economical. Spring only.	Plant immediately; keep roots moist. Spread roots naturally in hole. No burlap to worry about.
Balled & Burlapped (B&B)	Root ball wrapped in burlap and wire basket. Heavy. Large trees/shrubs.	Remove wire basket and burlap from top 1/3 at minimum; synthetic burlap must be fully removed. Plant at correct depth — do not cover root flare.

Container Grown	Plant in plastic pot with media. Available longer season.	Check for circling/girdling roots; score or loosen root ball. Plant at correct depth. Media may differ from native soil — ensure good contact.
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Planting and Establishment Best Practices

- Plant at the correct depth — root flare should be at or just above soil grade
- Dig hole 2–3x wider than root ball, not deeper — compacted sides are better than settling
- Do not amend backfill soil — roots need to grow into native soil
- Mulch 2–4 inches deep in a ring extending to drip line; keep mulch away from trunk (no "mulch volcanoes")
- Water deeply and consistently for the first 1–3 growing seasons
- Staking: only if necessary for wind stability; remove within 1 year
- Pruning at planting: remove only dead, broken, or crossing branches — do not top
- Establishment period: typically 1 year per inch of trunk diameter

Basic Pruning Principles

Pruning is a large topic; this module covers the fundamentals:

- Prune for structure, safety, and plant health — not just aesthetics
- Make cuts at branch collars (do not flush-cut or leave stubs)
- Timing varies by species — flowering shrubs: prune after bloom; most trees: late dormancy
- Never remove more than 1/3 of live canopy in a single season
- Do not top trees — it creates structural weakness and disease entry

Ecosystem Services of Woody Plants

- Stormwater interception: canopy intercepts rainfall, reduces runoff volume and velocity
- Urban heat island reduction: shade and transpirational cooling
- Carbon sequestration: long-lived trees store significant carbon
- Air quality: leaf surfaces capture particulates; some uptake of gaseous pollutants
- Wildlife habitat: food (fruit, seeds, nectar), nesting sites, cover
- Biodiversity support: native trees support hundreds of associated insect species
- Aesthetic and psychological: documented benefits for human wellbeing, property value

Section 3.2 — Herbaceous Plants

Herbaceous plants — those without woody stems, whose above-ground growth largely dies back each winter — are among the most versatile and widely used plants in home landscapes. They range from annuals that complete their life cycle in a single season to long-lived perennials that return year after year from underground structures.

What Makes a Plant "Herbaceous"?

Herbaceous plants have non-woody stems. In the Northeast temperate zone:

- Above-ground growth dies back in winter
- Underground structures (roots, bulbs, rhizomes, tubers, corms) survive
- In tropical climates, many of the same species are woody perennials (e.g., peppers, figs, bananas) — here they behave as annuals or tender perennials

Hardiness Zones: The First Question for Any Herbaceous Plant

The USDA Plant Hardiness Zone Map defines zones by average annual minimum winter temperature. Always check the zone rating before selecting a perennial. Central New York (including much of the Finger Lakes region) is generally Zone 5b-6a.

- Zone tells you: will this plant survive our winters?
- It does NOT tell you: heat tolerance, drought tolerance, or spring/fall performance
- Microclimates matter: south-facing walls, urban heat, frost pockets all shift effective hardiness

Types of Herbaceous Plants

Type	Life Cycle	Examples
Annuals	Complete seed-to-seed in one growing season; must be replanted each year	Marigolds, zinnias, impatiens, petunias, basil
Biennials	Two-year cycle: foliage year 1, flower/seed year 2, then dies; seeds self-sow	Foxglove (<i>Digitalis</i>), hollyhock, black-eyed Susan (can act as biennial)
Herbaceous Perennials	Non-woody; die back each winter; return from roots/crown for 3+ years	Coneflowers (<i>Echinacea</i>), hostas, daylilies, astilbe, peonies
Bulbs	True bulbs: layered storage structure (onion model); die back annually	Tulips, daffodils, allium, hyacinths
Corms	Solid storage structure; replaces itself each year	Crocus, gladiolus
Tubers	Swollen stem or root used for storage; can be divided	Dahlia, caladium, tuberous begonia

Rhizomes	Horizontal underground stem; spreads vegetatively	Iris, lily of the valley, hostas (crown-like)
Ornamental Grasses	Growing point at soil level; treated like perennials; cut back in early spring	Karl Foerster feather reed grass, switchgrass (Panicum), little bluestem

Site Assessment and Garden Planning

Before choosing herbaceous plants, assess the site thoroughly. The lecture emphasizes that mismatches between plant needs and site conditions are the most common cause of garden failure.

Site Assessment Questions for Herbaceous Plantings

- How much time do you have for maintenance? (Most perennial gardens require regular care — "low maintenance" is more accurate than "no maintenance")
- Sun/shade: hours of direct sun per day? Morning vs. afternoon sun?
- Soil type and drainage: does water pool after rain?
- Slope and exposure: wind, erosion risk, moisture variation
- Where do people/pets move through the site? (Design paths and borders accordingly)
- Are there legal restrictions? HOA rules, municipal ordinances about height?
- What is the deer pressure in the area? (Greatly limits plant choices in many NY locations)
- Are there existing trees creating shade, root competition, or allelopathy (e.g., black walnut)?
- Where does water go during heavy rain? (Follow the water, not just current conditions)
- What does existing vegetation tell you about the site's conditions?

Soil Preparation for Herbaceous Plantings

Good soil preparation before planting is far more effective than trying to correct problems later:

- Test soil pH and nutrient levels before amending
- Work compost (2–4 inches) into the top 8–12 inches of bed soil
- Address drainage issues: raised beds for wet sites, subsoil drainage where feasible
- Avoid working wet soil — destroys structure and creates compaction
- Do not rototill more than necessary — disrupts soil biology and brings weed seeds to the surface

Note on Jumping Worms (*Amyntas* spp.)

A significant new concern in Central New York. Jumping worms have become widespread in the last 5 years and dramatically alter soil structure and chemistry by consuming organic matter at high rates. They are especially concerning for forest ecosystems.

- Do NOT share plants from divided perennials if jumping worms are present in your soil

- If you must share divisions, remove ALL soil from roots before transferring
- Actively research best practices — Cornell is working on protocols for safe plant sharing
- Teach volunteers and community gardeners about identification and containment
- Cornell has a fact sheet and short claymation video on jumping worms

Garden Design and Plant Selection Fundamentals

For herbaceous plantings, design principles overlap with plant selection:

- Layer by height: taller plants at back/center, shorter at front/edges
- Plan for season-long interest: sequence bloom times from early spring through fall
- Consider foliage texture and color — flowers are temporary, foliage lasts the season
- Group plants of 3, 5, or 7 for visual impact (avoid single specimens of each species)
- Leave adequate spacing for mature size — overcrowding leads to disease and competition
- Consider pollinator value — native perennials generally outperform cultivars for insect support
- Annuals fill gaps between perennials during establishment years

Cornell Herbaceous Plant Resources

- Cornell Garden-Based Learning website: curated plant lists and regional recommendations
- Pat Kern's Top Plant List (Central New York): vetted perennial recommendations for the region
- Cornell Flower Bulb Research Program: extensive research on bulb performance
- Cornell Woody Plant Database also includes groundcovers and vines
- USDA Plant Hardiness Zone Map: planthardiness.ars.usda.gov

Mulching Herbaceous Plantings

- Apply 2–3 inches of organic mulch (shredded leaves, wood chips) around, but not on top of, plant crowns
- Mulch conserves moisture, moderates soil temperature, suppresses weeds, adds organic matter as it decomposes
- Remove or thin mulch in spring to allow crown emergence
- Avoid piling mulch on crowns — promotes rot

Edging

- Physical edging (metal, plastic, stone) or maintained cut edges keep grass and groundcovers from invading borders
- Re-cut edges each season; invasive grass rhizomes readily cross shallow barriers
- Deep edging (spade) more effective than surface cuts

Herbaceous Plant Propagation

Master Gardeners should be familiar with basic propagation methods for community education:

Division	Most common for perennials. Divide every 3–5 years (varies by species) to reinvigorate plants and share. Best in spring or fall. NOTE: Do not share divisions if jumping worms are present in your soil.
Seed	Annuals and many perennials from seed. Stratification may be needed for native perennials. Direct sow or start indoors 6–8 weeks before last frost.
Stem Cuttings	Tip cuttings of annuals and tender perennials. Best in spring/early summer with rooting hormone. Maintain humidity until rooted.
Bulb/Corm Offsets	Many bulbs produce offsets (daughter bulbs) that can be separated and replanted. Lift in fall after foliage dies back.
Tuber Division	Dahlias and tuberous begonias: divide tubers in spring, ensuring each division has an "eye" (growth bud).

Watering Considerations

- Most perennials need 1 inch of water per week during the growing season
- Drip irrigation or soaker hoses more efficient than overhead watering (reduces foliar disease)
- Water deeply and infrequently to encourage deep rooting
- Newly planted perennials need consistent moisture for the first season until established
- Annuals generally need more frequent watering than established perennials

Ecosystem Services of Herbaceous Plants

- Pollinator support: native perennials — especially composites (coneflowers, black-eyed Susans, asters) — are critical for bees, butterflies, and other insects
- Bird habitat: seed heads of perennials (coneflowers, grasses) provide winter food for birds
- Erosion control: dense herbaceous plantings stabilize slopes
- Stormwater management: deep-rooted perennials improve infiltration
- Biodiversity: diverse herbaceous plantings support far more insect species than turfgrass monocultures
- Carbon storage: deep perennial root systems sequester carbon in the soil

Quick Reference: Key Terms and Concepts

Woody Plant Terms

Tree	Woody perennial with a single main stem (trunk)
Shrub	Woody perennial with multiple main stems
Liana	Woody vine
Root flare	Widening at the base of trunk where roots emerge; must not be buried when planting
Mulch volcano	Improper practice of piling mulch against trunk; causes rot and disease
B&B	Balled and burlapped: tree/shrub sold with root ball wrapped in burlap
Site assessment	Systematic evaluation of a site's conditions before plant selection
Establishment period	Time required for transplant to develop sufficient root system for independence; ~1 year per inch of caliper
Allelopathy	Chemical inhibition of plant growth by another plant (e.g., black walnut / juglone)
Urban heat island	Elevated temperatures in urban areas due to impervious surfaces; trees mitigate this effect

Herbaceous Plant Terms

Annual	Completes full life cycle (seed to seed) in one growing season
Biennial	Requires two growing seasons to complete life cycle
Herbaceous perennial	Non-woody plant that dies back each winter and regrows from underground structures
Bulb	Layered storage structure (onion-type); true bulb produces offset "daughter" bulbs
Corm	Solid, compressed underground stem (crocus, gladiolus); replaced each year
Tuber	Swollen stem or root for storage (dahlia, potato); has "eyes" (growth buds)
Rhizome	Horizontal underground stem that spreads (iris, lily of the valley)
Ornamental grass	Perennial with growing point at soil level; treat like perennials; cut back in early spring
Hardiness zone	USDA classification based on average annual minimum temperature; guides perennial selection

Division	Propagation method for perennials; dig, split, replant portions; renews vigor
Jumping worms	Invasive <i>Amyntas</i> spp. that disrupt soil structure; concern for plant sharing and forest health

Discussion Questions & Activities

Section 3.1 — Woody Plants

Pre-Class Reading Discussion: "Moving Beyond the Natives/Exotics Debate"

Required reading: Bassuk & Sutton, *Urban Habitats*. Pair or small group discussion (10 min):

- The article opens with native plants dying at a Cornell library garden. What went wrong — and what does that tell us about how we think about plant selection?
- What is the "appropriate plants" framework? How does it differ from a native-only or exotic-friendly approach?
- The article challenges four common arguments for native-only planting (ease of care, diversity, wildlife, availability). Which argument did you find most or least convincing? Did anything surprise you?
- Think of a real planting scenario you have encountered or might encounter as a Master Gardener. Would the appropriate plants framework change how you approached plant selection?
- The article notes that some natives can be weedy or problematic in disturbed sites (boxelder, cottonwood, fox grape). How does this complicate simple "plant natives" advice to homeowners?

Facilitator note: The goal is not to reach consensus for or against natives — it is to develop the nuanced, site-based thinking that distinguishes informed plant selection from rule-following. Many trainees will arrive with strong native-plant convictions; others with little background. Both benefit from examining the assumptions.

Woody Plant Database Exploration Activity

Hands-on activity using the Cornell Woody Plant Database:

- Scenario 1: A homeowner has a small front yard with full sun, compacted clay soil, and road salt exposure. They want a tree under utility lines. Find 2–3 good candidates.
- Scenario 2: A shaded backyard with moist, acidic soil. The client wants a flowering shrub with fall interest. Find 2–3 options.
- Debrief: What site conditions were most limiting? How did the database help narrow choices?

Section 3.2 — Herbaceous Plants

Opening Reflection (Individual, then share)

Think about your own experience with herbaceous plants:

- How would you rate your current interest, experience, and knowledge?
- Where did you gather that experience?
- What would you most like to do with herbaceous plants in the future?

Sharing this context helps the facilitator calibrate the discussion and allows trainees to learn from each other's expertise.

Garden Design Challenge

Scenario: A client has a sunny, well-drained, 10' x 20' border with moderate deer pressure in Central New York (Zone 6a). She wants season-long color with some plants for cutting. Budget is limited — she wants to expand by dividing plants over time.

In small groups:

- Select 6–8 herbaceous plants (a mix of annuals and perennials) using Cornell resources
- Sketch a rough layout considering height, bloom time, and spacing
- Identify which plants can be propagated by division after establishment
- What would you warn her about regarding jumping worms when she shares divisions?

Debrief: Share plant lists. Discuss deer-resistant choices and native vs. non-native trade-offs.

Knowledge Check Questions

Use these to check for understanding:

- What is the difference between a corm and a bulb? Give an example of each.
- Why should you NOT pile mulch against the trunk of a newly planted tree?
- A homeowner wants to plant a large sugar maple near their house foundation. What concerns would you raise?
- What does the USDA Hardiness Zone tell you — and what doesn't it tell you?
- A volunteer wants to share hostas she divided from her garden. What should she know about jumping worms first?
- What is "allelopathy" and which common landscape tree is known for it?

Key Resources

Cornell Woody Plant Database	Search by plant name or site conditions. 450+ plants with photos, cultivars, disease info, invasiveness. Dr. Nina Bassuk, Urban Horticultural Institute.
Cornell Recommended Urban Trees	Available on same site as Woody Plant Database. Vetted selections for challenging urban sites.

Pat Kern's Top Plant List	Central New York-specific perennial recommendations. Available on Cornell Garden-Based Learning website.
Ornamental Grasses Resource	Separate Cornell resource covering grass culture, selection, and management.
USDA Hardiness Zone Map	planthardiness.ars.usda.gov — search by zip code for precise zone data.
Cornell Jumping Worm Resources	Fact sheets and short video on Amynthus identification, ecology, and management.
Urban Habitats: Natives/Exotics Debate	Bassuk & Sutton. "Moving Beyond the Natives/Exotics Debate." Core reading for Section 3.1 discussion. Covers the Cornell library garden case study, the appropriate plants framework (SITES), and a critique of common native-only arguments.
Open Access Government: Urban Trees	Bassuk. "Greening the Inner City." Four principles of urban tree selection; the compaction problem; diversity argument; quantifying ecosystem services.
Cornell Garden-Based Learning	Main hub for Master Gardener resources and plant databases.

Note on Linked Readings

Both Module 3 assigned readings — Bassuk & Sutton (Urban Habitats) and Bassuk (Open Access Government) — are incorporated in the Section 3.1 content above.