Sustainable Landscaping & IPM

Gary Fish
State Horticulturist
Maine Department of Agriculture, Conservation & Forestry
gary.fish@maine.gov
207-287-7545

Sustainability Topics

- Soil health
- Keeping carbon on site
- Reducing greenhouse gases
- Carbon sequestration & storage
- Record keeping & monitoring
- Plant diversity
- Water management & conservation

Soil health

Increase organic matter

Limit soil disturbance

Cover crop

Dense planting

Reduce tillage

Mulch, tarping, broad fork

Leave the leaves

Chop and drop

Compost

Sequester carbon

Moisture retention

Structure and drainage

Resist erosion

Hoard carbon

Lawn clippings

Brush piles

Dead hedge

Dead trees

Reduce greenhouse gas emissions

Rechargeable electric equipment

Scythes, push mower

Rakes and brooms for leaves

Reduce lawn

Plant derived mulches

Reuse or recycle plastic pots

Biodegradable seed starting pots

Minimize fertilizers

Grow your own

Soil test

LED or solar powered lighting

Automatic timers

Critically evaluate all inputs

Plant more trees

Sequesters carbon

Saves energy

Record keeping and monitoring

Journal: weather events, first and last frost, phenology

Rain gauge, thermometer

Planting dates

Site selection

Variety selection

Plant diversity

- Native plants
- Remove invasives
- Pollinator-Friendly Garden Certification
- Right plant, right place

Manage and conserve water

Raingardens or swales

Rain barrels

Pervious surfaces in your hard scaping

Less lawn

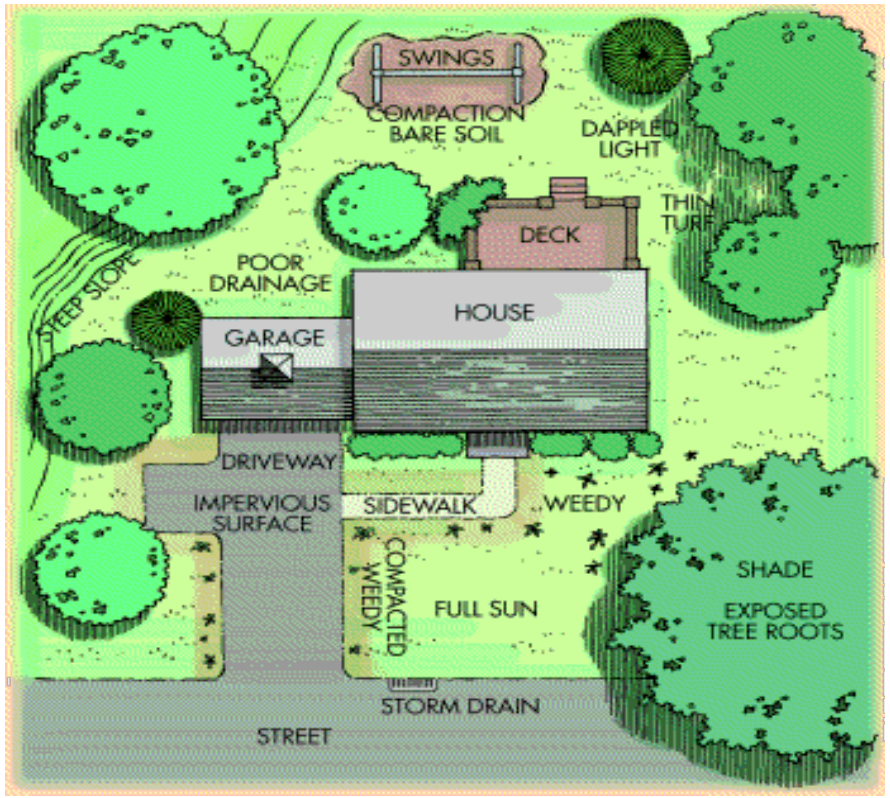
More natives

Mulch

Use IPM!
Integrated Pest Management

- Good horticultural practices
  - Select right plants for right places
  - Choose pest-resistant, disease-resistant cultivars
  - Provide optimal fertilizer, water
- Discourage pests:
  - row covers, traps, repellents, crop rotation, plant spacing
- Encourage natural enemies
  - Spare the sprays
  - Diverse plantings, including season-long offering of plants with flat, open flowers.
- Know your enemy: identify pests and good bugs

Look at the big picture



Make plans to manage specific problems

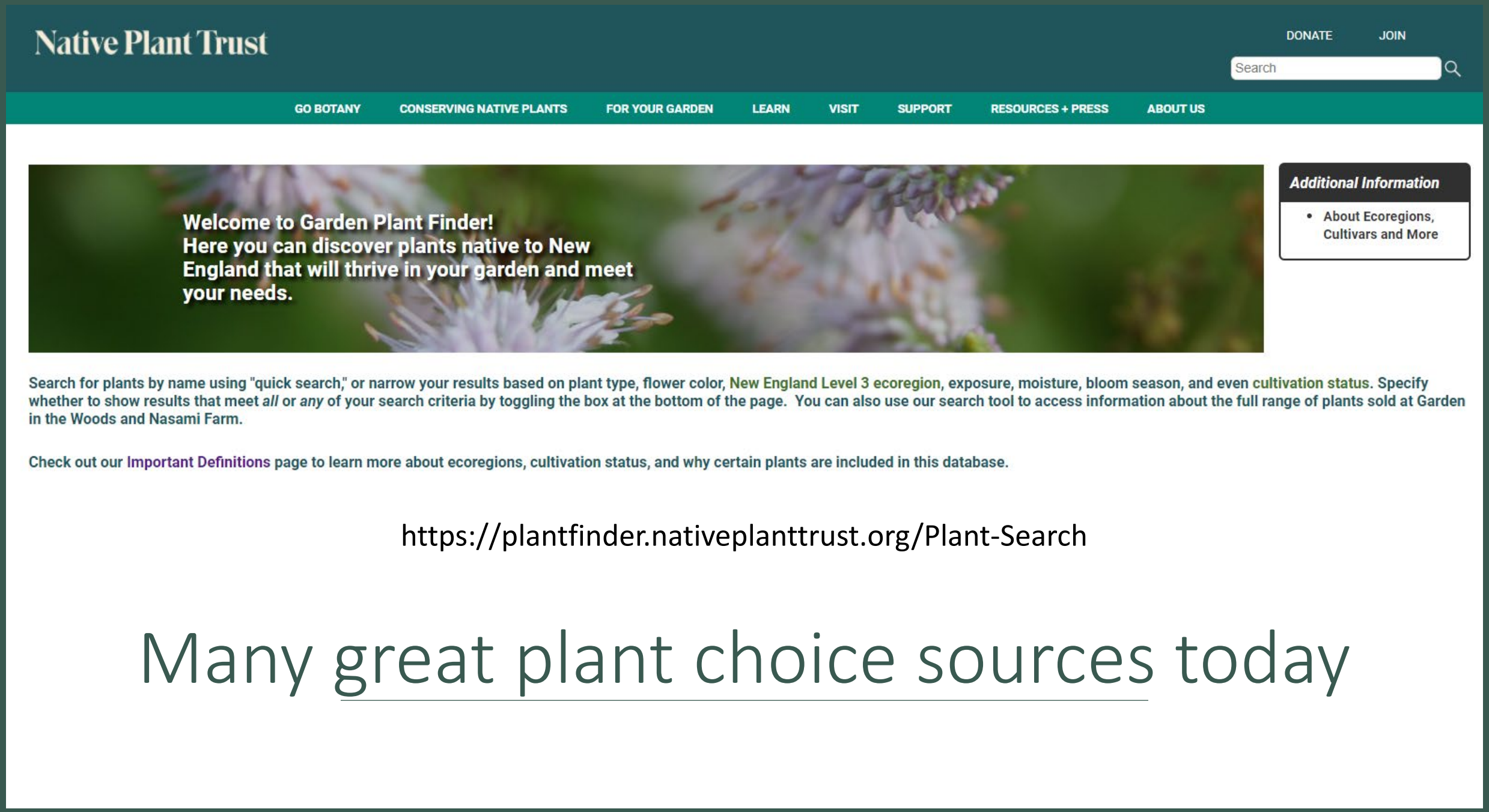
Right plant, right place, right purpose

- Choose plants based on the site conditions not just for their color
- Select plants that thrive under existing conditions rather than trying to alter the conditions to meet the needs of a plant
- Minimize disturbance of the existing landscape

Wild Cranberry Bog

Site conditions are key!

- light availability, intensity and duration (full sun to deep shade)
- water availability, salt water intrusion or spray
- exposure to wind and temperature extremes
- soil type, drainage, compaction
- hardiness zone
- competition from existing vegetation
- below ground conditions in urban sites



https://plantfinder.nativeplanttrust.org/Plant-Search

Many great plant choice sources today

https://plantfinder.nativeplanttrust.org/Plant-Search

Plant Type/Program:

ANY TYPE
Edible
Fern
Grasses, Sedges, and Rushes
Groundcover
Ornamental Grass
Perennial
Shrub
Tree
Vine/Liana

Ctrl-click (Mac users ⌘-click) to select multiple types to include in the search.

Flower Color:

ANY TYPE
Blue
Green
Insignificant
Maroon
Non-Flowering
Orange
Pink
Purple
Red

Ctrl-click (Mac users ⌘-click) to select multiple types to include in the search.

Height:

Inches

Spread:

Inches

Check any box below to find only plants having the specific characteristic(s). Otherwise, leave all boxes unchecked to maximize your search results based on the criteria above.

Cultivation Status

- [ ] Cultivar
- [ ] Selection
- [ ] Species

Exposure

- [ ] Sun
- [ ] Part Shade
- [ ] Shade

Soil Moisture

- [ ] Dry
- [ ] Average
- [ ] Wet

Ecoregion

- [ ] (58) Northeastern Highlands
- [ ] (59) Northeastern Coastal Zone
- [ ] (82) Acadian Plains and Hills
- [ ] (83) Eastern Great Lakes Lowlands
- [ ] (84) Atlantic Coastal Pine Barrens
- [ ] Not Ecotypic in New England

Ornamental Interest

- [ ] Spring Bloom
- [ ] Summer Bloom
- [ ] Fall Bloom
- [ ] Summer Fruit
- [ ] Fall/Winter Fruit
- [ ] Fall Foliage
- [ ] Winter Interest and/or Evergreen

Attracts Wildlife

- [ ] Attracts Bees
- [ ] Pollinator Powerhouse Plant
- [ ] Attracts Butterflies
- [ ] Host Plant
- [ ] Attracts Songbirds
- [ ] Attracts Hummingbirds
- [ ] Other Pollinators/Wildlife

Tolerance

- [ ] Deer/Rabbit Resistant
- [ ] Drought Tolerant
- [ ] Salt Tolerant
- [ ] Urban Environment
- [ ] Compaction Tolerant

Additional Attributes

- [ ] Edible
- [ ] Low Maintenance
- [ ] Spring Ephemeral
- [ ] Dioecious (fruits only on female plants)
- [ ] Fragrant
- [ ] Erosion Control/Soil Stabilization

Landscape Use

- [ ] Groundcover
- [ ] Hedge/screening
- [ ] Massing
- [ ] Specimen
- [ ] Rain Garden
- [ ] Meadow garden
- [ ] Naturalize
- [ ] Rock garden

Attractive Fall Foliage and/or Ornamental Fruit

- [ ] Red Fruit
- [ ] Red to Purple Fall Foliage
- [ ] Orange to Brown Fall Foliage
- [ ] Bright Yellow to Bronze Fall Foliage
- [ ] Blue Fruit
- [ ] Multi Color Fall Foliage
- [ ] Purple to Black Fruit
- [ ] White Fruit
- [ ] Orange to Yellow Fruit

https://plantfinder.nativeplanttrust.org/Plant-Search

https://plantfinder.nativeplanttrust.org/Plant-Search

Growth Habit

- [ ] Compact/Clumping
- [ ] Spreading/Suckering

- (•) Show only plants having **ALL** checked characteristics above
- ( ) Show plants having **ANY** checked characteristics above

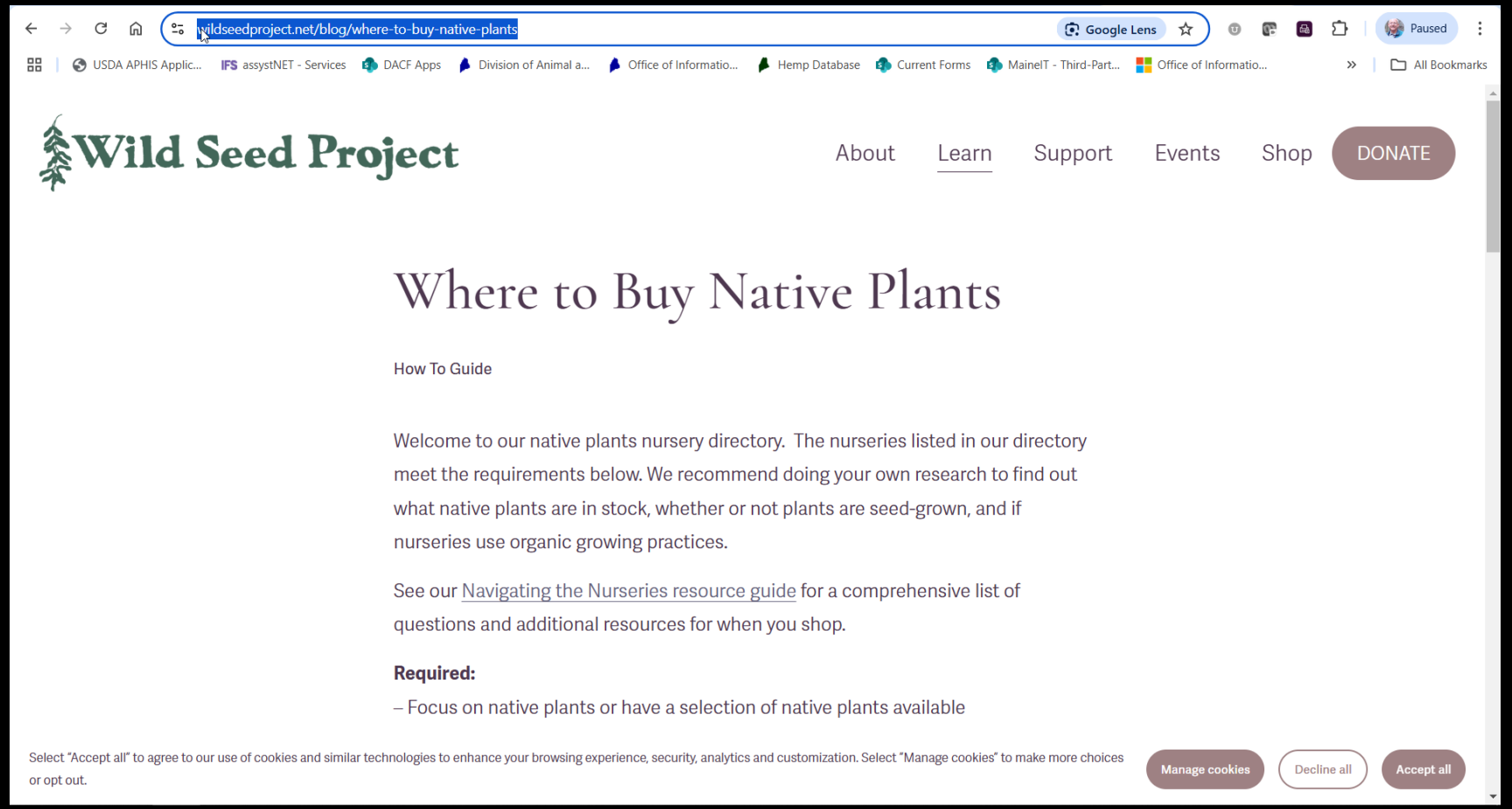
BEGIN SEARCH

Native Plant Trust

Conserving and promoting New England's native plants to ensure healthy, biologically diverse landscapes

180 HEMENWAY ROAD
FRAMINGHAM, MASSACHUSETTS 01701
508-877-7630

https://wildseedproject.net/blog/where-to-buy-native-plants/



Where to buy native plants

Rubus idaeus
red raspberry

Rubus occidentalis
black raspberry

Rubus odoratus
flowering raspberry

Salix discolor
pussy willow

Spiraea alba var. latifolia
white meadowsweet

Spiraea tomentosa
steeplebush

Swida alternifolia
pagoda dogwood

Swida amomum
silky dogwood

https://plantfinder.nativeplanttrust.org/Plant-Search

Geranium maculatum
wild geranium

Helianthus divaricatus
woodland sunflower

Helianthus tuberosus
sunchoke

Ionactis linariifolia
stiff aster

Lupinus perennis
sundial lupine

Solidago bicolor
white goldenrod

Solidago caesia
wreath goldenrod

Solidago nemoralis
gray goldenrod

https://plantfinder.nativeplanttrust.org/Plant-Search

Aquilegia canadensis
red columbine

Asclepias exaltata
poke milkweed

Asclepias incarnata
swamp milkweed

Asclepias purpurasecens
purple milkweed

Asclepias syriaca
common milkweed

Asclepias tuberosa
butterfly milkweed

Baptisia tinctoria
yellow wild indigo

Caltha palustris
marsh marigold

https://plantfinder.nativeplanttrust.org/Plant-Search

Pretty ornamentals? Or Pests?

http://www.maine.gov/dacf/mnap/features/invasive_plants/invasives_gallery.htm

Purple Loosestrife

Burning Bush

Glossy Buckthorn

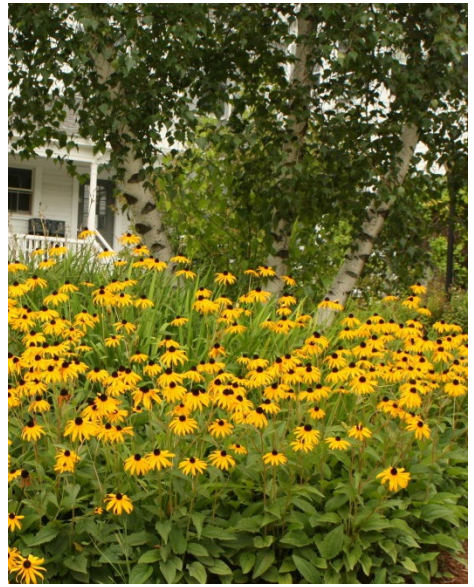
Japanese Barberry

Oriental Bittersweet

Use site appropriate, non-invasive plants

- Native plants are often well adapted
  - Fewer problems, less work, more rewards, **but all are NOT problem free**, e.g., viburnums, birches
- Invasive plants are easy to grow but crowd out native vegetation
  - Our local forest habitats are changing rapidly
  - Invasive plants can ruin wildlife habitat
  - Invasive plants harbor more infected deer ticks

Wild Columbine



Paper Birch

5% of our native plants make 75% of the food that drives food webs

Keystone plants

i.e. some native plants are much better at supporting food webs than others

The question is not
whether natives are better
than nonnatives.

It’s whether ecologically
productive plants are better
for our ecosystems than
unproductive plants.

Ginkgo = 0 species of caterpillars

Oaks = 424 species of caterpillars in southern Maine


Native *Prunus* = 405
species of caterpillars


Zelkova
supports
no caterpillars

Pieris japonica; 2 spp


Blueberries; 289 spp

English Ivy supports nothing

Best Bets: What to Plant

Woody Plants

Common Name	Plant Genus	Butterfly/moth species supported
Oak	Quercus	534
Black cherry	Prunus	456
Willow	Salix	455
Birch	Betula	413
Poplar	Populus	368
Crabapple	Malus	311
Blueberry	Vaccinium	288
Maple	Acer	285
Elm	Ulmus	213
Pine	Pinus	203
Hickory	Carya	200
Hawthorn	Crataegus	159
Spruce	Picea	156
Alder	Alnus	156
Basswood	Tilia	150
Ash	Fraxinus	150
Rose	Rosa	139
Filbert	Corylus	131
Walnut	Juglans	130
Beech	Fagus	126
Chestnut	Castanea	125

Herbaceous Plants

Common Name	Plant Genus	Butterfly/moth species supported
Goldenrod	Solidago	115
Asters	Aster	112
Sunflower	Helianthus	73
Joe pye, Boneset	Eupatorium	42
Morning glory	Ipomoea	39
Sedges	Carex	36
Honeysuckle	Lonicera	36
Lupine	Lupinus	33
Violets	Viola	29
Geraniums	Geranium	23
Black-eyed susan	Rudbeckia	17
Iris	Iris	17
Evening primrose	Oenothera	16
Milkweed	Asclepias	12
Verbena	Verbena	11
Beardtongue	Penstemon	8
Phlox	Phlox	8
Bee balm	Monarda	7
Veronica	Veronica	6
Little bluestem	Schizachyrium	6
Cardinal flower	Lobelia	4

www.bringingnaturehome.net/what-to-plant.html

Some native plants have pest problems too

Viburnum leaf beetle

- Over-winters as egg deposited into holes chewed into twigs, then capped. Twig has rough appearance.
- Eggs hatch in May, larvae feed together in groups on leaves.
- Adults found mid-July to first frost.

Viburnum Leaf Beetle

- Resistant cultivars
  (www.hort.cornell.edu/vlb/suscept.html)
  - **Some 'resistant' cultivars:**
    - *V. cassinoides, (witherod viburnum) -native*
    - *V. plicatum* var. *tomentosum* (doublefile viburnum),
    - *V. carlesii* (Koreanspice viburnum),
    - *V. burkwoodii* (Burkwood viburnum),
    - *V.* × *juddii* (Judd viburnum),
    - *V. lantanoides* (alnifolium) (Hobblebush) - native
    - *V. lentago* (Nannyberry) - native

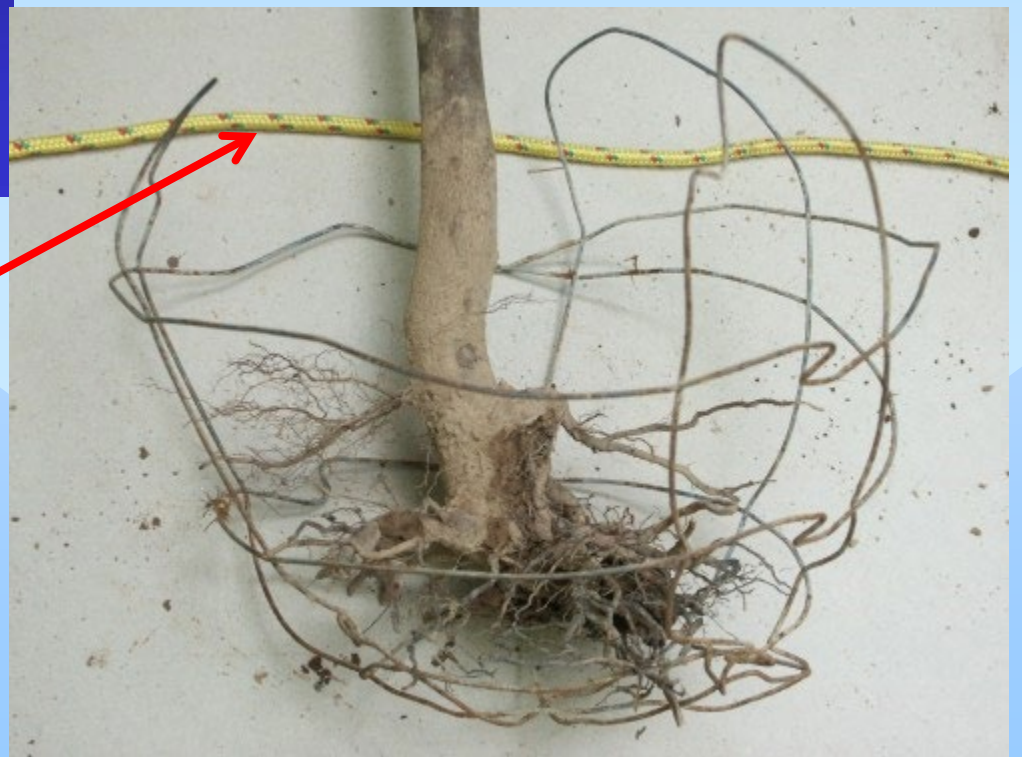
Some native plants have pest problems too

- In many landscapes, birch trees begin to decline within a few years, and many trees die well before reaching maturity - Grow and Maintain a Healthy Birch Tree – USDA, FS
- Birch leaf miner, bronze birch borer, root scald

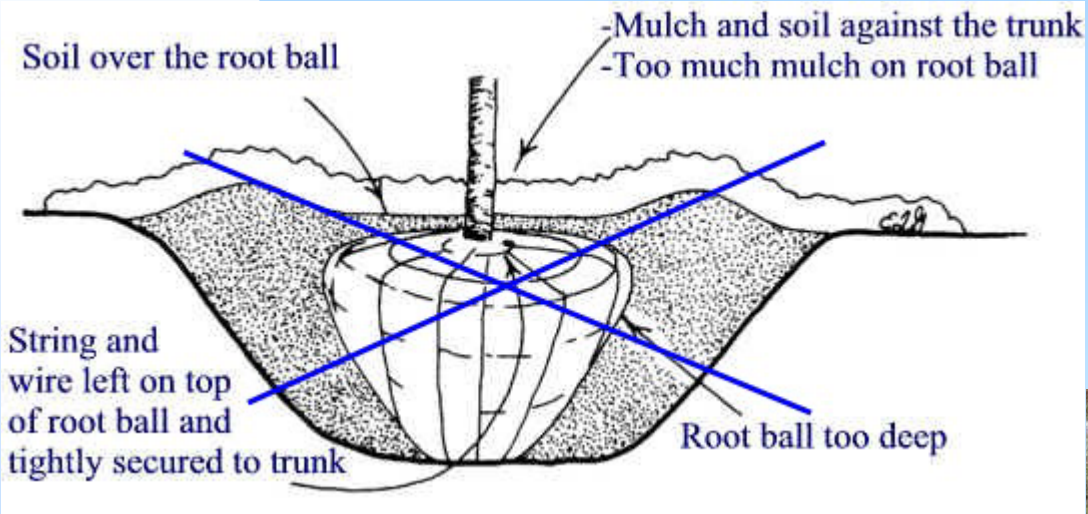
Individual plant selection is key

Root ball problems!

Original soil level in root ball



Start them out right



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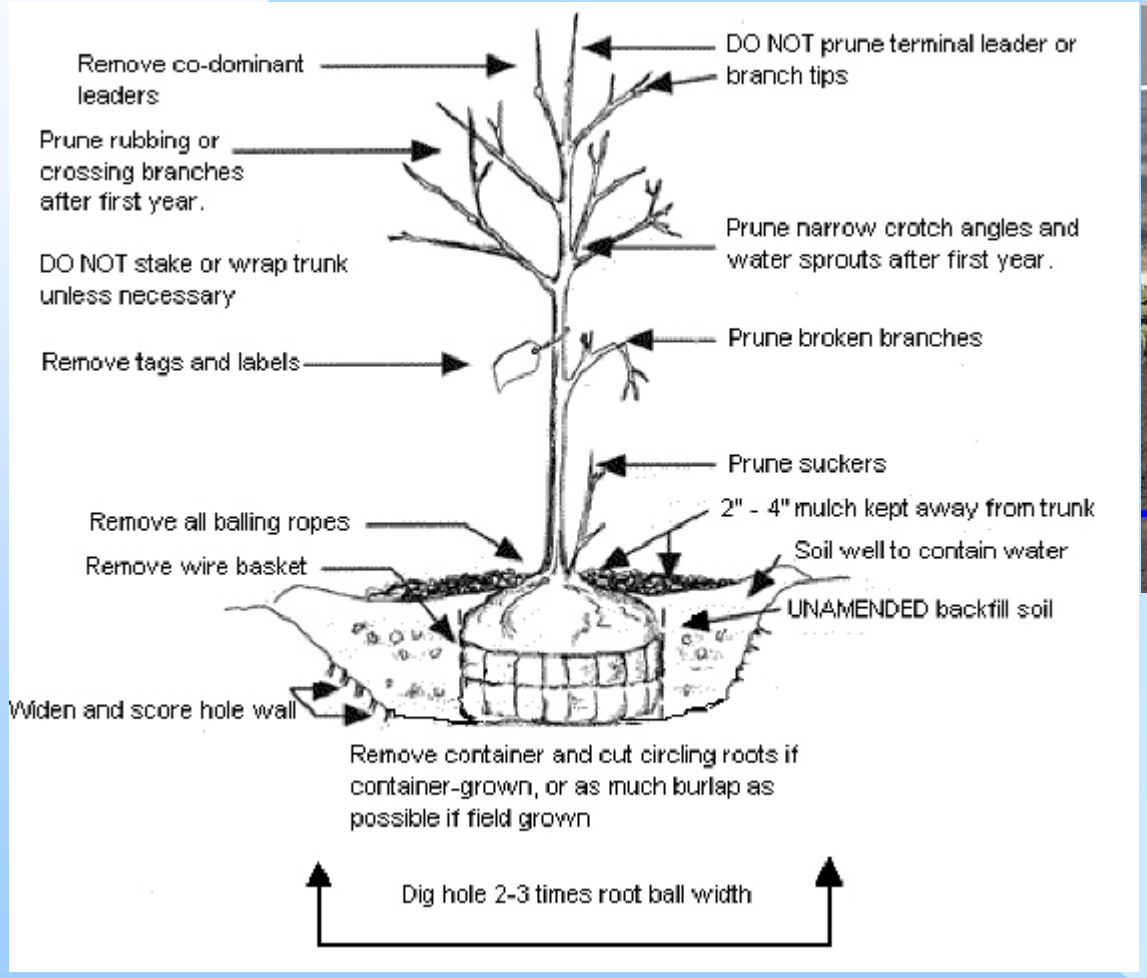


Mulch volcanoes kill…

- **Mulching**
  - **can suppress weeds, conserve moisture, provide habitat for natural enemies**
  - **pull mulch away from the trunk to decrease pest/ disease potential**
  - **keep under 3 – 4 inches**

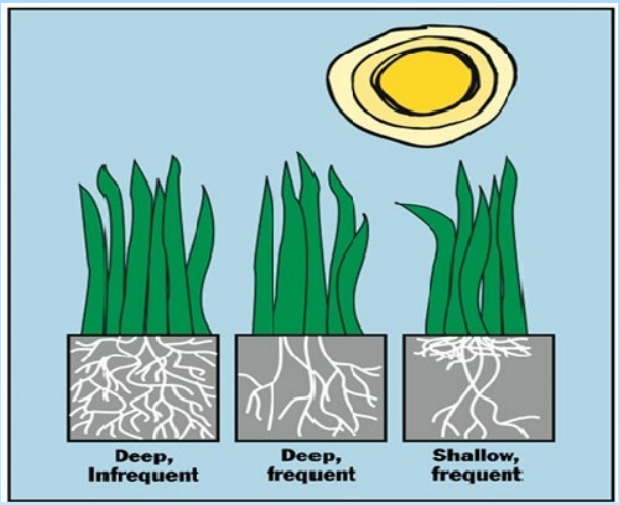
Water during establishment

Proper Aftercare

Treegator Drip Irrigation Bag

Water management is crucial

- **proper irrigation**
  - **water deeply and infrequently**
  - **only water the root system**
  - **water early in the morning**

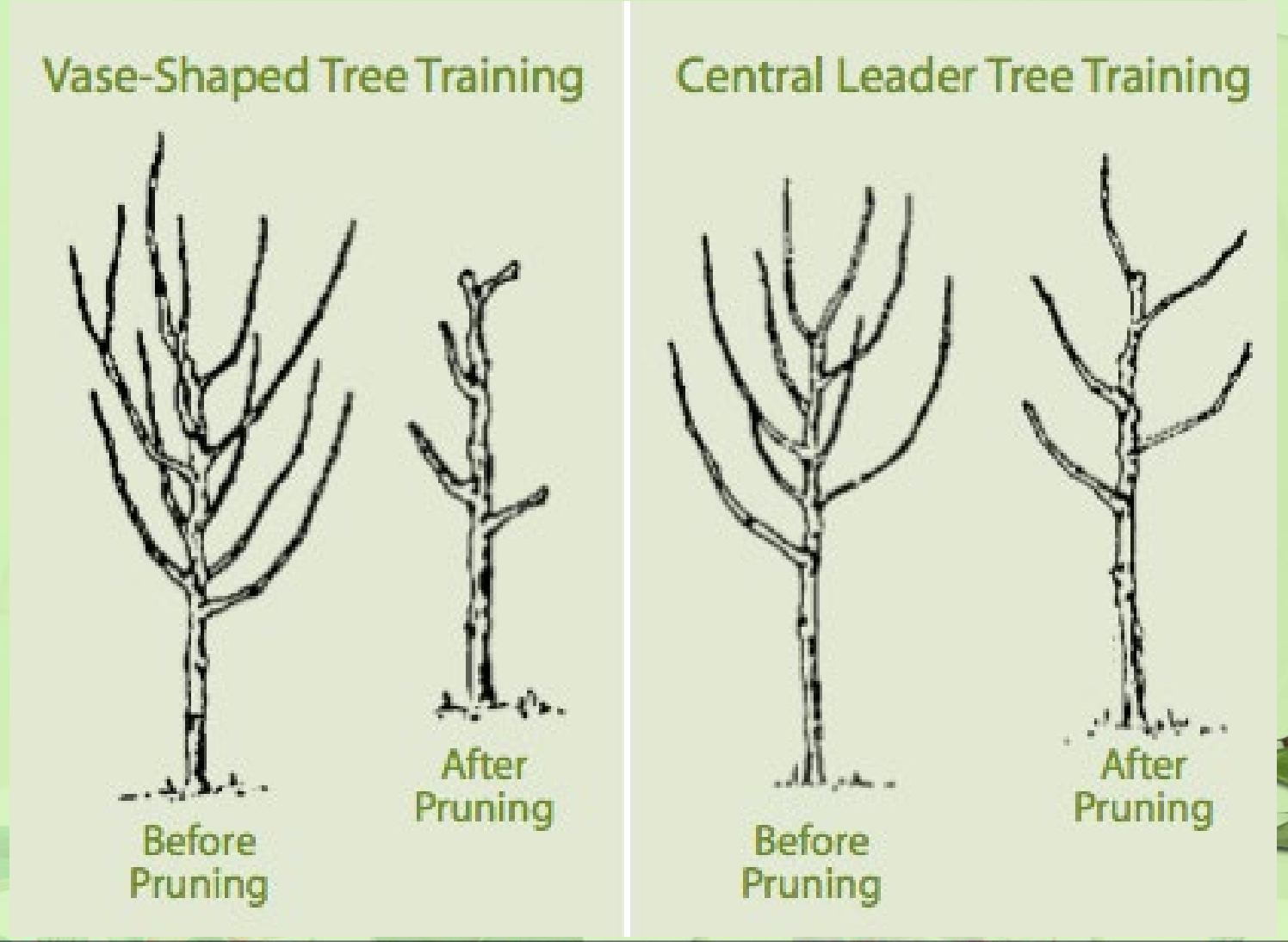


#1 Killer of house plants

- OVER Watering
  - Plant wilts even though soil is wet
  - Leaf tips turn brown
  - Whole leaves turn brown and wilt
  - Leaf cells rupture (Edema)
  - Leaves turn yellow
  - Leaves start falling off

simplescaping.wordpress.com/

Air circulation is essential



Cultural controls

- **Landscape design**
  - **replace “susceptible” or chronically pest-prone plants with resistant or non-susceptible plants**
  - **increased plant diversity and habitat complexity can increase natural enemies present (Shrewsbury 1996)**

Cranberry Viburnum

Siebold viburnum

Apple scab

susceptible

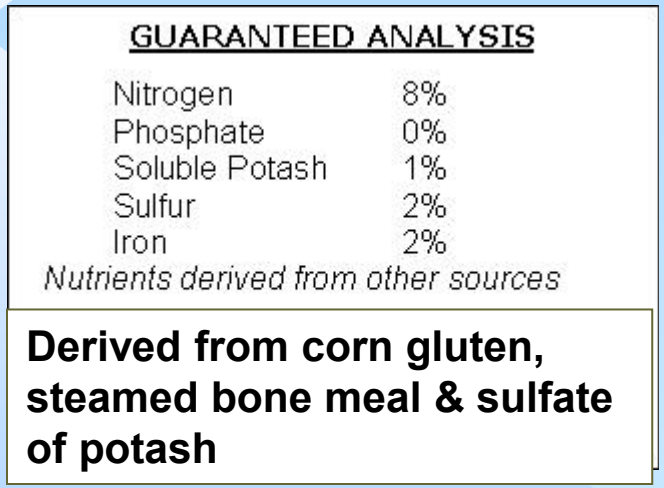
resistant

Cultural controls

- Fertilizer
  - over fertilization can cause the “aphid effect”
  - high nitrogen fertilizers may help the pest more than the plant

No endorsement intended or implied

Select slow release fertilizers



GUARANTEED ANALYSIS

Nitrogen	8%
Phosphate	0%
Soluble Potash	1%
Sulfur	2%
Iron	2%

Nutrients derived from other sources

Derived from corn gluten, steamed bone meal & sulfate of potash

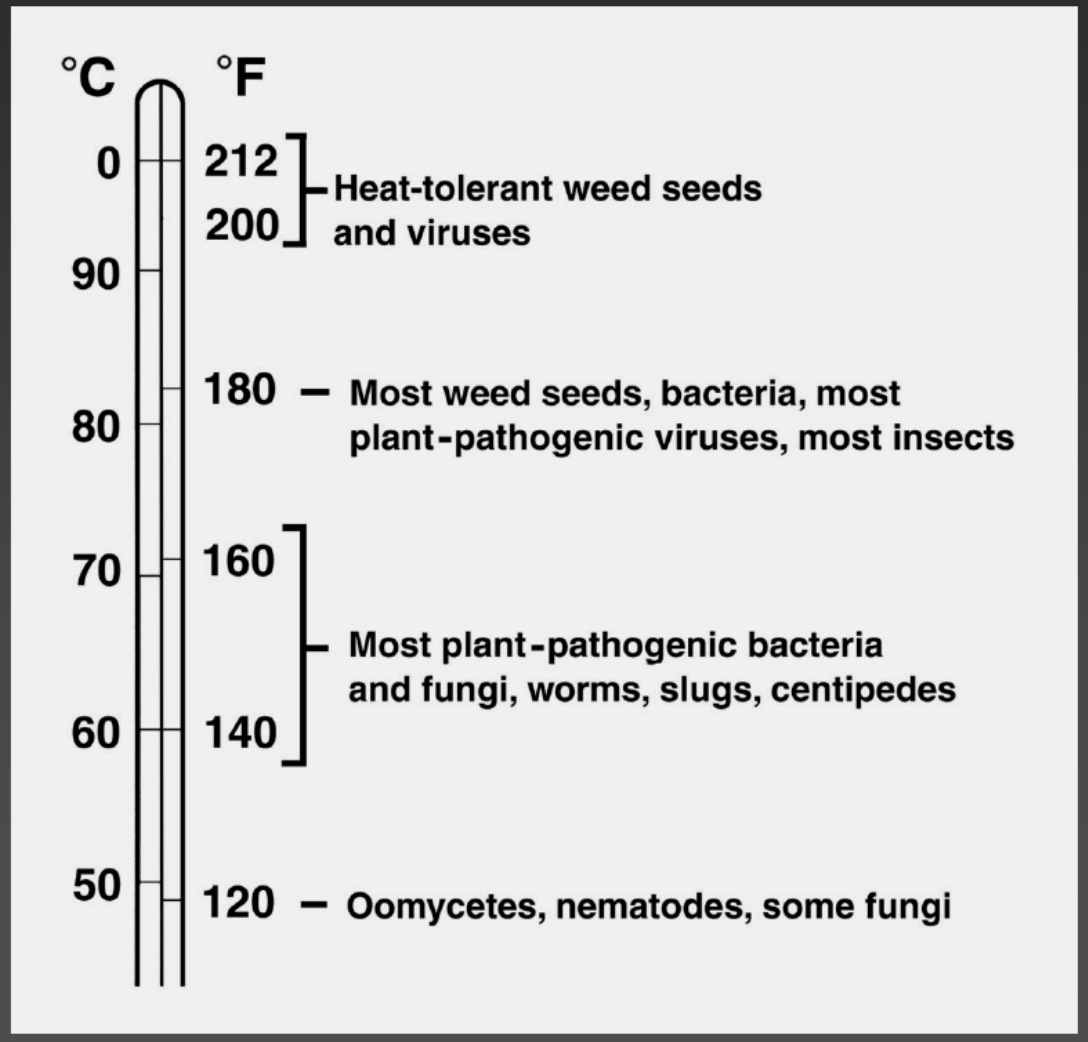
- **GUARANTEED ANALYSIS**
- Total Nitrogen (N).....8.00%
  1.0 % Water Soluble Nitrogen
  7.5 % Water Insoluble Nitrogen
  Available Phosphate (P205).....0.0 %
  Soluble Potash (K20).....1.0 %
- **NON PLANT FOOD INGREDIENTS**
  Bacillus subtilis, Bacillus licheniformis, Bacillus pumulis, Bacillus megaterium, Paenibacillus polymyxa, Paenibacillus durum each @ 275,000 CFU per gram of finished product

Look for Water Insoluble Nitogen (WIN)

Physical Methods

- Exclusion by screens, barriers (example: bird netting, row covers)
- Pruning infested/infected plants
- Physical removal
  - hand-pick,
  - shake and capture
  - rake or remove infested tissue

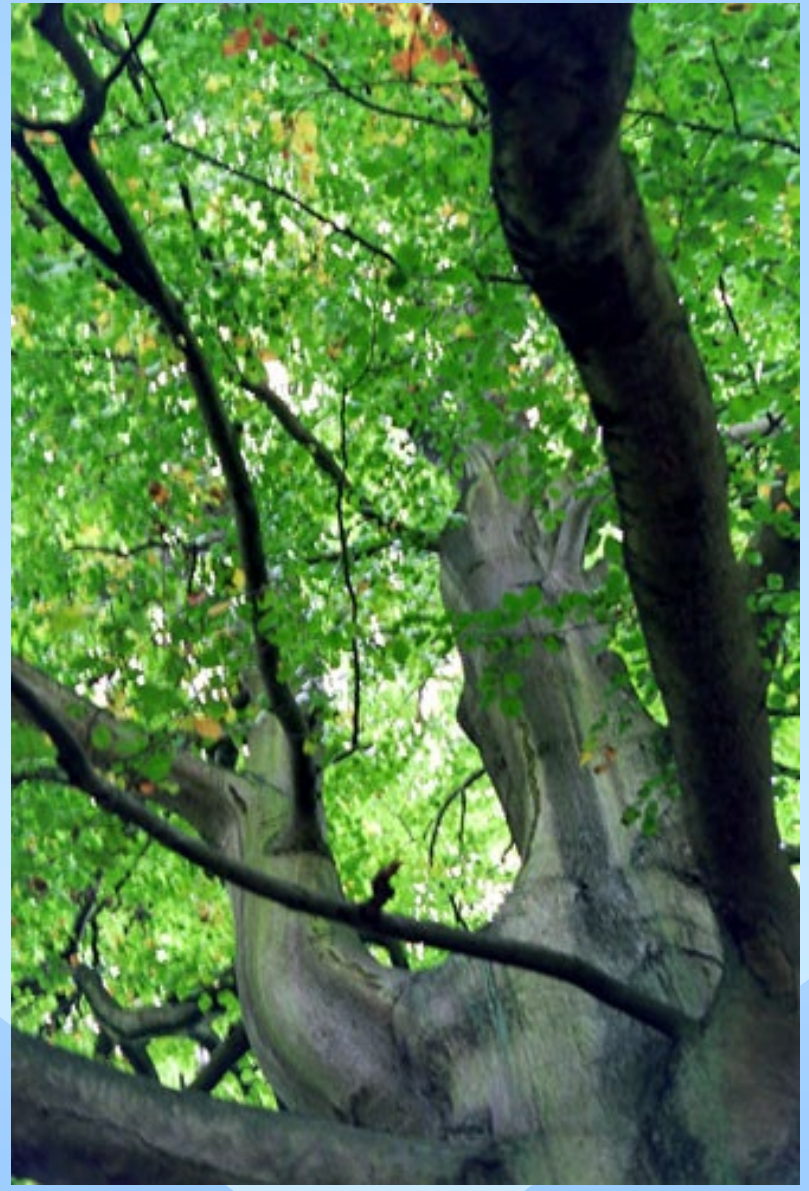
Temperatures needed to kill plant pests:



Weed Management

What is a weed? Is this plant a weed?

#1 Killer of grass



Turf Weeds ID site | Turfg

turfweeds.cals.cornell.edu

Apps EPA: Pesticides - Prop USDA APHIS Applicat Division of Animal an MS-TAMS Logon System Dashboard - ePermits (APHIS) Board of Pesticides Co Order Now | Custom

Cornell University

Search Cornell go

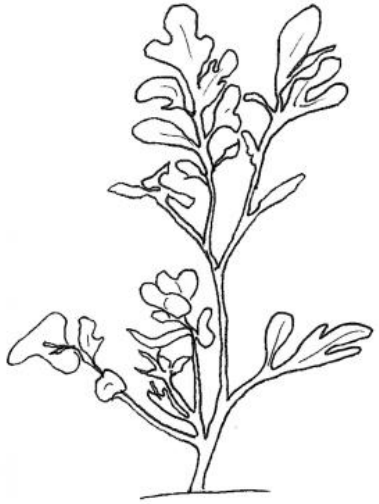
Turfgrass and Landscape Weed ID

Weeds ID Resources About

Introduction and Instruction

Grass-like

Broadleaf



First rule of weed management

- Exclusion!
  - Dense plantings, ground cover plants, taller vegetation
  - Inspect plants before installation
  - Mulch
    - six inches if no plants
    - three – four inches with plants

4

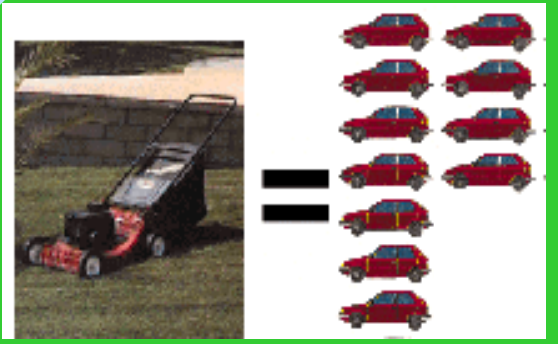
Got weeds?

- Liberally apply perennial ryegrass seed all season long.

Weed & Seed

Mechanical methods

- Mow properly
  - Mow high-at least 3 inches
  - Higher is better
  - Mow regularly
  - Keep mower sharp
  - Vary mowing pattern



Mower exhaust = 11 cars' exhaust

One hour of mowing = driving 400 miles

Mowers spew 87 lbs of greenhouse gases and 40 pounds of other pollutants annually

Pulling or weed whacking

- Pull weeds when they are small
- Weed whack or mow before flowering or reproduction
- Know the weeds – Do not fragment stoloniferous or rhizomatous weeds like Japanese knotweed, quackgrass or bentgrass

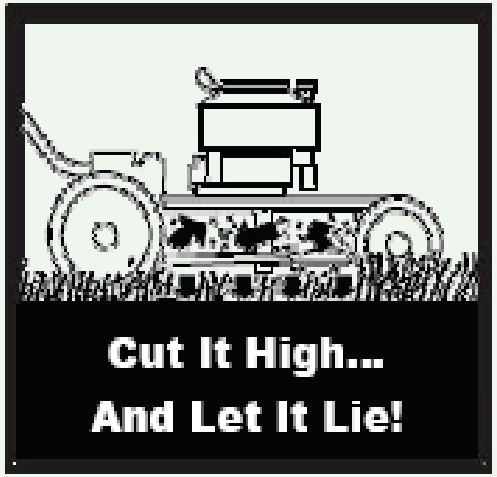
Quackgrass

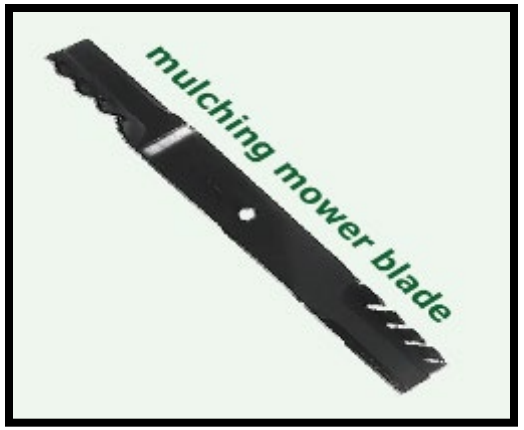
Japanese knotweed

❷

Let the clippings lie.

- Clippings are high-quality, low-cost fertilizer.



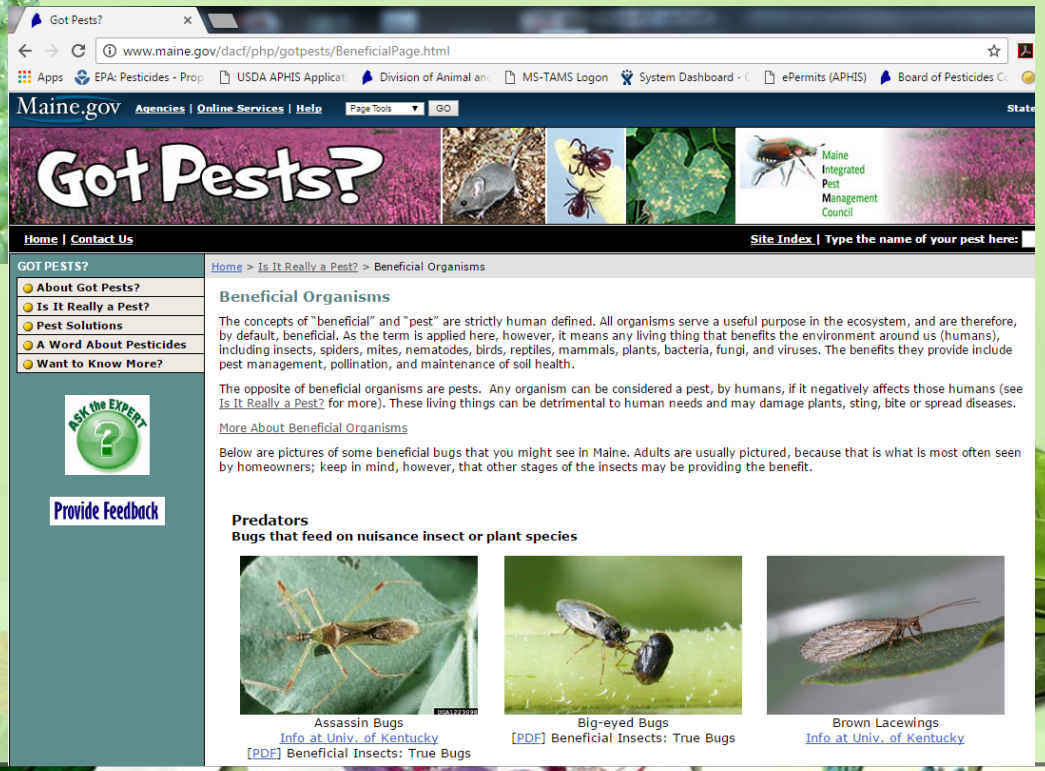


Most insects are not pests

- Beneficial insects: predators and parasites
- Pollinators
- Decomposers
- Aesthetics

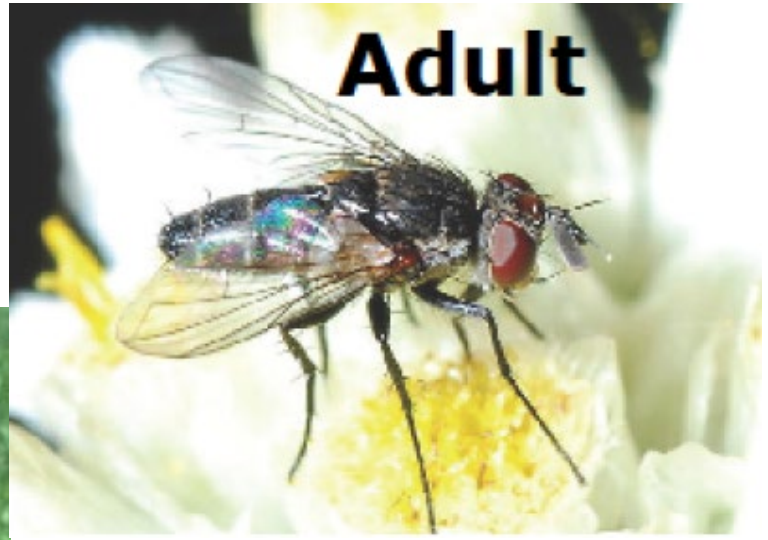
- Plant diversity in the landscape enhances diversity and abundance of “good guys”

Know your beneficials



Welcome or Unwelcome?

1. Welcome
2. Unwelcome



Tachinid fly (the so-called “winsome fly”) laying an egg on a Japanese beetle adult

Istocheta* (=*Hyperecteina*) *aldrichi
Introduced into US from Japan in 1922
Adults emerge Late June/July, feed on honeydew, nectar

- **Lay up 100 eggs in two weeks**
- **Eggs hatch 1 day later, dig into beetle**
- **Kills beetle in 5-6 days**
- **Just before death, beetle digs into ground where fly spend winter as pupa**

Joshua P. Basham
T.S.U. Otis L. Floyd Nursery Research Center
McMinnville, TN 37110-1367
From Point Sebago Golf Course, Casco, Maine

We love the good “bugs!”

Welcome or Unwelcome?

1. Welcome
2. Unwelcome

Good bug in action

Welcome or Unwelcome?

1. Welcome
2. Unwelcome

Flower fly larvae eat aphids!

Ants are beneficial too, but can also be a problem

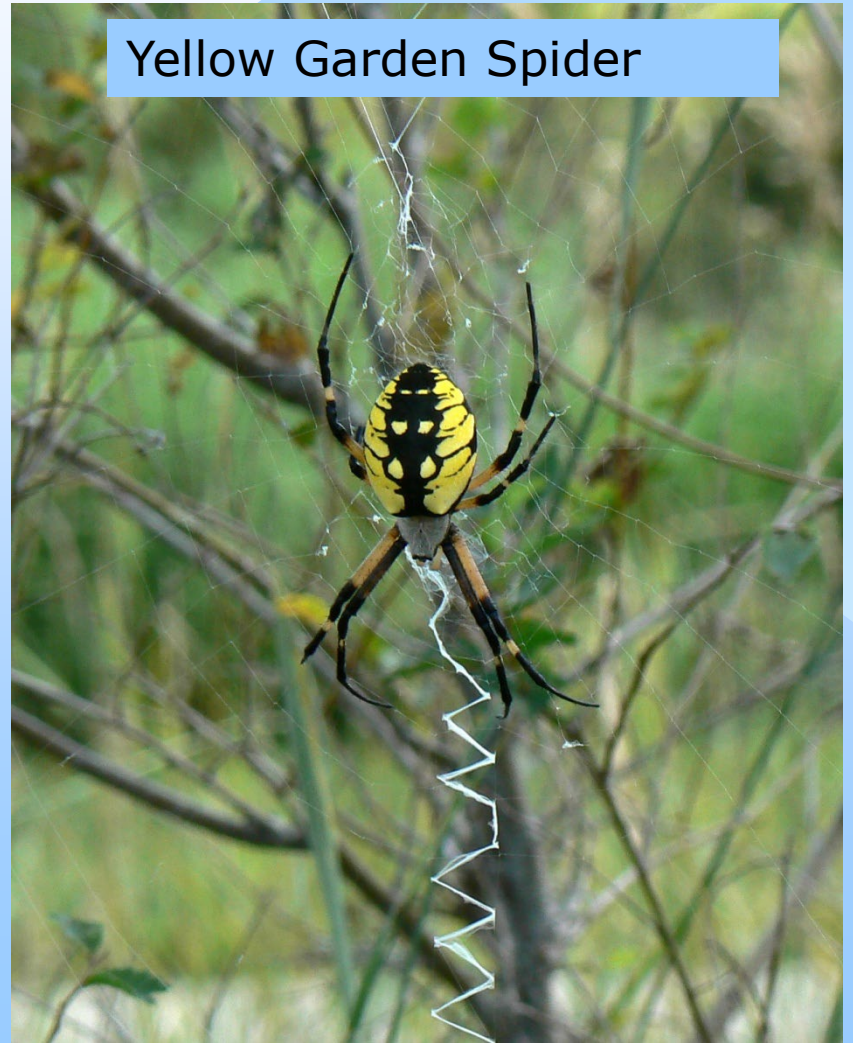
More Beneficial Insects

Flower Flies
(aka Hover Fly or Syrphid Fly)

Larvae are predators of small insects

Spiders

Predators of Insects



Yellow Garden Spider

Daddy Long Legs aka Harvestmen

Crab Spiders

Ground Beetles

Harpalus rufipes (eats weed seeds and small insects)

Beneficial Wasps

Parasitized aphids = ‘mummies’

Braconid wasps on tomato hornworm

Types of Natural Enemies

- **Predators**
  - Kills many prey during its lifetime.
  - Both larvae and adults feed on pest insects & mites.
  - May have to control ants if they are interfering with useful beneficials.

Photo: JHC

Spare the Sprays to Protect Beneficial Insects

- Dragonflies
- Spiders
- Small parasitic wasps
- Predatory mites
- Syrphid flies
- Ground beetles

Toxicity of Common Organic-Approved Pesticides to Pollinators

Toxicity of Common Organic-Approved Pesticides to Pollinators

PESTICIDE	NON-TOXIC	LOW TOXICITY	HIGHLY TOXIC
Insecticides/Repellants/Pest Barriers			
Bacillus thuringiensis (Bt)			
Beauveria bassiana			
Cydia pomonella granulosis			
Diatomaceous Earth			
Garlic			
Insecticidal Soap			
Kaolin Clay			
Neem			
Horticultural Oil			
Pyrethrins			
Rotenone			
Sabadilla			
Spinosad			
Herbicides/Plant Growth Regulators/Adjuvants			
Adjuvants			
Corn Gluten			
Gibberellic Acid			
Horticultural Vinegar			
Fungicides			
Copper			
Copper Sulfate			
Lime Sulfur			
Sulfur			

Soaps and Oils, only when directly sprayed upon the pollinator

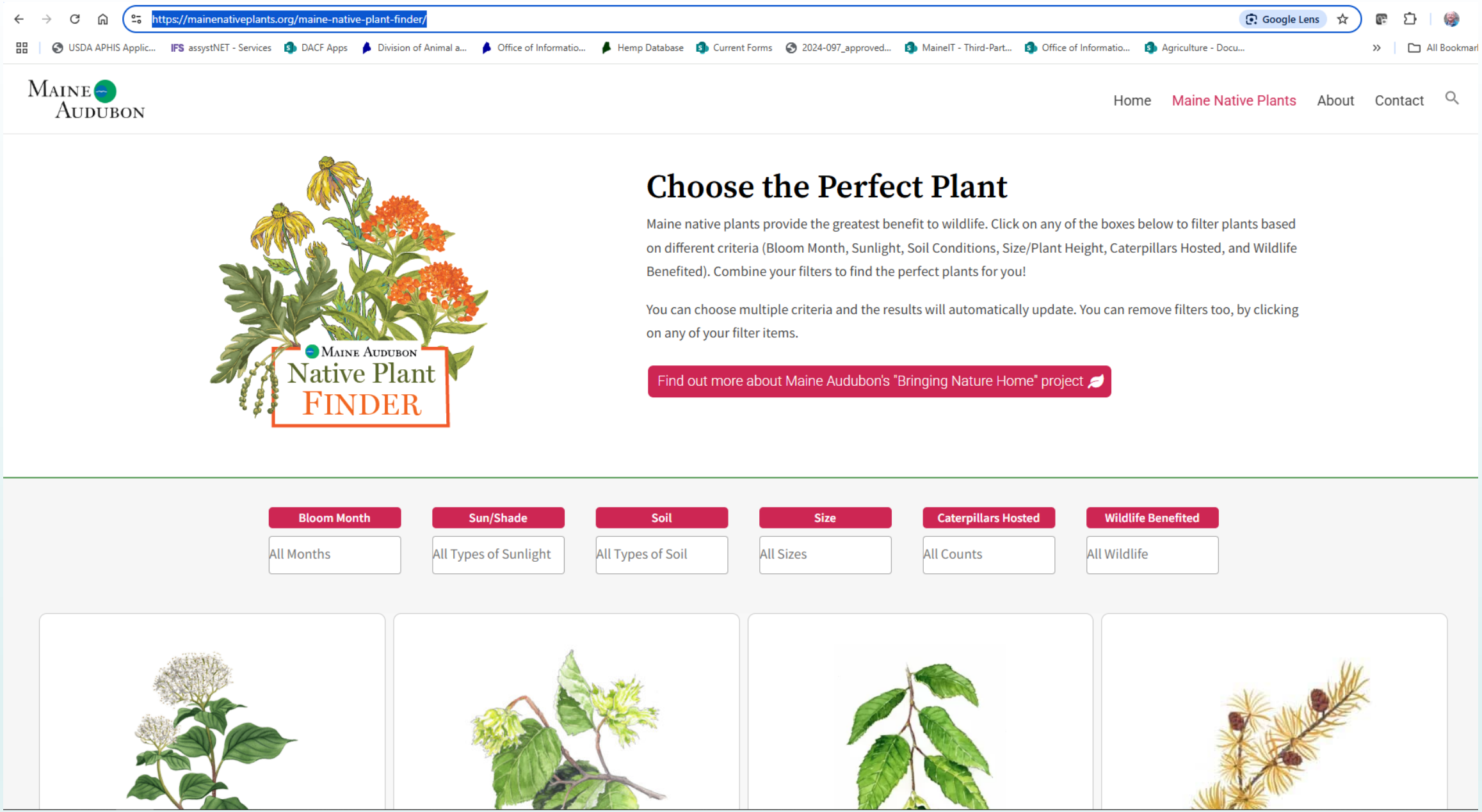
Habitat enhancement for beneficials

Many beneficials, as adults, larvae, or both, require pollen and/or nectar as dietary supplements

Key is to provide a series of plants that, collectively, provide continuous nectar/pollen supply

Many of the same plants that provide food and habitat for natural enemies also provide resources for pollinators

https://extension.umaine.edu/gardening/pollinator-garden-certification/

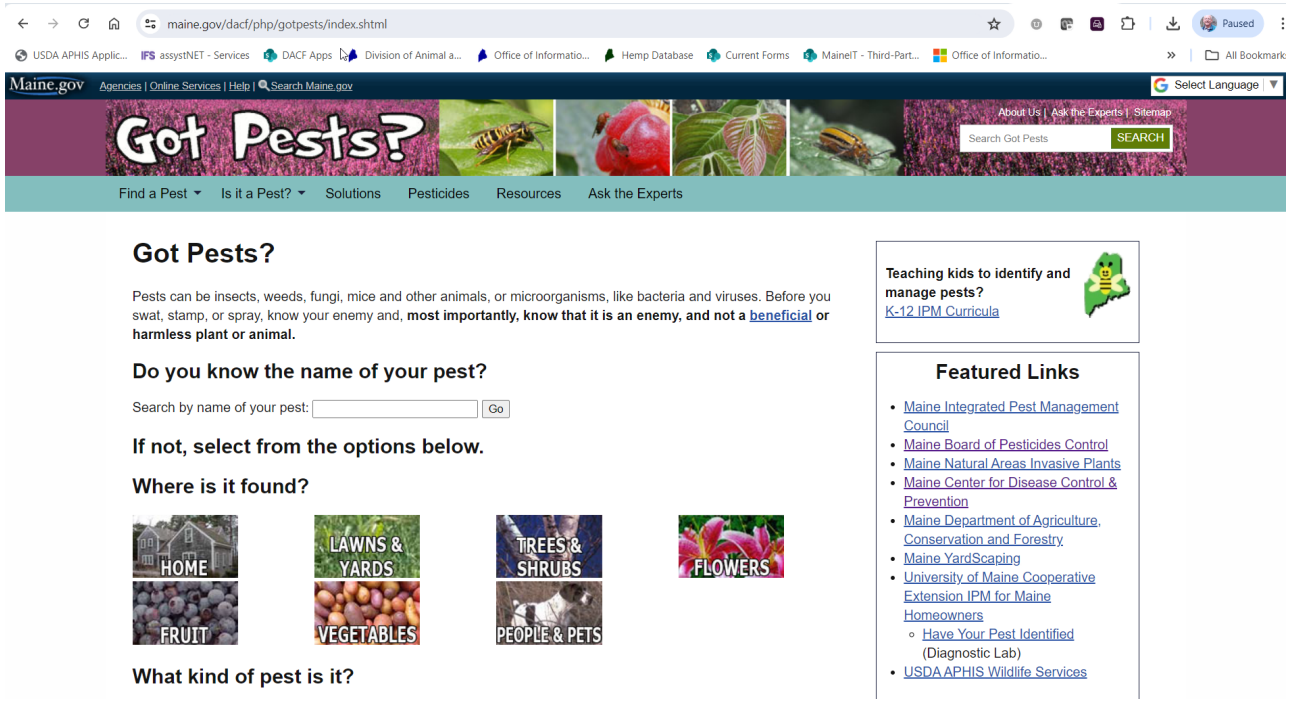


https://mainenativeplants.org/maine-native-plant-finder/

Do you need a pesticide?

- First identify the pest
- Is it *really a problem*
- Try cultural or sanitary controls
- Encourage the “Good bugs”
- Replace with resistant varieties

Sustainable landscapes cost less long term



www.gotpests.org

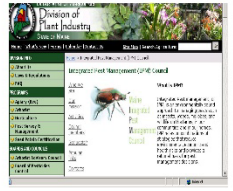
Maine Integrated Pest Management Council

Protecting Maine's Future through Reduced Reliance on Pesticides

- **Established by state legislature in 2002** to 'promote and enhance implementation of IPM practices that reduce or minimize harmful environmental and human health risks.'
- **Promotes public education** about the need, benefit, and practices of IPM.
- **Identifies priorities** for integrated pest management research, education, demonstration and implementation;
- Serves as a **communication** link among researchers, educators, regulators, policymakers and integrated pest management users;
- **Sets goals** for expanding, advancing and implementing integrated pest management;
- Establishes protocols for **measuring and documenting** IPM adoption.

Membership:

The 11 members plus 2 coordinators represent a broad range of IPM and environmental interests



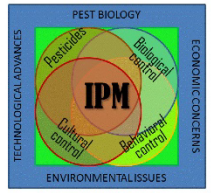
Find out more at www.maine.gov/IPMcouncil

Smarter Ways to Deal with Pests

From mice to mildew, crabgrass to cockroaches – whenever nature becomes a pest, Integrated Pest Management (IPM) offers least-risk solutions.

What is Integrated Pest Management?

- IPM is a **common sense and sustainable method** anyone can use to protect against pests. Every time you swat a fly, pull a weed, or select disease-resistant plants for your garden, you're using IPM tactics that reduce the need for pesticides.
- IPM methods include:
  - **Cultural practices** such as mowing higher to favor grass instead of weeds
  - **Physical methods** such as pruning or installing deer fencing)
  - **Biological controls** such as attracting or conserving beneficial insects and spiders
  - **Chemical methods** such as selective and careful use of organic, natural and/or conventional **pesticides only as needed**.



On the Farm...

Maine farmers use IPM to produce healthy crops, protect the environment and save money. Shop for Maine-grown food and ask your farmer-neighbors about their IPM practices.

Find IPM answers to common pest issues at www.gotpests.org

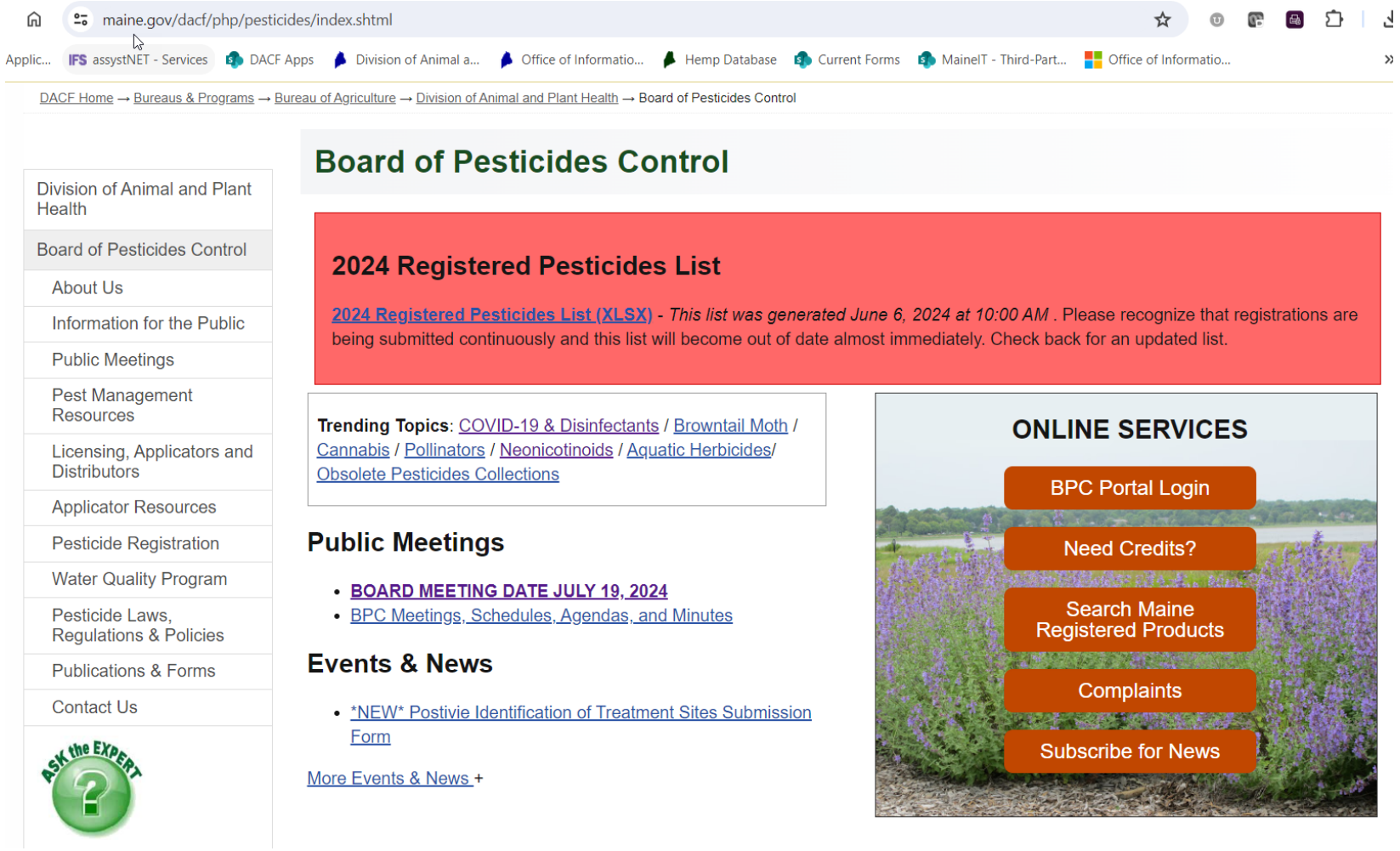
Our Mission

The Integrated Pest Management Council will define, promote and enhance implementation of IPM practices that reduce or minimize harmful environmental and human health impacts of pesticides and other pest management practices. The Council will promote the education of the public regarding the need, benefit, and practices of IPM.

Specifically, the council is directed to:

- Identify long-term and short-term priorities for integrated pest management research, education, demonstration and implementation; Priority Needs for IPM (updated 2017)
- Serve as a communication link for the development of coordinated multidisciplinary partnerships among researchers, educators, regulators, policymakers and integrated pest management users;
- Identify funding sources and cooperate on obtaining new funding for on-site trials, education and training programs and other efforts to meet identified goals for expanding, advancing and implementing integrated pest management;
- Establish measurable goals for expansion of integrated pest management into new sectors and advancing the level of integrated pest management adoption in sectors where integrated pest management is already practiced; and
- Cooperate with appropriate organizations to establish protocols for measuring and documenting integrated pest management adoption in the State.

Maine Board of Pesticides Control

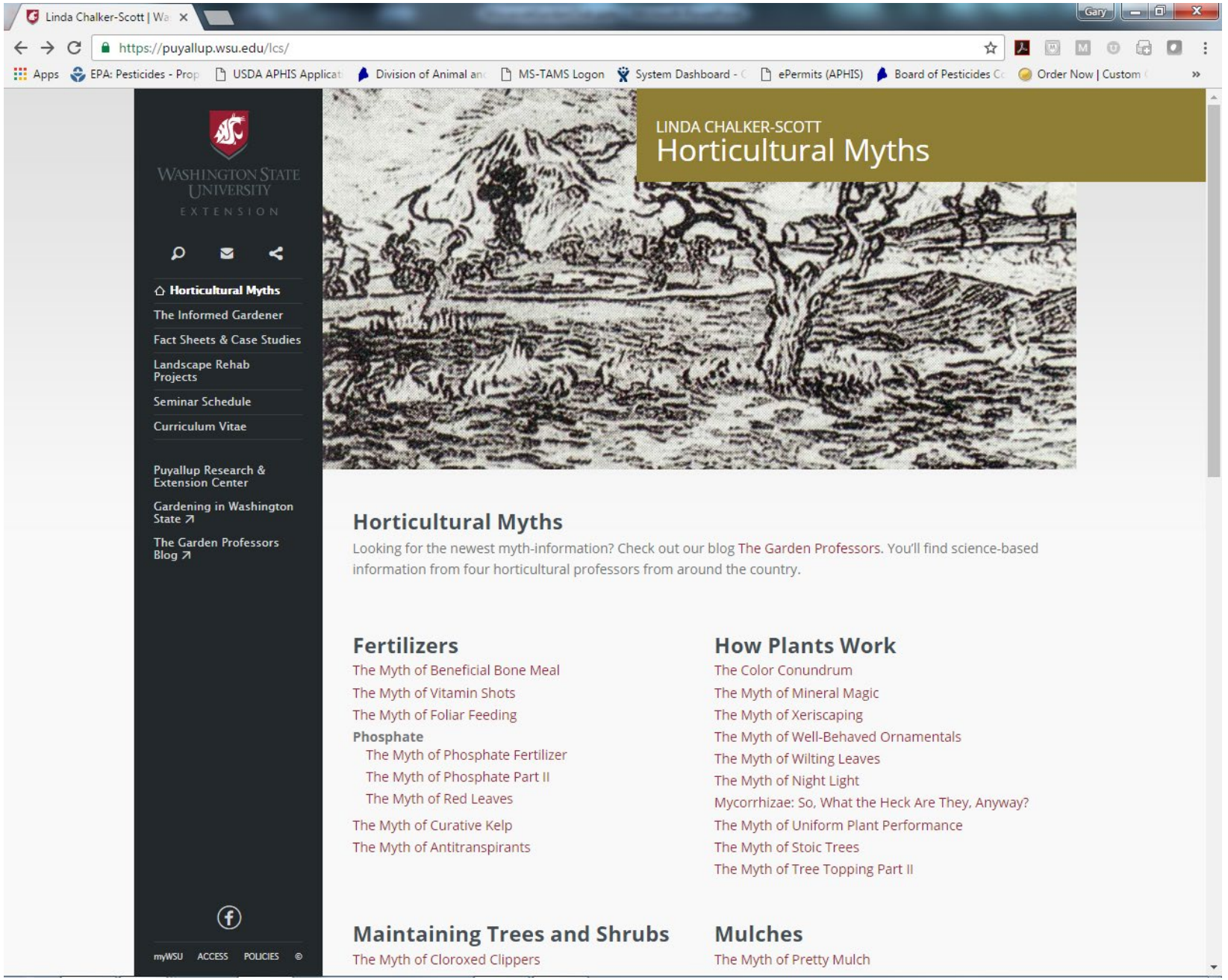


www.thinkfirstspraylast.org

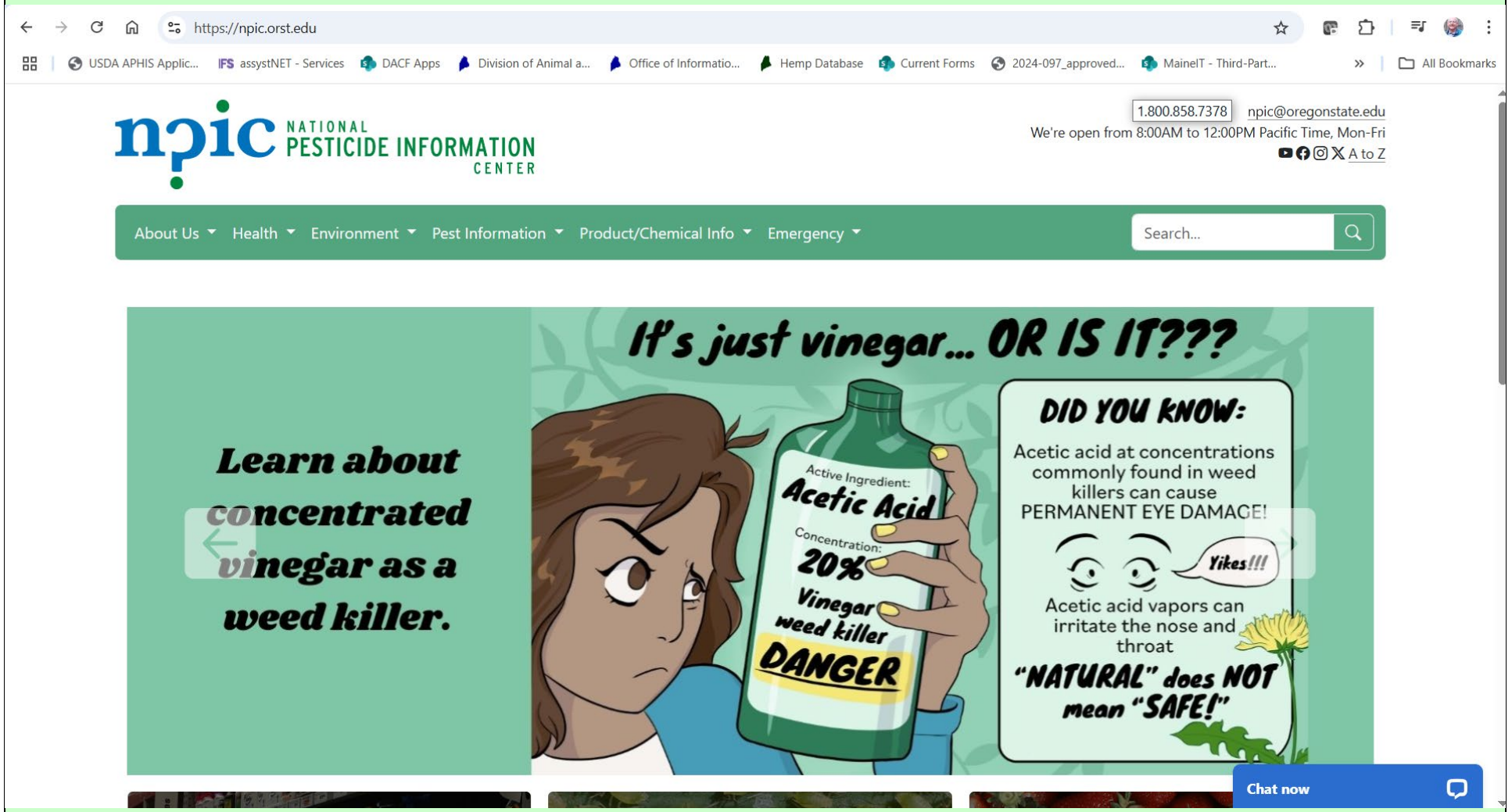
Resources

- **Maine Department of Agriculture, Conservation and Forestry Plant Health Division**
  - **Apiary • Arborist • Ginseng • Horticulture • Hemp • IPM - Programs**
    207-287-3891
  - https://www.maine.gov/dacf/php/index.shtml
  - **Cooperative Extension: Insect Pests, Ticks, and Plant Diseases**
  - 207.581.3880 or 800.287.0279 (in Maine)
  - extension.diagnosticlab@maine.edu

Who you gonna call?



http://www.theinformedgardener.com.



http://npic.orst.edu/pest/ipm.html

Questions?