Lawns and Transitioning to Natives

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maine DEPARTMENT OF Agriculture Conservation & Forestry
PLANT HEALTH

Some Benefits of a Healthy Lawn

- Reduce noise
- Reduce glare
- Reduce surface runoff
- Reduce injury from falls
- Reduce "nuisance" pest risks (ticks) and airborne allergens

Essential Components of Lawn Management

- Grass seed selection - different for lawns, golf courses, sports fields & rights-of-way
- Establishment - soil preparation, sod or seed
- Maintenance - fertilizer, water, mowing, pest control - weeds, insects & diseases

Starting from scratch

- Where do you need a lawn?
  - Keep the lawn area as small as possible
- Proper grading and drainage
  - Remove topsoil before making grade changes
  - Should be around a 1 – 2 % grade away from the home, avoid steep grades
  - Avoid wet areas. If a lawn must be planted in wet areas, you must provide drainage

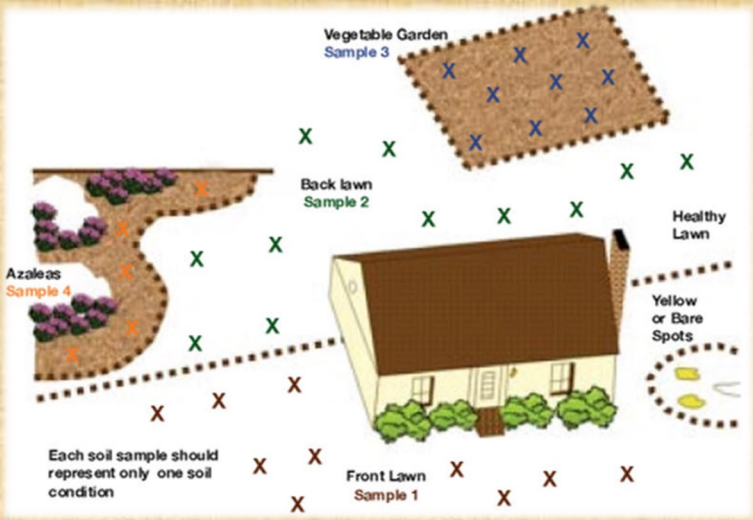
When's the best time?

- If water is available, sod can be installed anytime during the growing season
- Seeding is best done from August 15 to September 30
  - High soil temps, less weed emergence
- Seeding in May or June is less desirable
  - Low soil temps, large weed flush at the same time grass emerges

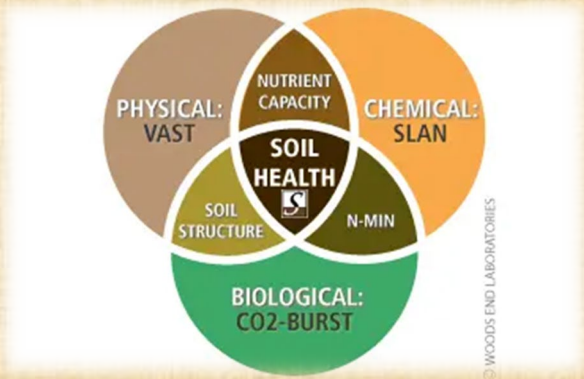
Harvest Moon = best seeding time

Soil, Soil, Soil

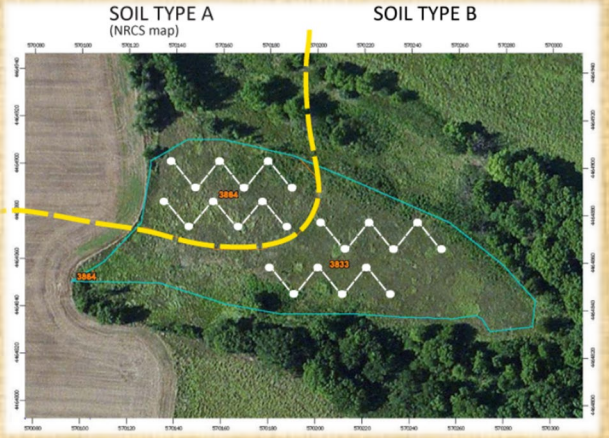
- At Least 6 – 12 inches of sandy loam topsoil is preferable!
- Do a soil test
  - Take 10 – 15 samples/1000 sq. ft.
  - Take samples about 6 inches deep
  - Mix samples together in a bucket and send about a 2-cup composite sample to a soil lab



Soil labs



- Maine Soil Testing Service at The University of Maine https://umaine.edu/soiltestinglab/
- Woods End Lab, Mount Vernon https://woodsend.com/



Adjust the soil (more on nutrients later)

- Adjust soil nutrients, pH, and organic matter conditions as indicated by a soil test
  - Slow-release N fertilizer
  - 0.5LB/1000 sq. ft. or less of N,
  - P only if deficient, no more than 1LB/1000 sq. ft.
  - K is only needed if deficient
  - 50LB/1000 sq. ft. of lime (Calcium is very important)
  - 1 – 2 inches of finished compost as needed to get the soil's Organic Matter level to 3 – 5% (humus and carbon!)

Soil Test Results

Soil Nutrient	Low	Medium	Optimum	Excessive
Phosphorus	xxxxxxxxxxxxxxxx			
Potassium	xxxxxxxx			
Calcium	xxxxxx			
Magnesium	xxxxxxxxx			
Soil pH	xxxxxxxxxxx			
Org. Matter	xxxxxxxx			

Site preparation before planting

- Minimize soil disturbance as much as possible

- Use solarization or layers of cardboard and compost
- May want to use a pre-emergent herbicide

- Kill existing turf and slit seed through the dead turf

Solarization

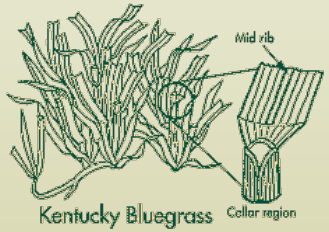
https://landscapeontario.com/study-evaluates-solarization-for-weed-control/

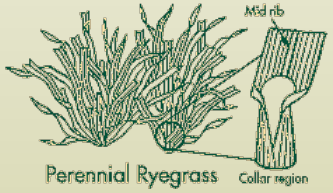
Takes 4 – 8 weeks, depending on the amount of sunlight

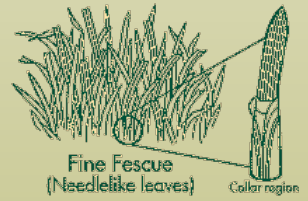
Must be done June – August

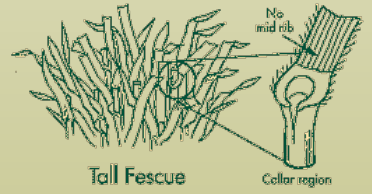
Not especially effective in Maine

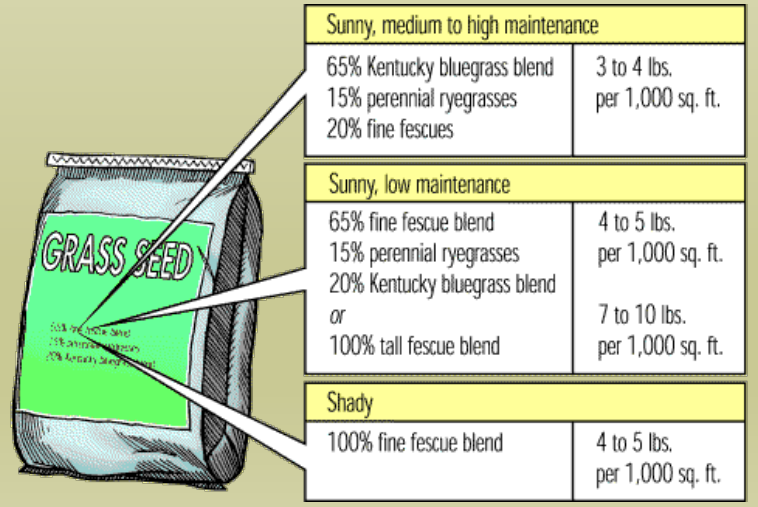
Choose the right grass varieties for Maine











Sunny, medium to high maintenance	
65% Kentucky bluegrass blend 15% perennial ryegrasses 20% fine fescues	3 to 4 lbs. per 1,000 sq. ft.

Sunny, low maintenance	
65% fine fescue blend 15% perennial ryegrasses 20% Kentucky bluegrass blend	4 to 5 lbs. per 1,000 sq. ft.
or 100% tall fescue blend	7 to 10 lbs. per 1,000 sq. ft.

Shady	
100% fine fescue blend	4 to 5 lbs. per 1,000 sq. ft.

Turf Selection

- AVOID "Contractor's Blend"!!!!
- Use a blend of at least three different cool-season grass cultivars or three different species!
- Fine or tall fescues are well adapted to Maine and create lower-maintenance lawns!

Turf Selection

	Kentucky Bluegrass	*Perennial Ryegrasses*	*Tall Fescue*	*Fine Fescue*
Growth habit	Rhizotamous	Bunch	Bunch	Bunch
Leaf texture (blade width)	Medium–Fine	Medium	Coarse	Very Fine
Establishment from seed	Slow (approx. 30–90 days)	Fast (approx. 14–21 days)	Fast to Average (21–30 days)	Average (21–50 days)
Seeding rate	1 to 2 lb./1,000 $ft.^2$	5 to 9 lb./1,000 $ft.^2$	5 to 9 lb. /1,000 $ft.^2$	3 to 5 lb./1,000 $ft.^2$
Annual nitrogen fertilizer	3 to 4 lb./1,000 $ft.^2$	2 to 6 lb./1,000 $ft.^2$	2 to 4 lb./1,000 $ft.^2$	1 to 2 lb./1,000 $ft.^2$
Drought tolerance	Poor	Poor	Some	Some
Shade tolerance (min. 4 hr. of direct sun)	Poor	Poor	Good	Excellent
Wear tolerance (traffic)	Good	Good	Good	Poor
Insect tolerance	Some	Some	Excellent	Good
Disease tolerance	Some	Some	Good	Good

Seed or sod?

- Sod is generally high input Kentucky Bluegrass
  - Needs lots of H_20 & N
  - Not shade tolerant
  - Good for slopes, But?
- Seed is more flexible
  - Can adjust for shade
  - Less inputs, etc.

Lower maintenance mixes

- Fine Fescues 40 - 50% of mix
  - Creeping Red Fescue
  - Hard Fescue
  - Chewings Fescue
- Tall Fescue 100% of mix, 2 – 3 varieties
- Common Kentucky Bluegrass
- Endophyte enhanced fescues or perennial rye
- Yardscaping mix from Allen, Sterling & Lothrop.
  https://www.allensterlinglothrop.com/lawn-seeds

After planting care

- Scratch the seed in very shallow
- Roll with a liquid-filled roller
- Mulch with weed-seed-free compost, oat straw, or one of the new commercial mixes
- Water, water, water, keep the seed moist, don’t drown it

Water is essential at this stage

- Seed or sod must be watered until it is well established

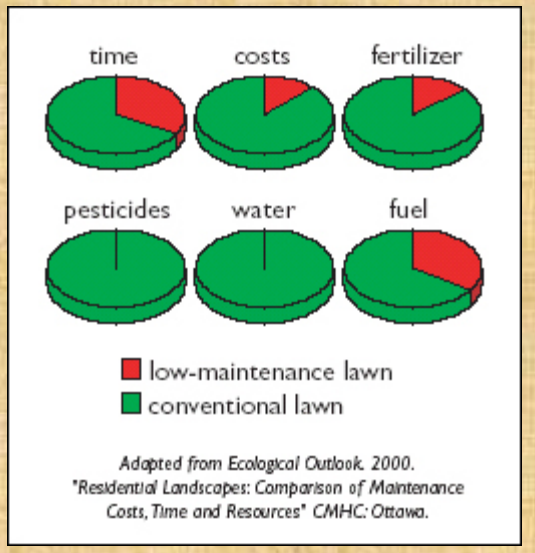
- Keep the seed moist throughout the day
  - May have to water 2 – 3 times/day
  - Keep the top ½ inch of soil moist
  - Takes about 3 weeks for KBG & Fescues to germinate fully

Mow after grass is established

- Once grass reaches 2 inches it is time to cut it
- Mowing at this stage reduces weeds
- Cut to 1½ inches for the first 3 mowings
- Then mow at highest mower setting (3 – 4 inches)

Low Maintenance Lawn Benefits – *2000 CMHC study of 30 residences*

- Residents with lower-maintenance lawns spent
  - 50 per cent less time,
  - 85 per cent less money, and
- used
  - 50 per cent less fuel,
  - 85 per cent less fertilizer,
  - 100 per cent less water and
  - 100 per cent less pesticides per year



http://www.cmhc-schl.gc.ca/en/co/maho/la/la_004.cfm

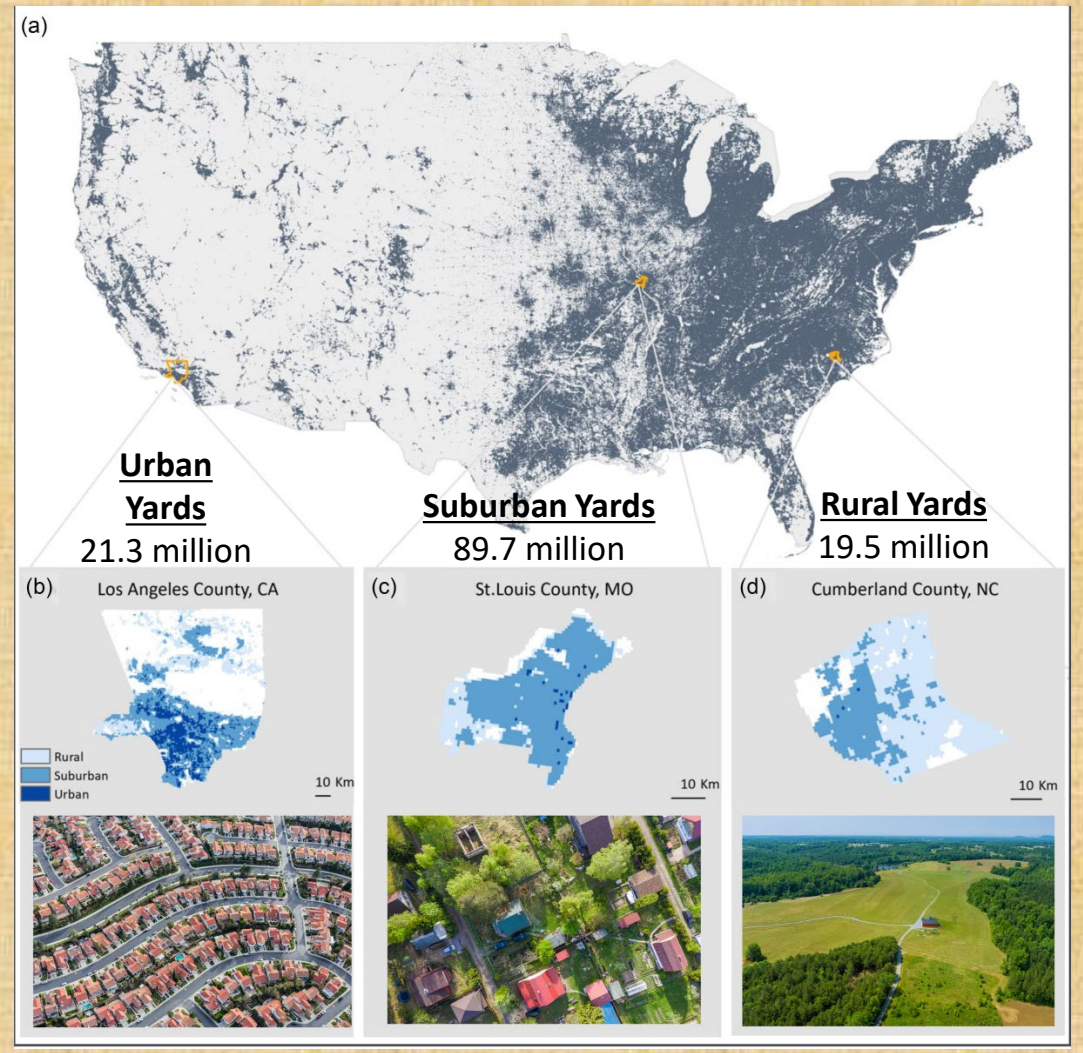
So many yards that are mostly lawn

Yards

~30% US lands

7X > protected land

Lerman et al. 2023 *BioScience*



Yards as habitat for **Biodiversity**

Susannah B. Lerman - USFS

How about ***low/no*** mow grass? How about adding clover?

No Mow Mix

Consider a native plant "lawn"

Fragaria virginiana
wild strawberry

Eragrostis spectabilis
purple lovegrass

Carex pensylvanica
Pennsylvania sedge

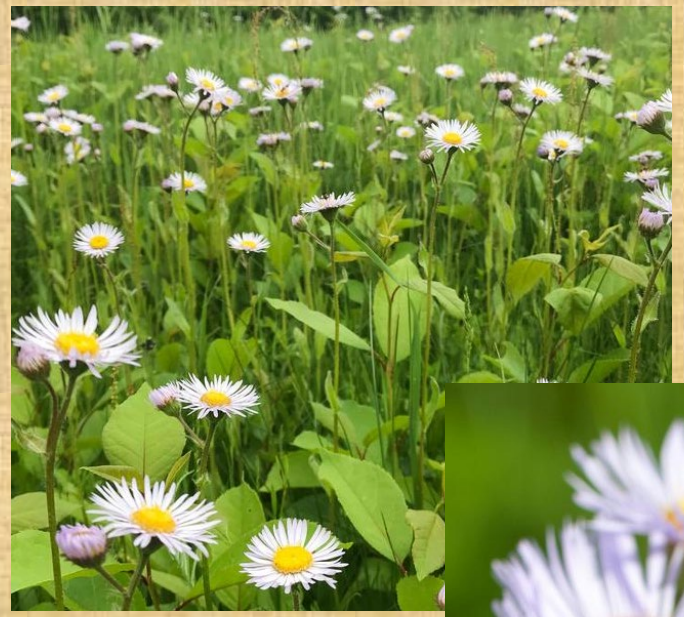
How about ***alternative native lawn species***?

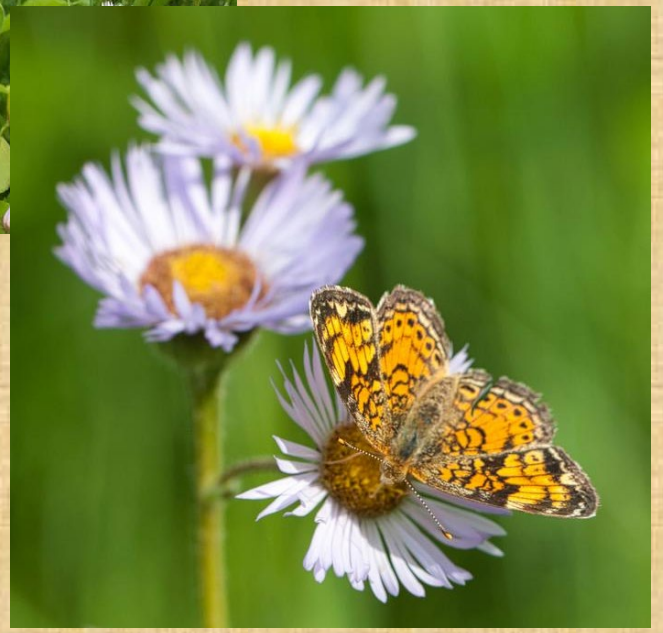
Pennsylvania sedge ***Carex pensylvanica***

Wild strawberry ***Fragaria virginiana***

How about ***alternative native lawn species***?

Heal all ***Prunella vulgaris***



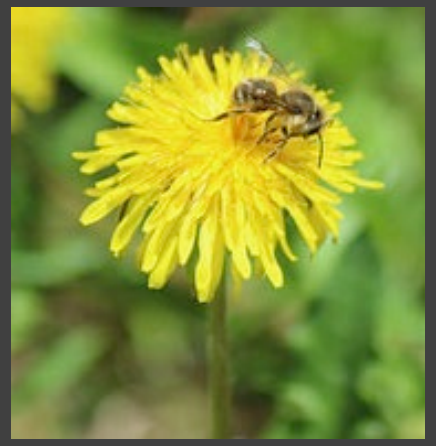


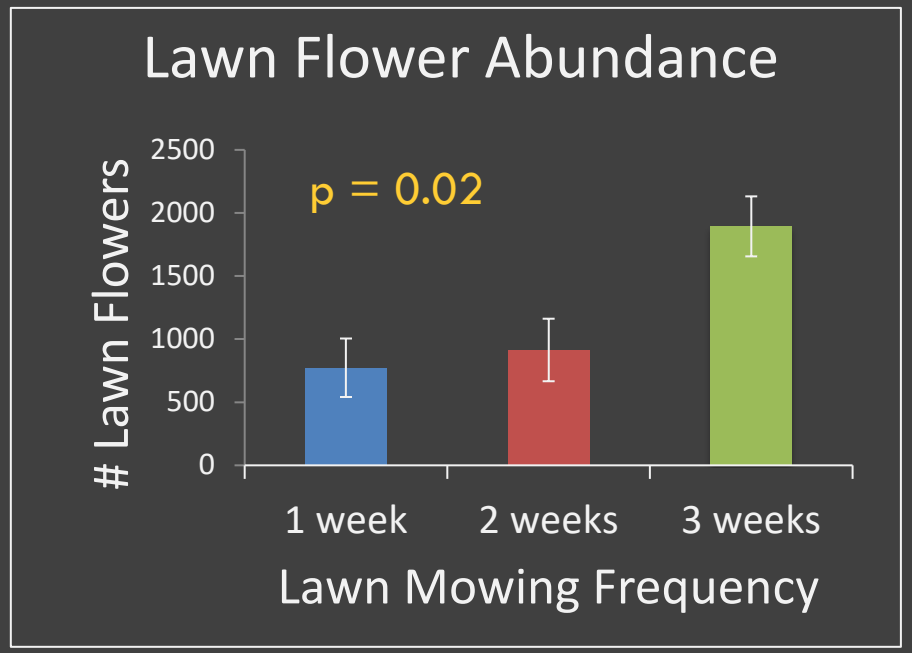
Robin's plantain fleabane Erigeron pulchellus

Making lawns ‘less bad’

58 species in lawns

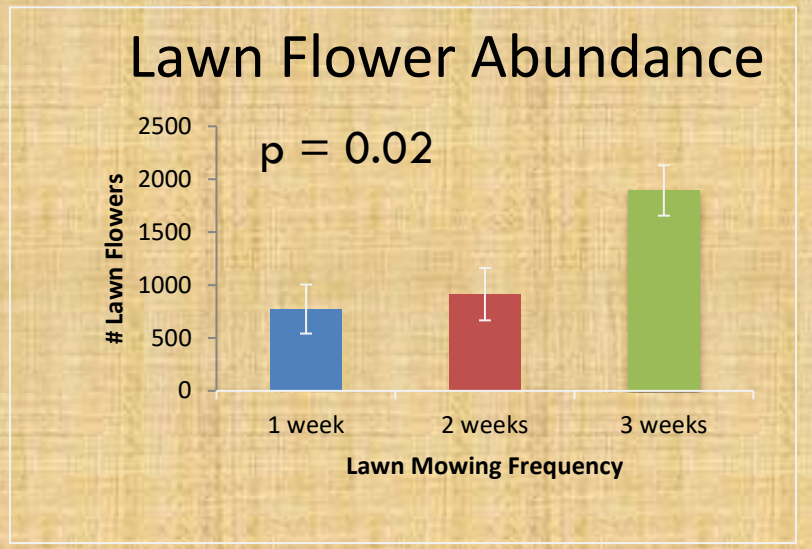
White clover	Annual fleabane
Yellow wood-sorrel	Horseweed
Dandelion	Yellow hawkweed
Purple smartweed	Carpetweed
Birdsfoot Trefoil	Field pennycress

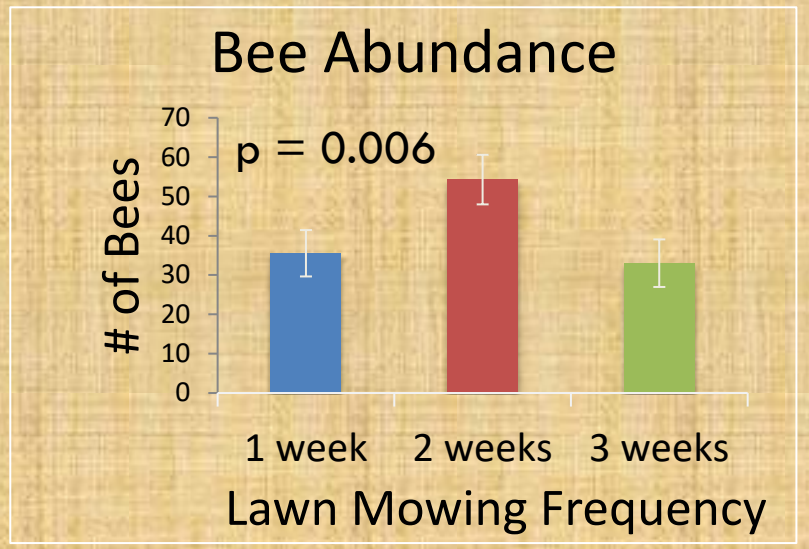




Lerman & Milam 2016 *Ann Entomol Soc Am*
Lerman et al. 2018 *Biological Conservation*

Making lawns ‘less bad’





Bee patterns

- Lawn flower abundance
- Work-horse species
- Taller grass

Lerman & Milam 2016 ***Ann Entomol Soc Am***
Lerman et al. 2018 *Biological Conservation*

Making lawns ‘less bad’

Lawns for Bees & People

Two-week solution
Aesthetically pleasing
Creates bee habitat

Minimize lawn areas

Mow or bush hog 1/2 or 1/3 of the meadow each year

Maintenance of **established lawns**

- Mowing
- Watering
- Aeration & Dethatching
- Soil Amendments
- Pest Management

Typical "High Input" Lawn Maintenance Program (higher risk of runoff)

- Fertilize 4 to 6 times per year (4 to 5 pounds of Nitrogen per 1000 sq. ft./year)
- Pre-emergence herbicide annually (to prevent crab grass and other annual weeds)
- Broadleaf herbicide annually – 2 to 3 times (to control dandelions and other broadleaf weeds)
- Mow once to twice per week
- Irrigate during drought
- Grub or surface insecticide when needed

https://primecutlandscaping.net/residential-yard-maintenance/

"Lower Input" Lawn Maintenance Program (less risk of runoff)

- Select or introduce lower-maintenance turf species. (Tall or Fine Fescues)
- Use slow-release fertilizers, no more than 2 pounds of Nitrogen per 1000 sq. ft./year in the early fall
- Mow high (3 – 4 inches)
- Don't irrigate, let go dormant
- Use pesticides (herbicides and insecticides) only when needed (monitor/ sample pest populations before applying)

Tall fescue at 4 inches

Even with maintenance start from the ground up

- Minimum of 6 – 12 inches topsoil is ideal
  - May need to build topsoil by topdressing with high quality soil and/or compost
- Soil test every 1 - 3 years

Soil is a lawn's foundation

Nutrient tips

- Soil test!!!!
- Measure carefully
- P - Free
- How much
  - 1 - 2 lbs N/1000 sq ft
  - 0 – 1 lb for low input grasses
- When
  - Labor Day – Columbus Day
  - not when ground is frozen

Soil Test Results

Soil Nutrient	Low	Medium	Optimum	Excessive
Phosphorus	xxxxxxxxxxxxxxxx			
Potassium	xxxxxxxx			
Calcium	xxxxxx			
Magnesium	xxxxxxxxx			
Soil pH	xxxxxxxxxxx			
Org. Matter	xxxxxxxx			

Nutrient tips Con't

- Adjust soil pH to 5.5 – 6.5 with lime
  - Pelletized dolomitic limestone preferred unless soil test shows excess magnesium
- Unless the soil test indicates a deficiency, skip the phosphorus!
- Apply potassium only when a soil test indicates a need

Select slow-release fertilizers

Table 1

Characteristics of Common Turfgrass N Sources

Classification, burn potential, leaching potential, low temperature response, and residual effect on common turfgrass N sources.

Fertilizer Source	N Content %	Leaching Potential	Burn Potential	Low Temp. Response	Residual Effect
Inorganic					
Ammonium nitrate	33-34	High	High	Rapid	Short
Calcium nitrate	16	High	High	Rapid	Short
Ammonium sulfate	21	High	High	Rapid	Short
Organic–Natural					
Activated sewage sludge	6	Very Low	Very Low	Very Low	Long
Manures	3-10	Very Low	Very Low	Very Low	Long
Other natural products	3-10	Very Low	Very Low	Very Low	Long
Synthetic					
Urea	45-46	Moderate	High	Rapid	Short
Urea solutions	12-14	Moderate	High	Rapid	Short
Sulfur coated urea	14-38	Low	Low	Moderate	Moderate
Resin coated urea	24-35	Low	Low	Moderate	Long
Isobutylidene diurea (IBDU)	30-31	Mod. Low	Low	Moderate	Moderate
Methylene ureas and Ureaformaldehyde*	38	Low	Low	Low	Mod. Long to Long

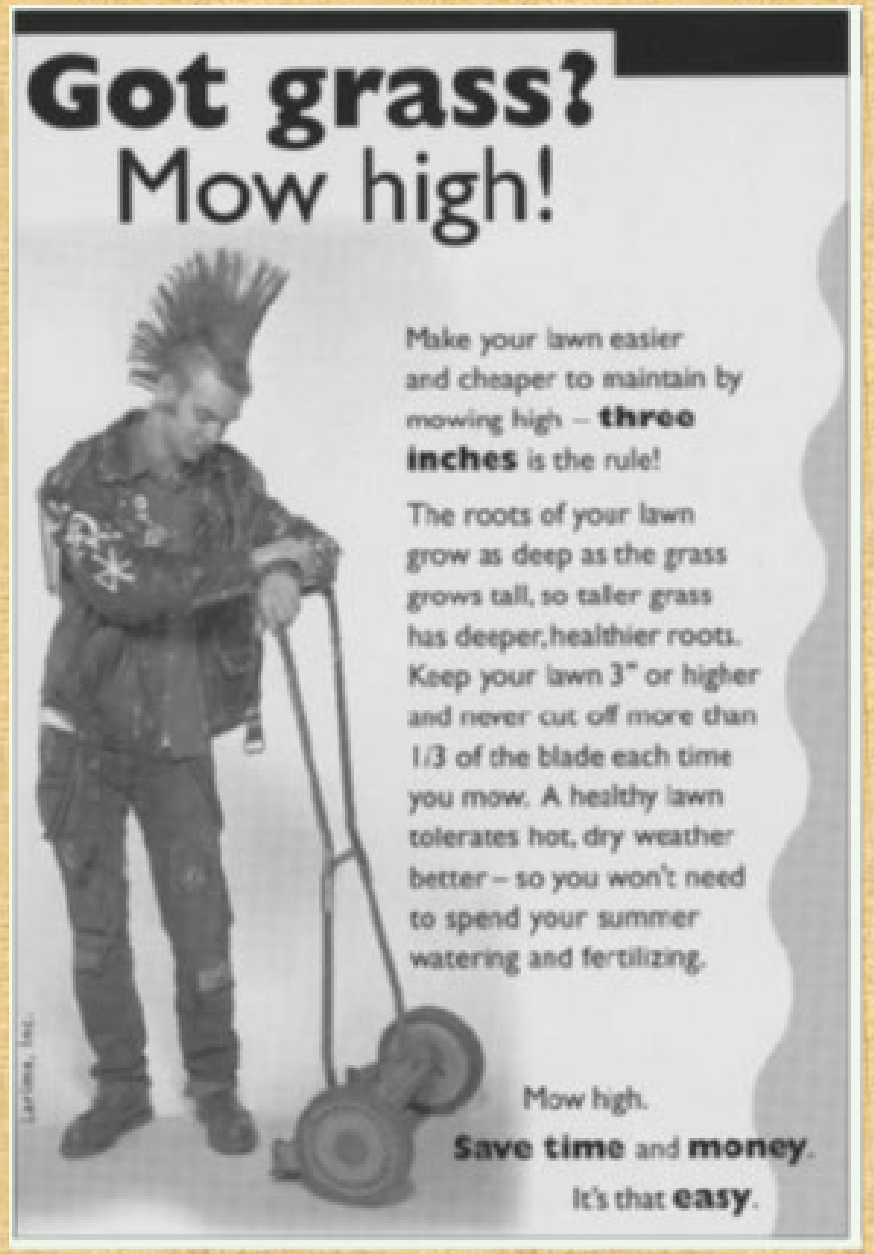
*some products may contain urea in addition to the ureaformaldehyde component.

No endorsement intended or implied

No endorsement intended or implied

Mow properly

- Mow high at 3 - 4 inches or highest setting
- Mow regularly
- Keep mower sharp
- Return clippings
- Vary mowing pattern



Add organic matter

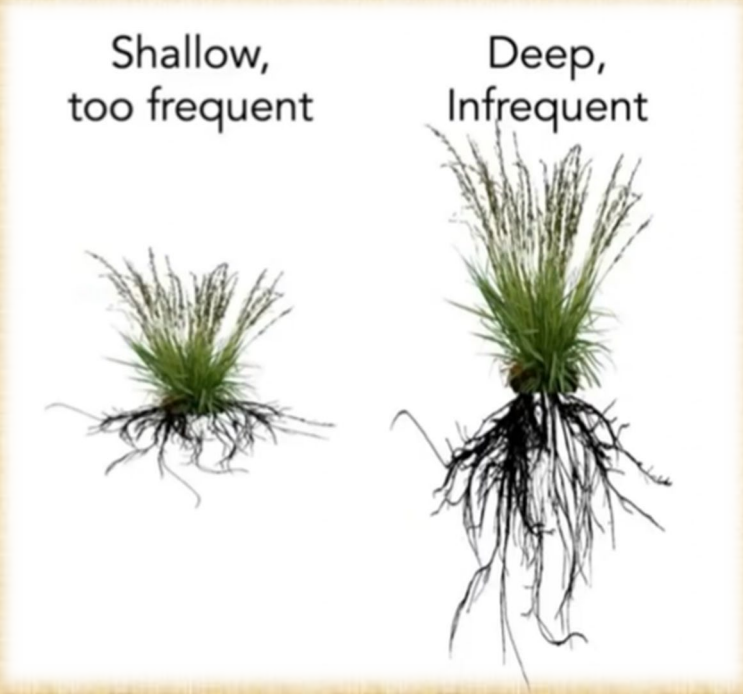
- Top dress with
  1/8 - 1/4 inch of compost
  - reduces thatch
  - improves nutrient and water holding capacity

No endorsement intended or implied

- Some composts may be high in nutrients
  - use a source that has been tested
  - test the soil after application
  - watch for the development of layers and high phosphorus levels

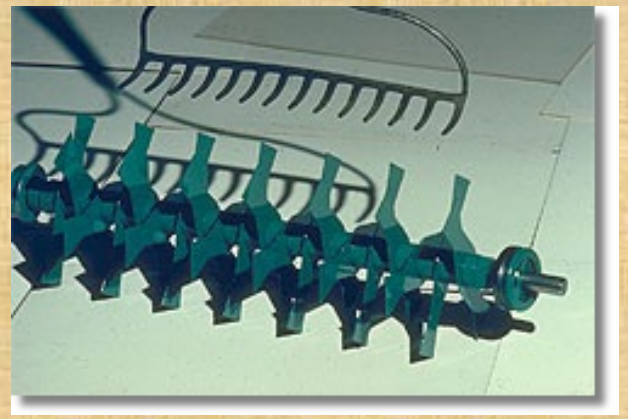
Water only when needed

- Deepen the roots by holding off on watering in the spring until you see signs of stress (turf has a blue or purple cast)
- Water deeply 3/4 - $1^{1/2}$ inches per week
  - Don’t water every day (use a rain gauge)
  - 1 - 2 times a week is best
  - Water early in the morning (to reduce disease)
- To reduce water needs, allow the turf to go dormant in the summer
  - apply 1/4 - 1/2 inch of water every 3 weeks



Let it breathe

- Keep thatch under 1/2 inch
- Minimize reliance on insecticide use
- Core aerate in the late summer or early spring



How do you use your lawn?

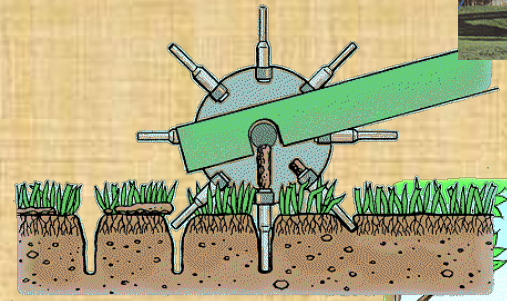
- Do you tread lightly?
- Do you rough it up?
- Are there problem areas?

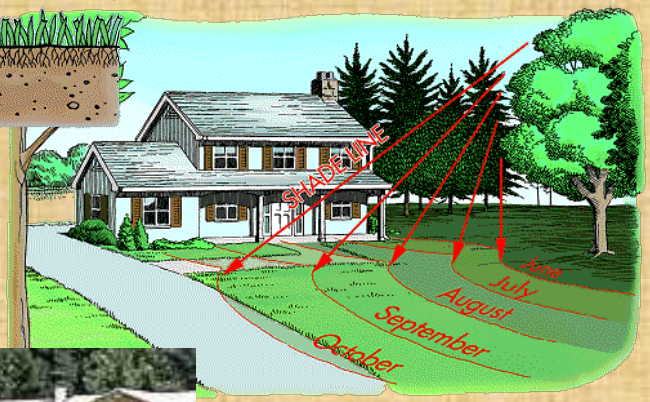
Problems are inevitable

- Like all plants, turf has its ups and downs
- Problem areas can help you decide how to flip the script

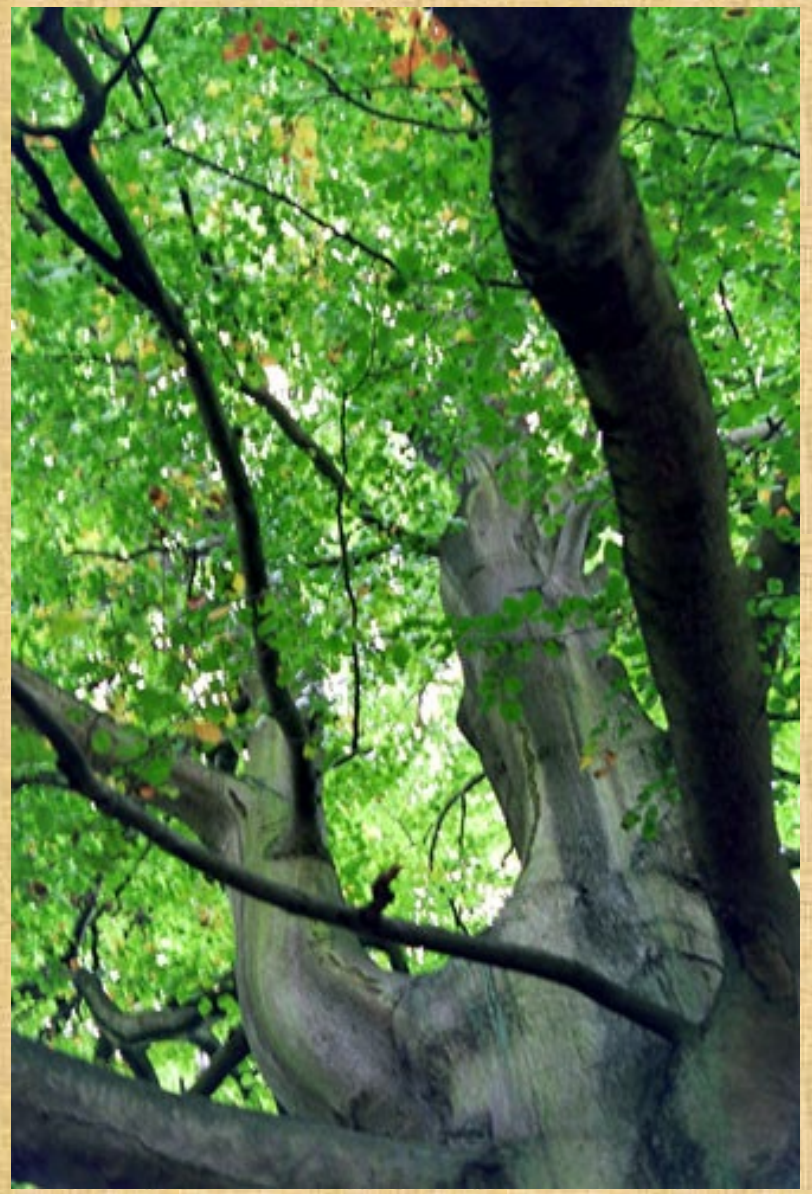
Where are the problem areas and what are the causes?

- High traffic
- Compaction
- Shade
- Pest problems





#1 Killer of grass



To much shade?

- Must have at least 6 hours of direct sunlight to grow lawn grasses
- Trees in shaded areas must be thinned and lower branches pruned
- Better yet, leave the trees and plant shade-tolerant ground cover plants

Traditional ground covers

- Non-native and invasive

Periwinkle or Myrtle

Categorized as highly invasive

Pachysandra

Categorized as highly invasive

English Ivy

Categorized as highly invasive

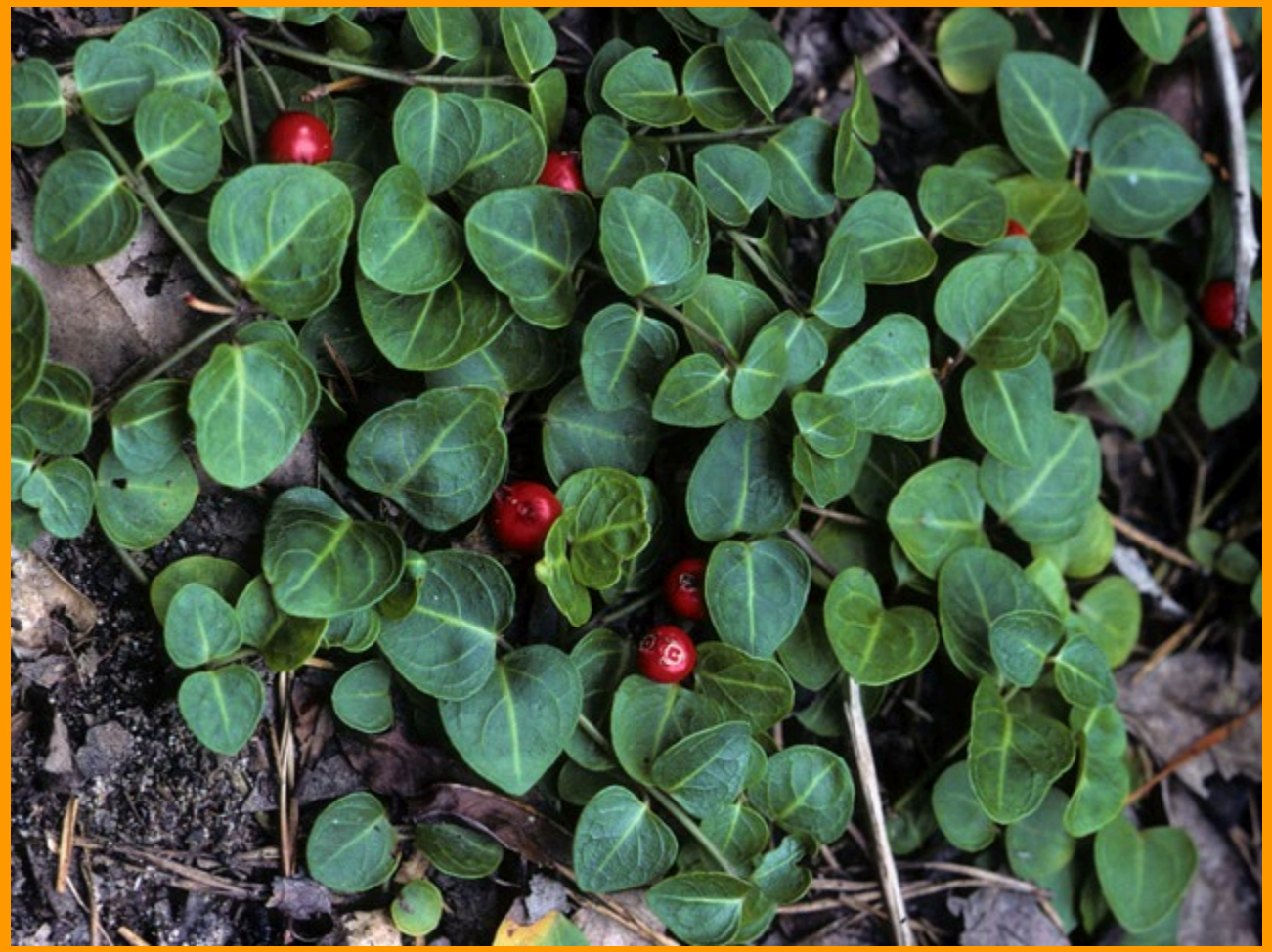
Native Groundcovers for the

Shady Woodland Landscape

Clintonia borealis **blue-bead lily**

Native Groundcovers for the

Shady Woodland Landscape



Mitchella repens **Partridgeberry**

Carex pensylvanica
Pennsylvania sedge

Native Groundcovers for the

Shady Woodland Landscape

Chamaepericlymenum canadense
Bunchberry

Gaultheria procumbens
Teaberry

Integrated Pest Management

- Grow stress-free turf

Is this stress-free turf?

- Accept a few weeds or insects

- Keep an eye on the lawn

Integrated Pest Management

- Identify the pest

- Pull it out or mow it off

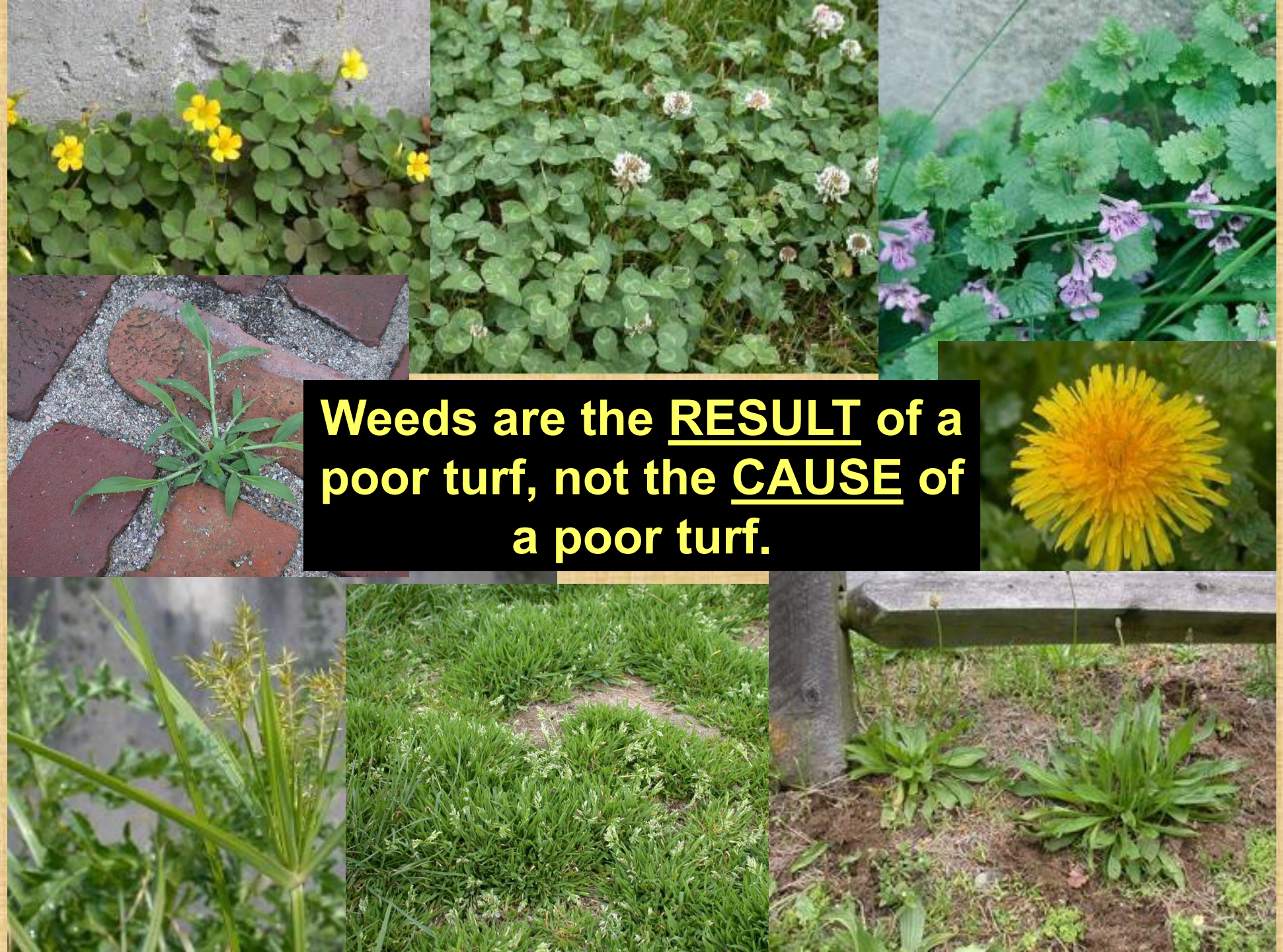
- Irrigate

Integrated Pest Management

- Encourage biological controls
- Minimize reliance on pesticides
- Read and follow labels carefully

No endorsement intended or implied

Weed Management - weeds are indicators


Weeds are the RESULT of a poor turf, not the CAUSE of a poor turf.

Weeds: The Cultural Practice Report Card

“Indicator weeds” are species that are very competitive when environmental factors are not optimal for turfgrass growth.

Common broadleaf weeds as indicators

Acidic soil, compacted soil & low fertility

Plantain

Acidic soil

Hawkweed

Encroaching shade & poor drainage

Creeping Charlie/ Ground Ivy

Common grassy weeds as indicators

Sod lawns, wet soils

Nutsedge

Thin areas in lawns, scalping of lawns, and poor growing conditions

Crabgrass

Adapts to almost any growing condition

Quackgrass

May indicate low soil pH

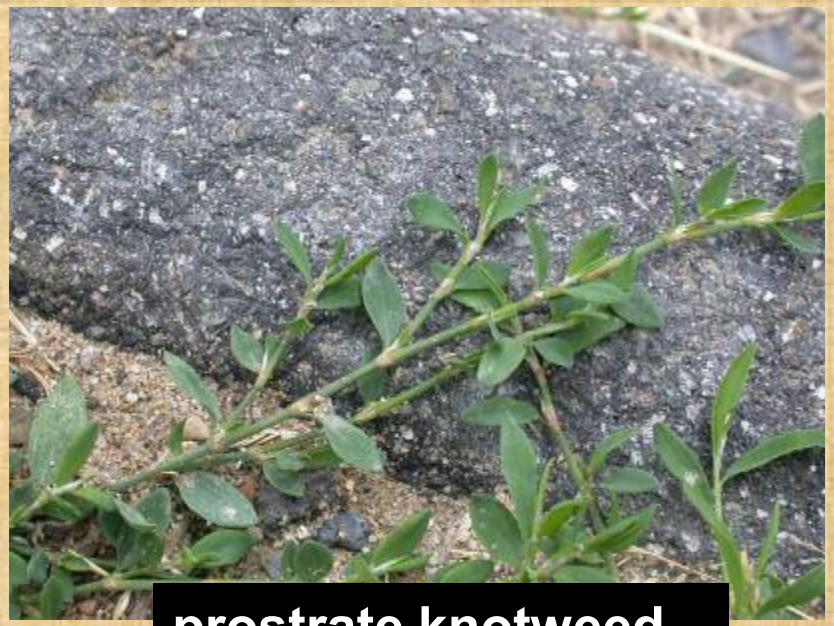
crabgrass

spotted spurge

goosegrass

Found in drought-prone areas


COMPACTION!!



prostrate knotweed

pineappleweed

goosegrass

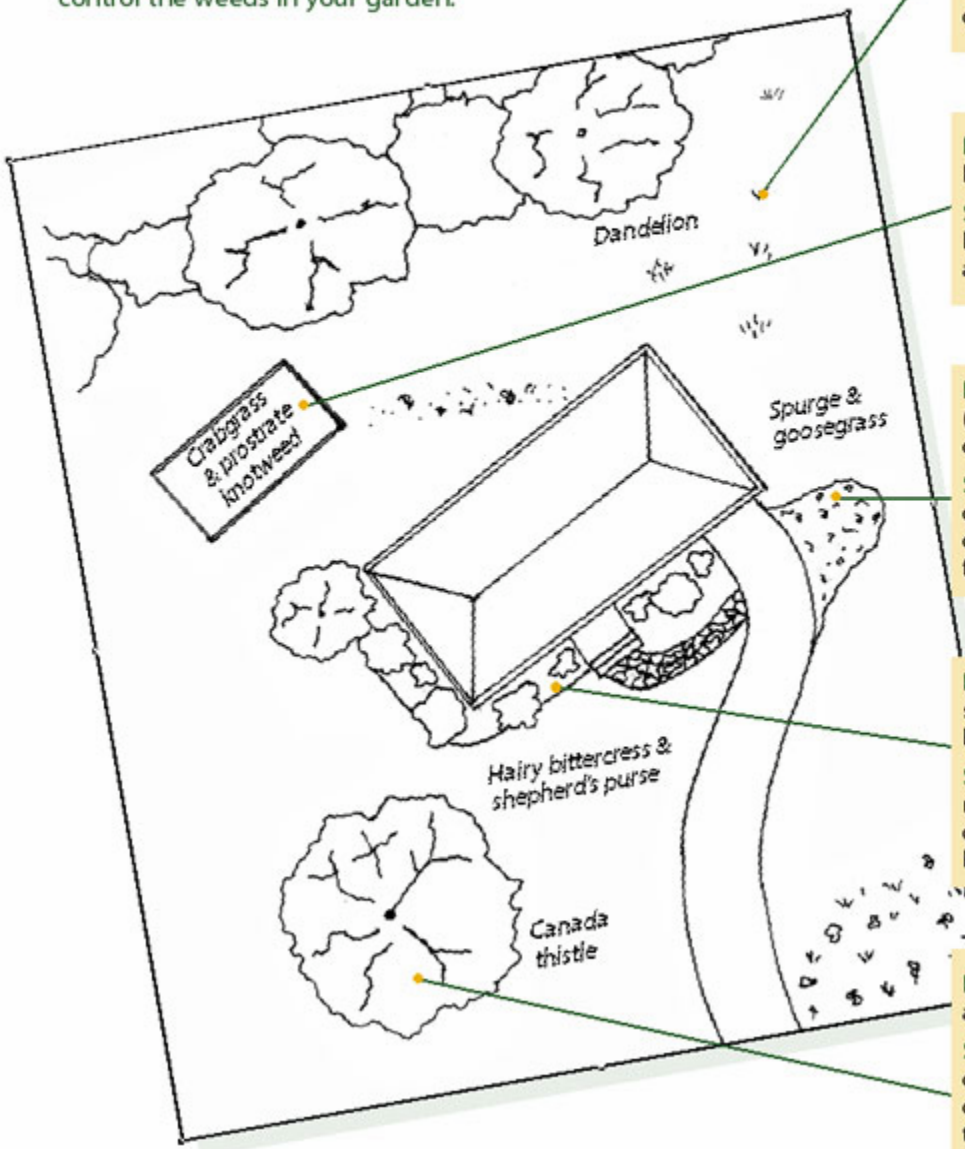
broadleaf plantain

path rush

COMPACTION!!


prostrate knotweed

Begin by sketching a map of your yard. Label it with the names of the weeds you find and their locations. Once you assemble this information, you can do some research and make decisions about how and when to control the weeds in your garden.



PROBLEM: Dandelion (*Taraxacum officinale*) scattered throughout the lawn.

SOLUTION: The best solution for dandelions is to learn to enjoy their presence, or you can hand-pull them using a dandelion weeder.

PROBLEM: Crabgrass (*Digitaria* spp.) and prostrate knotweed (*Polygonum aviculare*) in the children's play area.

SOLUTION: Define the edges of the area and add a deep layer of sand or mulch. It will keep weeds down and provide a good playing surface for children.

PROBLEM: Spurges (*Euphorbia* spp.) and goosegrass (*Eleusine indica*) in the area next to the driveway where the car backs up when leaving the garage.

SOLUTION: These plants are indicators of compacted, dry soil with low fertility. Either pave the area or stop driving over it and turn it back into lawn by aerating, fertilizing, and seeding.

PROBLEM: Hairy bittercress (*Cardamine hirsuta*) and shepherd's purse (*Capsella bursa-pastoris*) in the garden beds around the house.

SOLUTION: These are both winter annuals that prefer moist, shady spots and cool weather, so watch for them during the fall, winter, and spring, and hand-pull them before they set seed.

PROBLEM: Canada thistle (*Circium arvense*) on the edge of a mulch bed at the base of a tree.

SOLUTION: This has probably come over from the meadow on the other side of the driveway. It is an invasive plant that can be hand-pulled when young. Monitor for seedlings in the garden and pull them immediately.

Change the growing environment

- adjust soil pH
- adjust soil moisture
- adjust sun exposure
- adjust air circulation

Indicator weeds and soil conditions	
Wet, waterlogged, poor drainage Creeping buttercup, Coltsfoot, Ox-eye daisy, Curled dock, Moss, Plantain, Garden sorrel, Perennial sow thistle, Broad-leaved meadowsweet	**Acidic or low lime** Eastern bracken, Silvery cinquefoil, Coltsfoot, Ox-eye daisy, Dandelion, Curled dock, Hawkweed, Field horsetail, Knapweed, Prostrate knotweed, Moss, Common mullein, Nettle, Plantain, Garden sorrel, Sheep sorrel
Hardpan Field bindweed, Quackgrass, Pineappleweed, Stinkweed	**Tilled or cultivated soil** Buttercup, Chickweed, Prostrate knotweed, Lamb's quarters, Prickly lettuce, Mustard, Nettle, Redroot pigweed, Plantain
Alkaline Bladder campion, White mustard, Perennial sow thistle, Foxtail barley	**Heavy clay soil** Chicory, Coltsfoot, Dandelion, Annual sow thistle, Canada thistle
Dry soil Silvery cinquefoil, Field horsetail	**Overgrazed** Perennial bluegrasses, Bentgrasses
Nutrient imbalance Eastern bracken (low K, low P), Yarrow (low K), Stinkweed (high lime)	**Saline soils** Shepherd's purse, Russian thistle
Compacted Velvetleaf, Jimsonweed	
Adapted from a handout by Stuart Hill and Jennifer Ramsey for Ecological Agricultural Projects at MacDonald Campus of McGill and published in ***The Soul of the Soil, A Guide to Ecological Soil Management***, 2nd Edition, by Grace Gershuny and Joseph Smillie.	

This sign should say “Bagged weed seeds”
Composting does not kill all weed seeds.

Weed control approach

- First rule of weed management – Exclusion!
- Mow as high as possible!

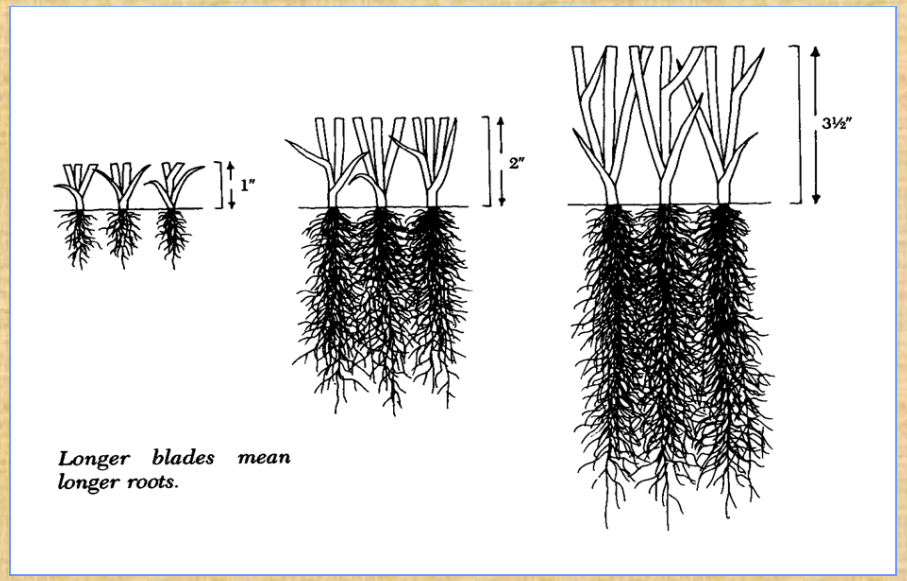


Illustration courtesy of Paul Wheaton, richsoil.com

Weed Control Approach (BASIC STRATEGY - dense, tall turf tends to reduce weed invasion)

- Mow high, 3 - 4inches MINIMUM
- Promote root growth – fertilize in late summer/early fall
- Reduce wear and compaction - encourage foot traffic away from turf; core aerify twice per year
- Overseed or slit-seed open areas ASAP
- Seed is the best weed control!
- Spot treatment with herbicides only when necessary.

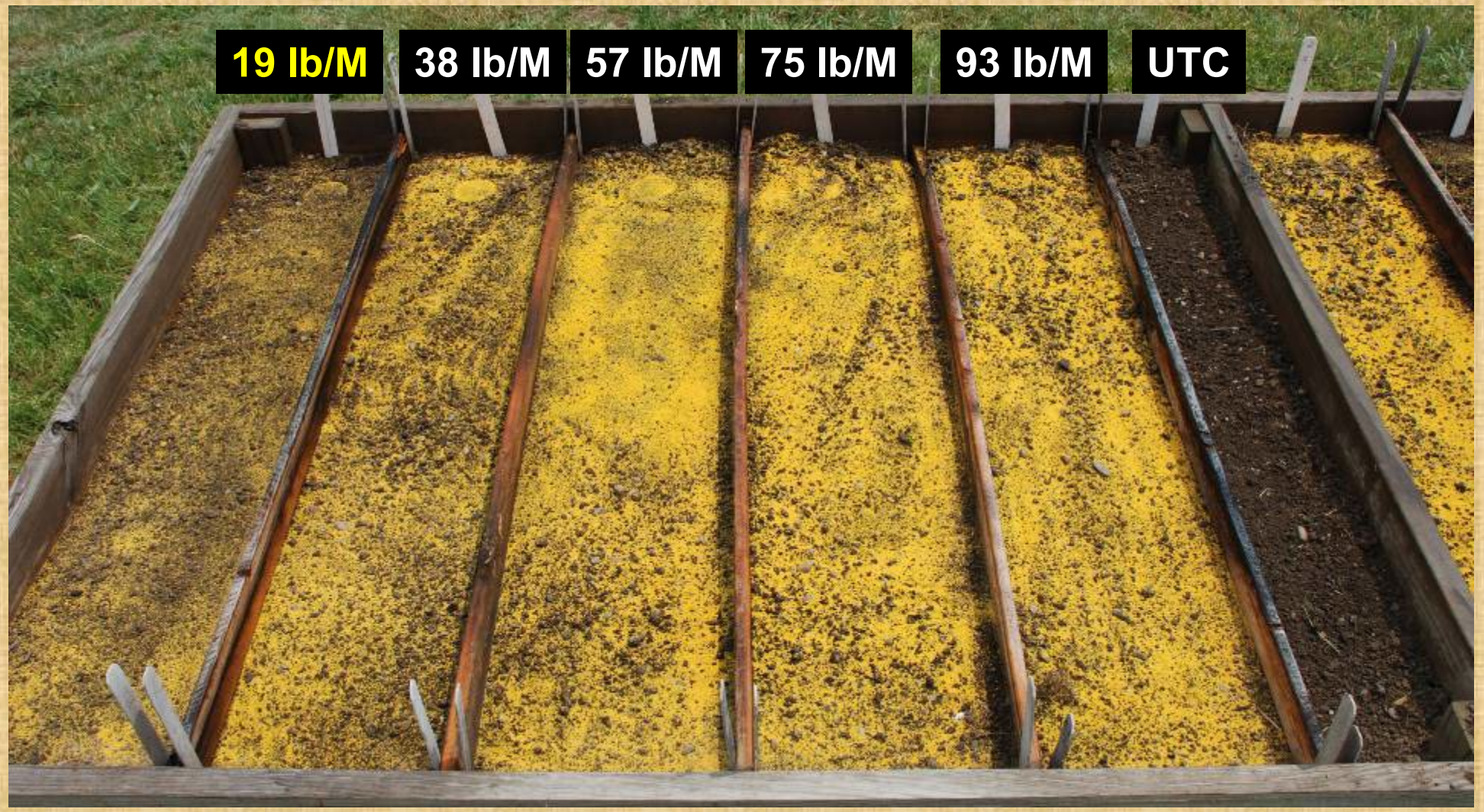
No endorsement intended or implied

Are there alternatives?

- Corn gluten meal has demonstrated pre-emergent herbicide activity?????
  - Rather expensive and a weak herbicide
  - Most effect comes from the nitrogen released as the meal breaks down - added fertility thickens turf and reduces weed germination (9% Nitrogen!)
- Weed flamers
- Hot water foam and steamers
  - Mostly used in cities where herbicides have been banned

No endorsement intended or implied

Weed Control with Corn Gluten Meal



Objective was to evaluate corn gluten meal for weed control on bare soil

CGM applied to freshly-tilled soil - 3 weeks after treatment


19 lb/M
38 lb/M
57 lb/M
75 lb/M
93 lb/M
UTC

Turf Insect Pests

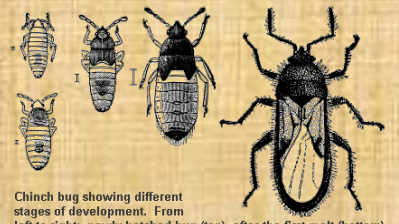
- Surface or thatch pests
- Root-feeding pests

White grubs

Sod Webworm

Integrated Pest Management – Insect Pests

- White Grubs
- Chinch Bugs
- Sod Webworms
- Billbugs

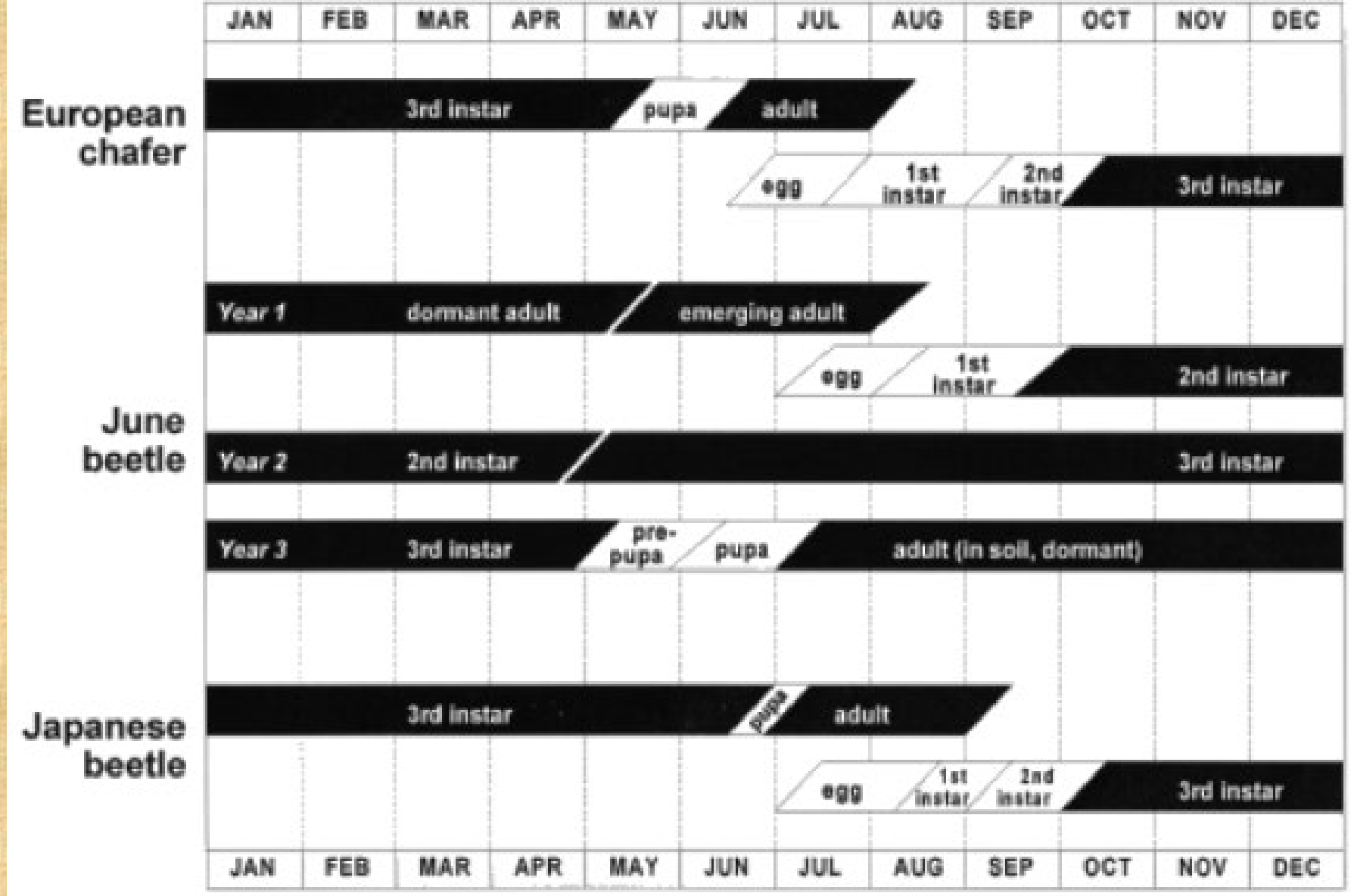


Chinch bug showing different stages of development. From left to right: newly hatched bug (top), after the first molt (bottom), second molt, third molt and adult chinch bug.

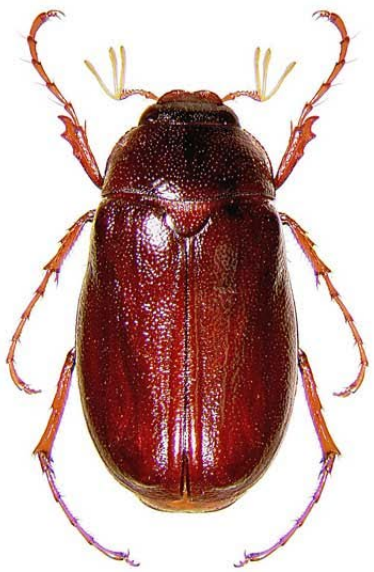
White Grubs

Grub biology

- European Chafer grubs are similar but may be active through the winter under snow
- Japanese and June beetle grubs are active in spring (April-May) and fall (mid-August through October)



Many species of beetle grubs become these critters



May-June Beetle

Not in Maine

Masked Chafer

Japanese Beetle

European Chafer

Oriental Beetle

Asiatic Garden Beetle

Black Turfgrass Ataenius

Aphodius

European chafers cause the most damage

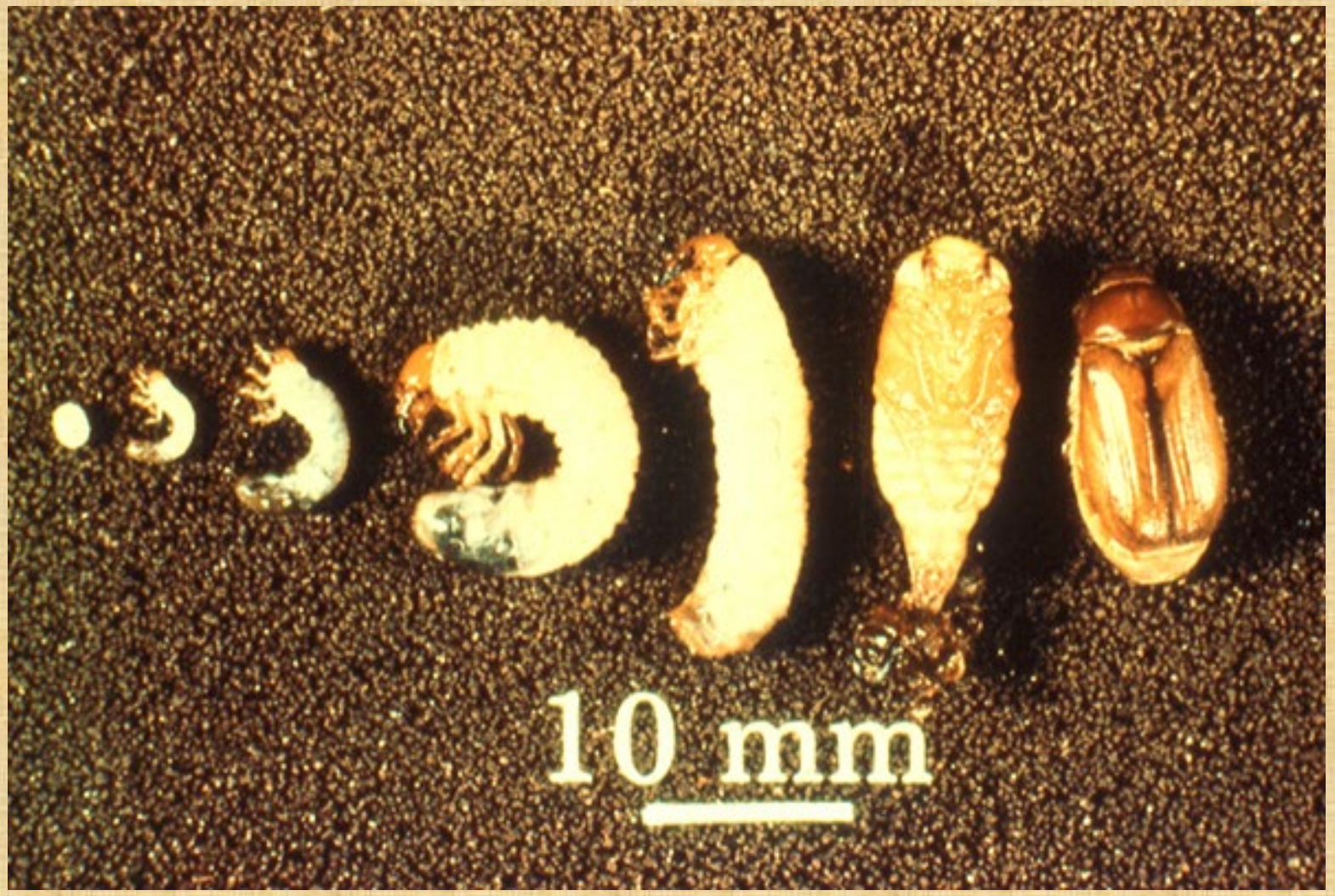
Eggs

Grubs

Typical body C-shape

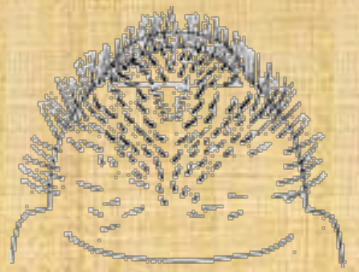
Pupa

European chafer – life stages

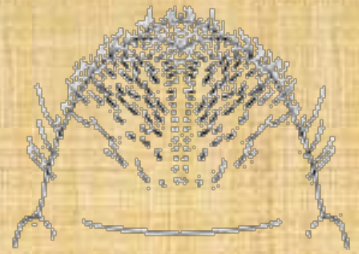


Pest Identification is crucial – butt check!

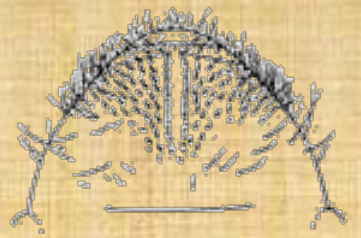
White grub rastral patterns



Japanese beetle



European chafer



May/June beetle

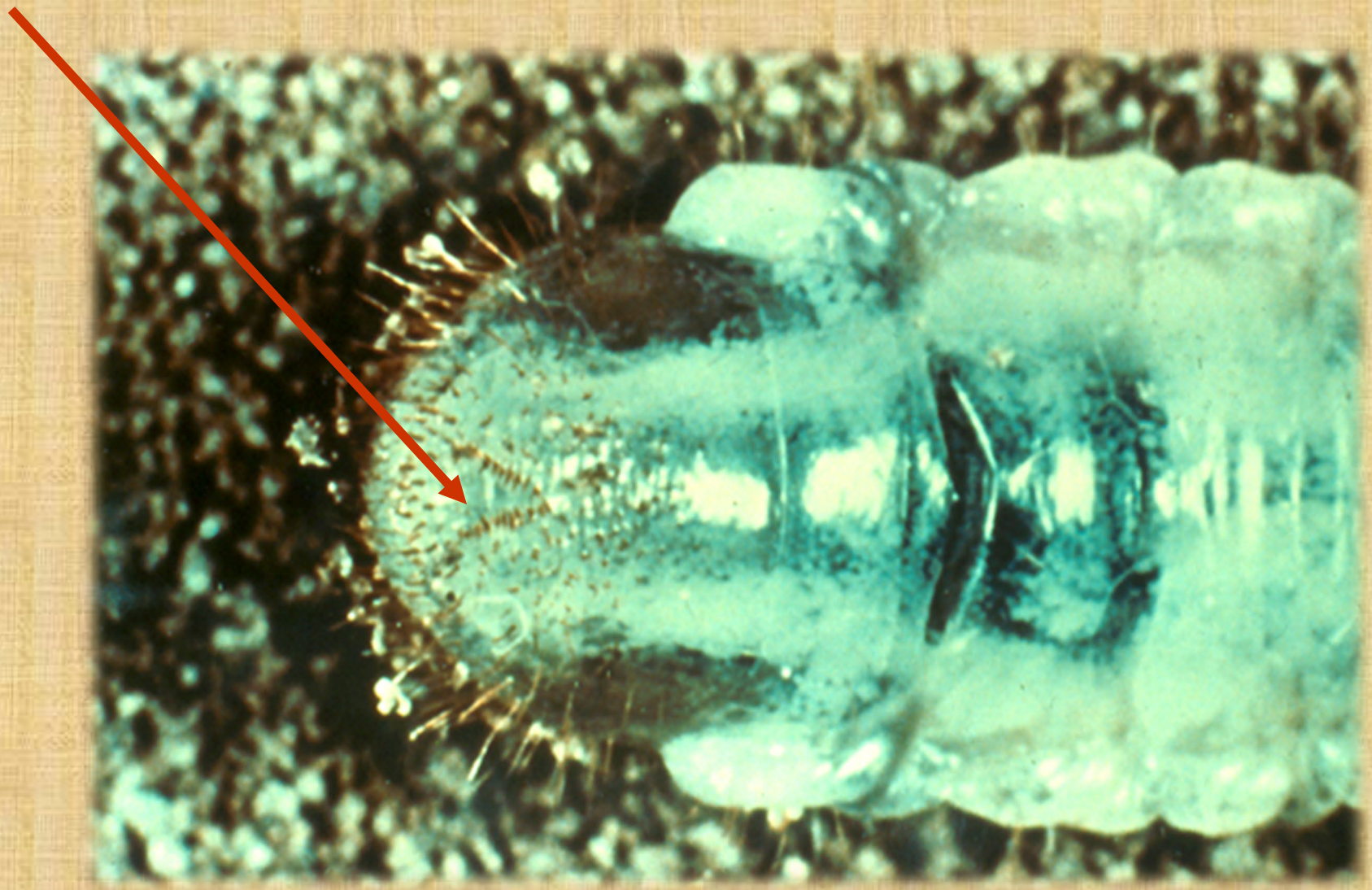
Asiatic garden beetle

Japanese beetles

- Most widely distributed species in New England
- Grubs are typically found in full sun areas
- Have developed resistance to some insecticides
- Adults feed on over 300 species of ornamental plants
- Tend to be cyclical and can be impacted by drought
- Irrigated turf can be a refuge during times of drought

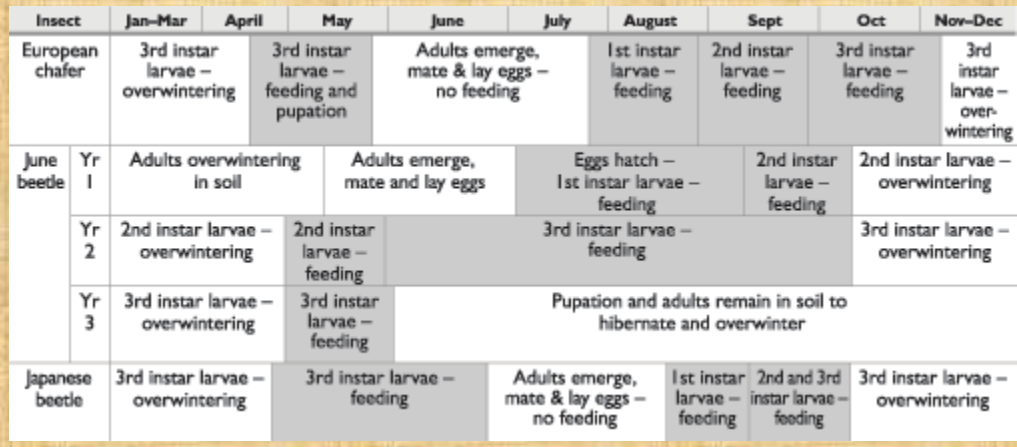
Japanese beetle adults

Look for the short "V"



European chafers

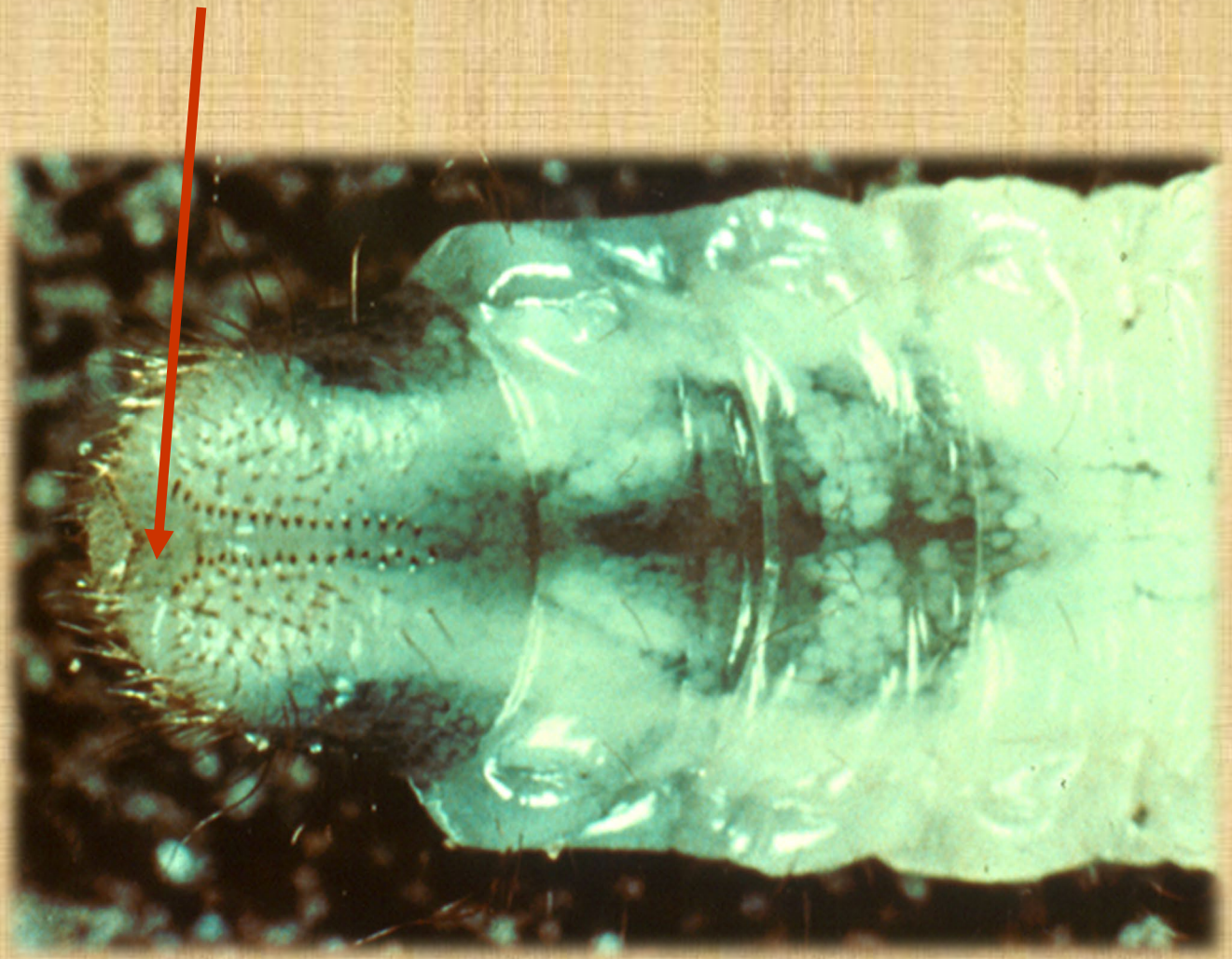
- Have become the primary grub problem
- Life cycle two weeks EARLIER than JB's
- Least sensitive to cold temperatures
  - Feeds all winter under snow-covered grass
- Most damaging species (grub for grub)

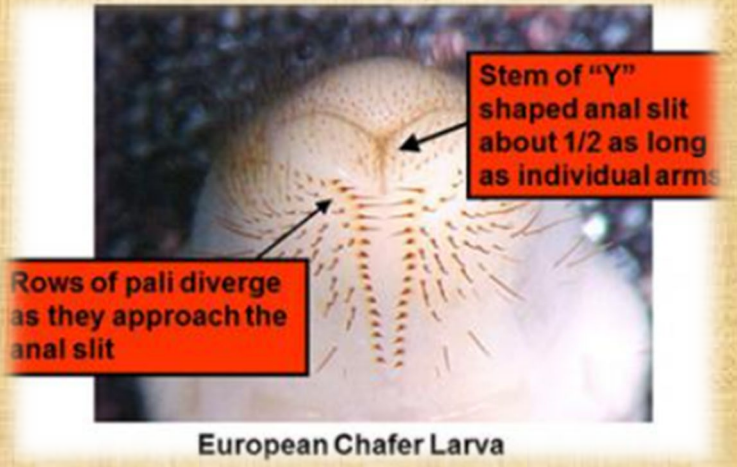


Insect		Jan–Mar	April	May	June	July	August	Sept	Oct	Nov–Dec
European chafer		3rd instar larvae – overwintering		3rd instar larvae – feeding and pupation	Adults emerge, mate & lay eggs – no feeding		1st instar larvae – feeding	2nd instar larvae – feeding	3rd instar larvae – feeding	3rd instar larvae – over-wintering
June beetle	Yr 1	Adults overwintering in soil			Adults emerge, mate and lay eggs		Eggs hatch – 1st instar larvae – feeding	2nd instar larvae – feeding	2nd instar larvae – overwintering	
	Yr 2	2nd instar larvae – overwintering		2nd instar larvae – feeding	3rd instar larvae – feeding				3rd instar larvae – overwintering	
	Yr 3	3rd instar larvae – overwintering		3rd instar larvae – feeding	Pupation and adults remain in soil to hibernate and overwinter					
Japanese beetle		3rd instar larvae – overwintering		3rd instar larvae – feeding		Adults emerge, mate & lay eggs – no feeding	1st instar larvae – feeding	2nd and 3rd instar larvae – feeding	3rd instar larvae – overwintering	

European chafer adults

Look for the extended "V"





European Chafer Larva

New grub species

- Asiatic garden beetle
- Grubs are slightly smaller than Japanese beetle and European chafer
- Adults are drawn to bright lights at night

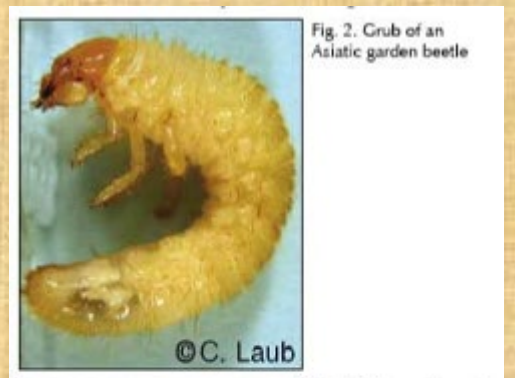


Fig. 2. Grub of an Asiatic garden beetle

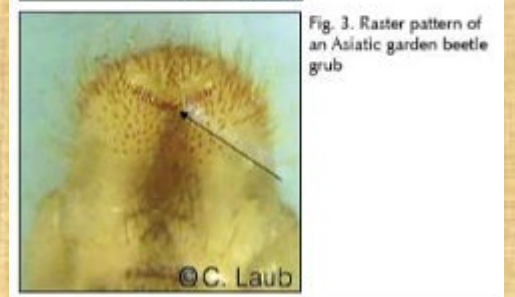


Fig. 3. Raster pattern of an Asiatic garden beetle grub

Monitoring for grubs

- Most grub damage happens in September - October or April - May
- Turn over 1 sq. ft patch of turf, count grubs or Cup cutter plug (0.1 sq. ft.)
- Threshold:
  - Japanese beetles 8 – 15 / sq. ft.
  - European chafers 4 – 10 / sq. ft.
  - May / June beetles 3 – 8 / sq. ft.
  - Asiatic garden beetle 15 – 20 / sq. ft.
  - **These levels are doubled on irrigated turf**

Monitoring for grubs

Cultural controls for grubs

- Avoid use of bluegrass
- Tall fescue may be more tolerant
- Let turf go dormant in July/August
- ¾ - 1 ½ inches of water every 5-7 days (once infested)
- High pressure water injection (done on golf courses)
- Core aeration may also help

Water reduces grub damage

- Once infestation is verified, water deeply ¾ - 1 **1/2** inches per week
  - Don't water every day (use a rain gauge)
  - 1 - 2 times a week is best
  - Water early in the morning (to reduce disease)
- Light watering (Syringing) on very hot afternoons is also acceptable

Nematodes for grub control

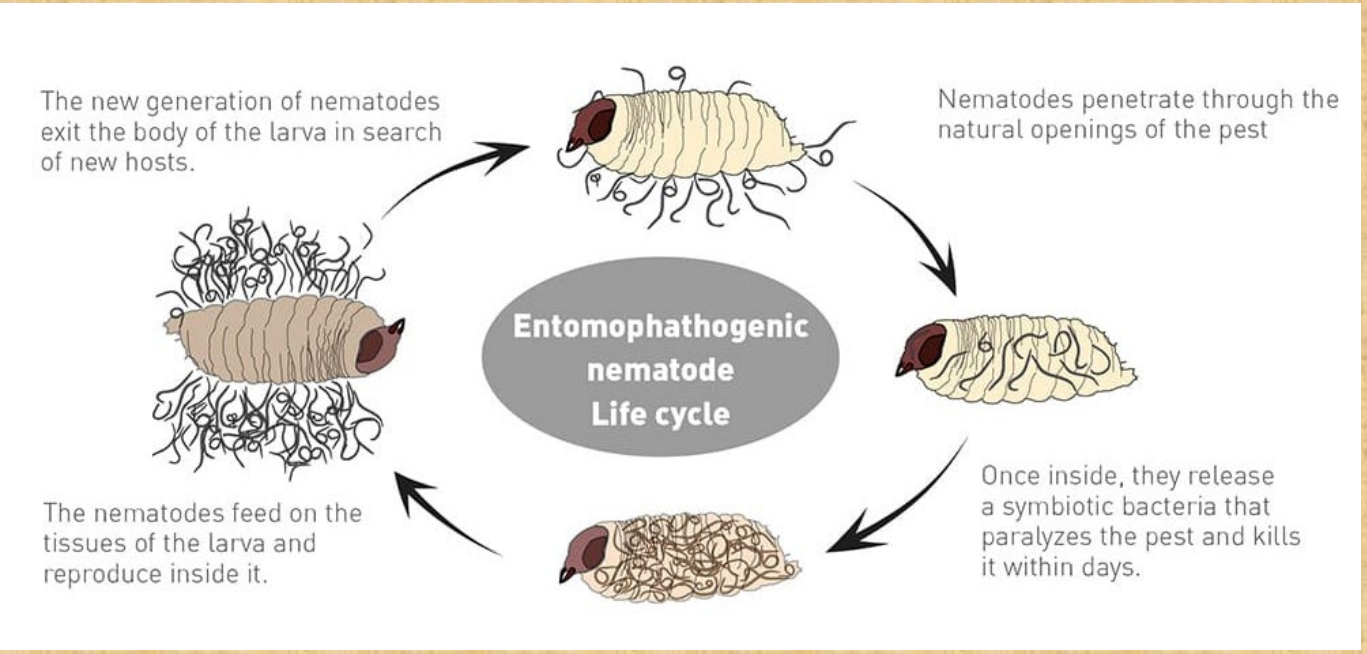
- *Heterorhabditis bacteriophora*
- *Heterorhabditis zealandica*
  - **These work on white grubs**

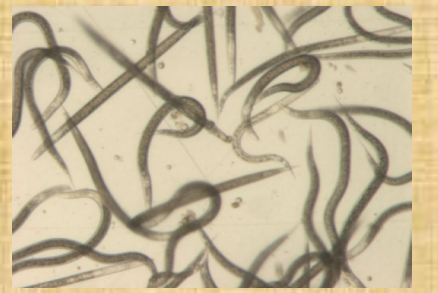
- *Steinernema carpocapsae* - Do NOT use for grubs under any circumstances!!!

http://www.yardscaping.org/lawn/documents/Beneficial_Nematodes.pdf

Entomopathogenic nematodes

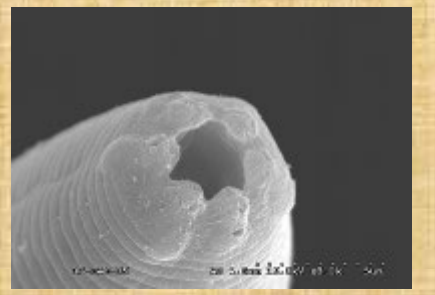
- "living hypodermic needles."
- Very sensitive to high temperatures and sunlight
- MUST be watered in immediately

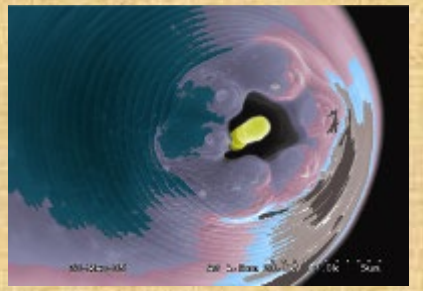




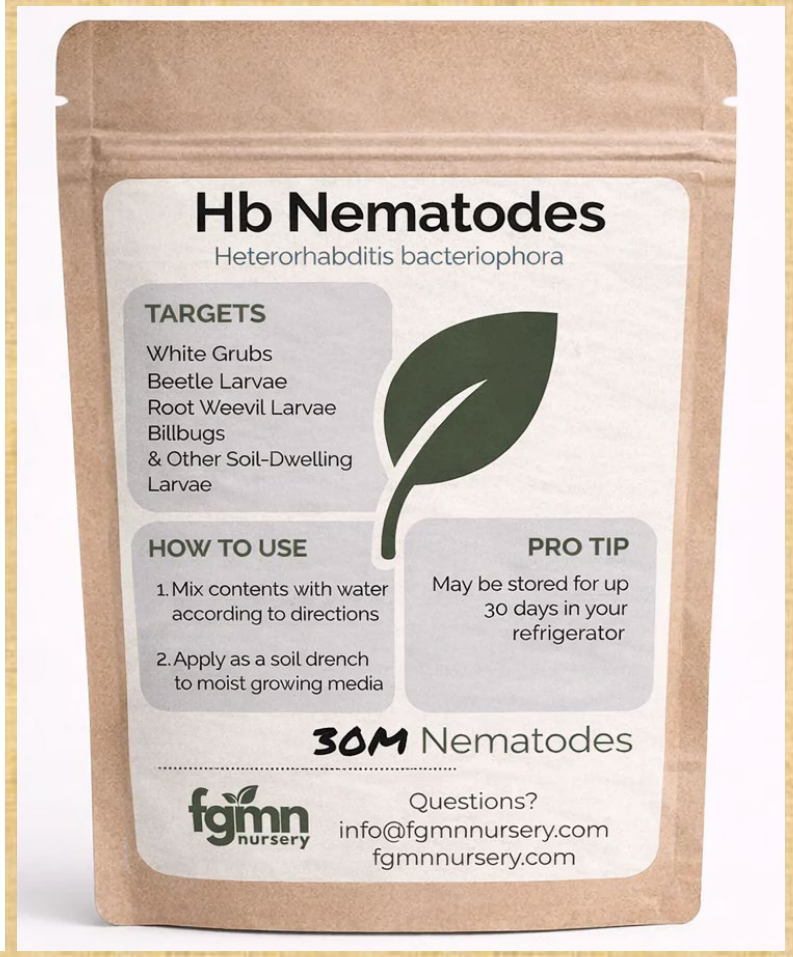
Infective juveniles

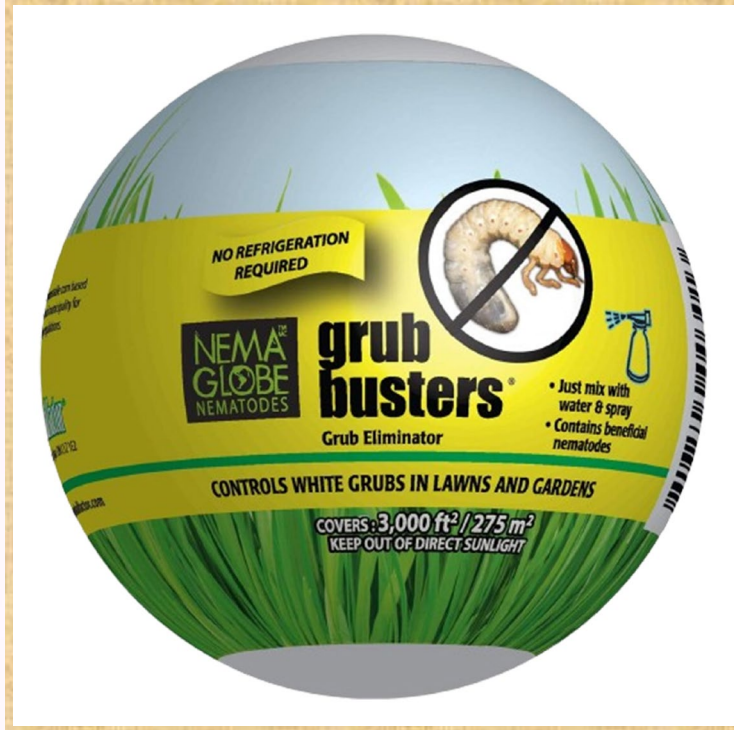
Female





Beneficial nematode products





No endorsement intended or implied

Bacteria

- *Bacillus popilliae* (milky disease)
  - Inconsistent in Maine & very expensive
  - When it works - only effective against Japanese Beetles
  - Most researchers say it does not work anymore!

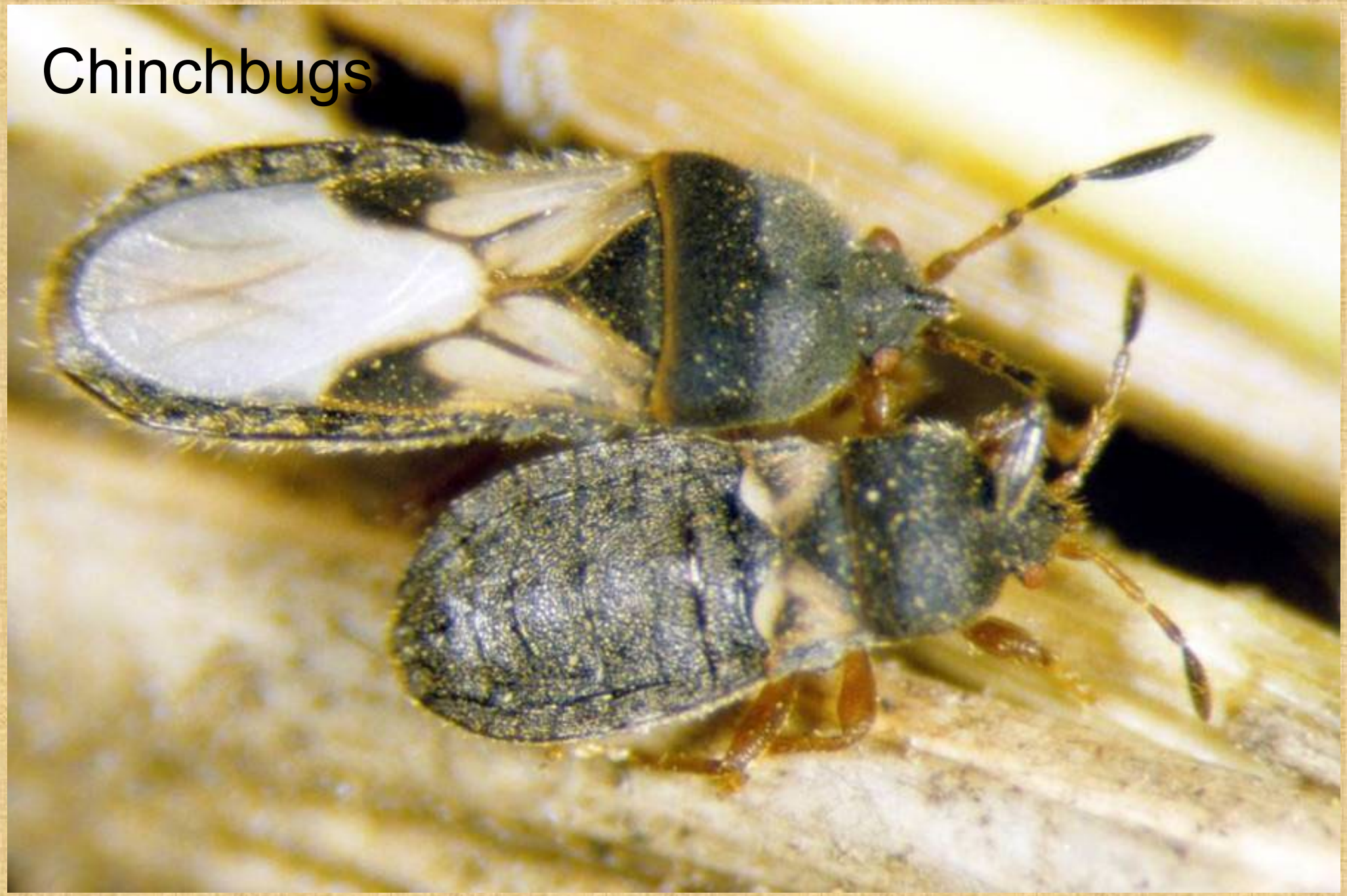
Have you seen this?

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

Istocheta 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

Chinchbugs



Hairy Chinch Bug

- Small (<1/4” long) red to black, white wings
- Adults and nymphs suck grass sap causing injury
- 1-2 gens/yr. Overwinters as adult in protected areas near turf.
- Damage: irreg. Yellow patches 2-3’ diameter, during hot dry weather in mid-summer & early fall (S. ME) or July (C. and N. ME). Looks like draught damage.

Chinch Bug Prevention and Monitoring

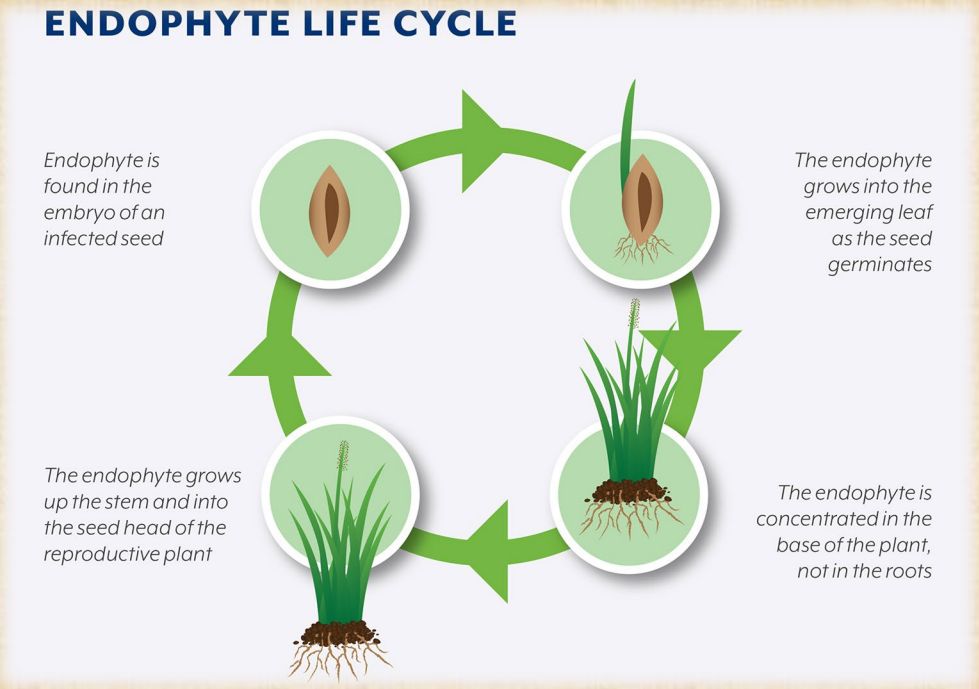
- Prevention: Irrigate regularly during hot, dry months
- Monitoring:
  - insert bottomless coffee can into turf, fill with water, poke turf w/stick.
  - Visual inspection - esp. when turf seems to be under drought stress
- Threshold: 15 bugs/6” diameter can

Biological Control -Chinchbugs

- Protect big-eyed bugs
- *Beauveria bassiana???*

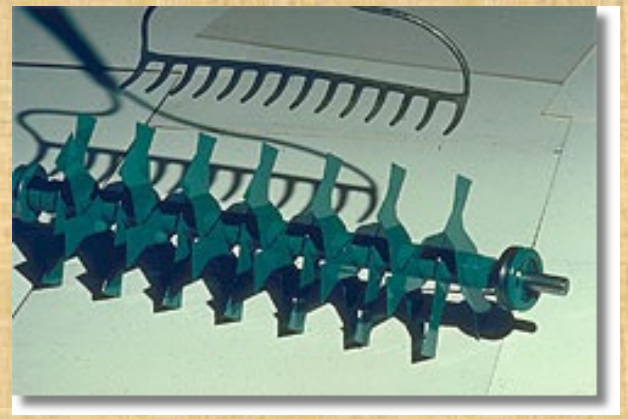
Cultural Control - Chinchbugs

- Use endophytic grass cultivars (fescues and ryegrasses)
- Minimize thatch – Core aeration
- Avoid drought stress



Minimize thatch

- Keep thatch under 1/2 inch
- Minimize reliance on pesticides
- Core aerate in the late summer or early spring



Core Aeration Guidelines

- Do not aerate during the heat of the summer
- Aerate when the soil is moist but not wet
- Leave cores on the ground and drag them in
- Seed bare areas at the same time as coring
- Irrigate after coring & dragging to facilitate recovery

Insect Control Approach

(BASIC STRATEGY - use resistant turf species and create deep root systems)

- Fescues and Ryegrasses with endophytes are resistant to surface feeding insects.

- Endophytes also make grasses more disease resistant and help exclude weed competition

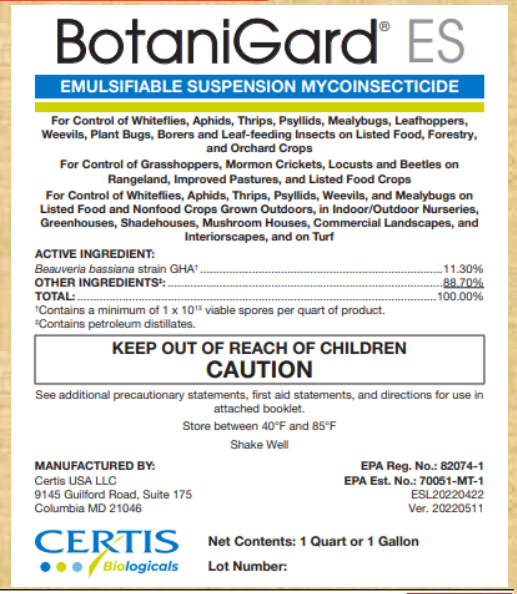
No endorsement intended or implied

Falcon IV is an endophyte-enhanced tall fescue with >92% Neotyphodium coenophialum endophyte, which provides resistance to many leaf and crown-feeding insects and nematodes. The presence of endophyte also contributes to improved biotic and abiotic stress tolerance, faster seedling establishment, enhanced fall recovery, and reduced summer weed invasion.

Simple slit seeding of endophytic grasses into an existing lawn resulted in a 30 to 50% stand of endophytic grasses - enough to control surface insects!

Entomopathogenic Fungi

Beauveria spp. "White" Fungus


BotaniGard® ES

EMULSIFIABLE SUSPENSION MYCOINSECTICIDE

For Control of Whiteflies, Aphids, Thrips, Psyllids, Mealybugs, Leafhoppers, Weevils, Plant Bugs, Borers and Leaf-feeding Insects on Listed Food, Forestry, and Orchard Crops

For Control of Grasshoppers, Mormon Crickets, Locusts and Beetles on Rangeland, Improved Pastures, and Listed Food Crops

For Control of Whiteflies, Aphids, Thrips, Psyllids, Weevils, and Mealybugs on Listed Food and Nonfood Crops Grown Outdoors, in Indoor/Outdoor Nurseries, Greenhouses, Shadehouses, Mushroom Houses, Commercial Landscapes, and Interiorscapes, and on Turf

ACTIVE INGREDIENT:
Beauveria bassiana strain GHA† 11.30%
OTHER INGREDIENTS‡: 88.70%
TOTAL: 100.00%

†Contains a minimum of 1 x 10^{13} viable spores per quart of product.
‡Contains petroleum distillates.

KEEP OUT OF REACH OF CHILDREN
CAUTION

See additional precautionary statements, first aid statements, and directions for use in attached booklet.

Store between 40°F and 85°F

Shake Well

MANUFACTURED BY:
Certis USA LLC
9145 Guilford Road, Suite 175
Columbia MD 21046

EPA Reg. No.: 82074-1
EPA Est. No.: 70051-MT-1
ESL20220422
Ver. 20220511

CERTIS Biologicals

Net Contents: 1 Quart or 1 Gallon

Lot Number:

Metarhizium spp. "Green" Fungus


LALGUARD M52 OD

BIOINSECTICIDE

Metarhizium brunneum (formerly known as *Metarhizium anisopliae* Strain F52	GROUP UNF	INSECTICIDE

ACTIVE INGREDIENT:
Metarhizium brunneum (formerly known as *Metarhizium anisopliae*) Strain F52* 11.0%
OTHER INGREDIENTS**: 89.0%
TOTAL: 100.0%

*Contains a minimum of 2.0 x 10^9 Colony Forming Units (CFU)/gram of product
**Contains petroleum distillates

KEEP OUT OF REACH OF CHILDREN
CAUTION

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Causes moderate eye irritation. Harmful if inhaled, absorbed through skin, or swallowed. Avoid contact with skin, eyes, or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.

REFER TO DIRECTIONS OF USE WITHIN THIS BOOKLET
SHAKE WELL BEFORE USING

NET CONTENTS:
34 fl. oz. (1 L)

LALLEMAND

LALGUARD M52 OD

Accepted by TDA

FIRST AID

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15 – 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15 – 20 minutes. Call a poison control center or doctor for treatment advice.

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Do not give any liquid to the person. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

HOTLINE NUMBER

Have the product container or label with you when calling a poison control center or doctor or going for treatment. For emergency information on this pesticide product (including health concerns, medical emergencies, or pesticide incidents) call the National Pesticide Information Center at 1-800-858-7378 8:30 a.m. – 4:30 p.m. Pacific Time (PT), seven days a week. During other times call the poison control center at 1-800-222-1222.

NOTE TO PHYSICIAN

Contains petroleum distillate. Vomiting may cause aspiration pneumonia.

Batch No.: See printing on bottle
EPA Est. No.: 264-FRA-003
EPA Reg. No.: 64137-33

7 640182 122591

Manufactured for:
Lallemand Plant Care SRL
Poststrasse 30
Zug CH-6300 Switzerland

Marketed and distributed by:
Lallemand Specialties Inc. /
LALLEMAND PLANT CARE
6122 West Douglas Avenue
Milwaukee, WI 53218
United States

LALLEMANDPLANTCARE.COM

No endorsement intended or implied

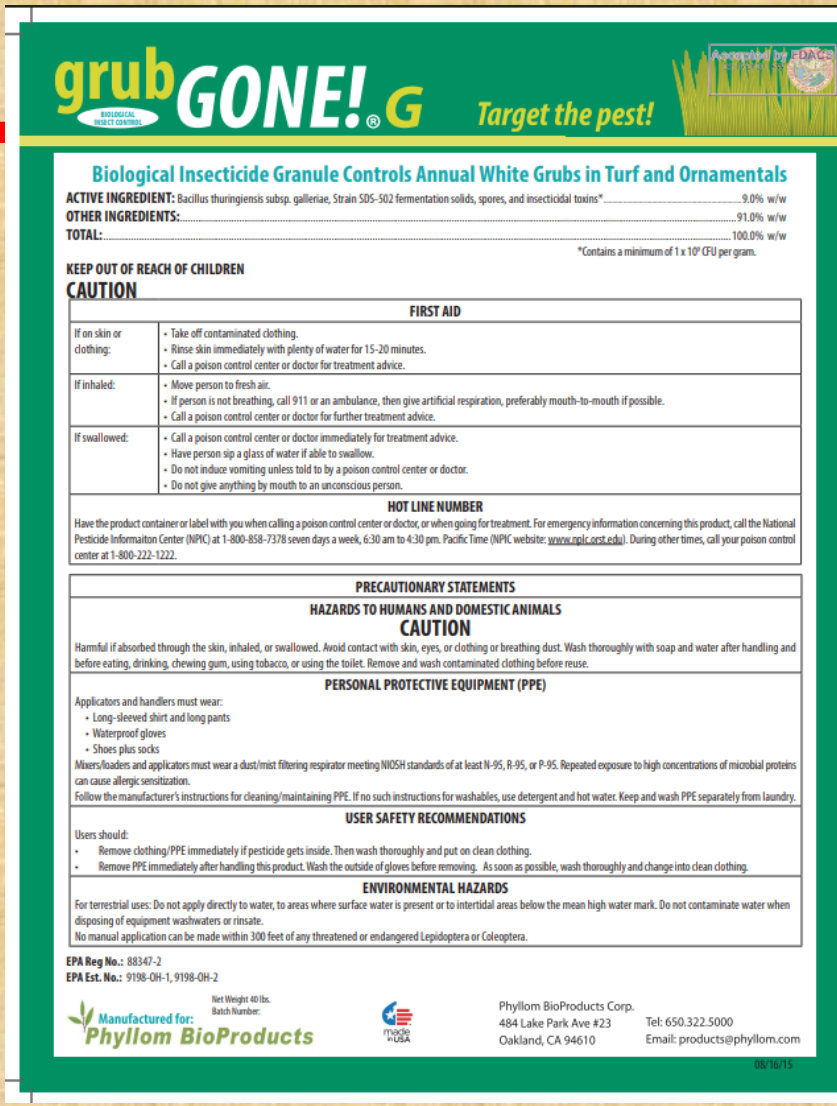
A bluegrass billbug adult (above) and Japanese beetle larva (right) infected with *Beauveria*.

Fire ant queen with *Metarhizium anisopliae* fungus.

Other biorationals

- ***Bacillus thuringiensis* galleriae**

  Mixed results on many grub species. Has worked well on adult Japanese beetles



grub GONE! G

Target the pest!

Biological Insecticide Granule Controls Annual White Grubs in Turf and Ornamentals

ACTIVE INGREDIENT: Bacillus thuringiensis subsp. galleriae, Strain SDS-502 fermentation solids, spores, and insecticidal toxins* ..... 9.0% w/w

OTHER INGREDIENTS: ..... 91.0% w/w

TOTAL: ..... 100.0% w/w

*Contains a minimum of 1 x 10^9 CFU per gram.

KEEP OUT OF REACH OF CHILDREN

CAUTION

FIRST AID

If on skin or clothing:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If inhaled:	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.

HOT LINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or when going for treatment. For emergency information concerning this product, call the National Pesticide Informaiton Center (NPIC) at 1-800-858-7378 seven days a week, 6:30 am to 4:30 pm. Pacific Time (NPIC website: www.npic.orst.edu). During other times, call your poison control center at 1-800-222-1222.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION

Harmful if absorbed through the skin, inhaled, or swallowed. Avoid contact with skin, eyes, or clothing or breathing dust. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove and wash contaminated clothing before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and handlers must wear:

- Long-sleeved shirt and long pants
- Waterproof gloves
- Shoes plus socks

Mixers/loaders and applicators must wear a dust/mist filtering respirator meeting NIOSH standards of at least N-95, R-95, or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.

Follow the manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from laundry.

USER SAFETY RECOMMENDATIONS

Users should:

- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

For terrestrial uses: Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters or rinsate.

No manual application can be made within 300 feet of any threatened or endangered Lepidoptera or Coleoptera.

EPA Reg No.: 88347-2

EPA Est. No.: 9198-OH-1, 9198-OH-2

Net Weight 40 lbs.
Batch Number:

Manufactured for: Phyllom BioProducts

Phyllom BioProducts Corp.
484 Lake Park Ave #23
Oakland, CA 94610

Tel: 650.322.5000
Email: products@phyllom.com

08/16/15

No endorsement intended or implied

Lawn disease management

- Avoid sod
- Improve air circulation
- Water in early morning only
- Reduce thatch with aeration
- Plant resistant varieties
- Convert shady areas to ground covers
- Apply nitrogen

Other disease-like problems

- Mushrooms
  - Buried wood
  - Infected soil
- Moss
  - Too wet
  - Too shady
  - Too acid
  - Too compacted
  - Low fertility
  - Scalping

Vertebrate problems

- Birds
  - Starlings, crows, grackles
- Moles
  - Eastern or star-nosed
- Skunks, squirrels, raccoons

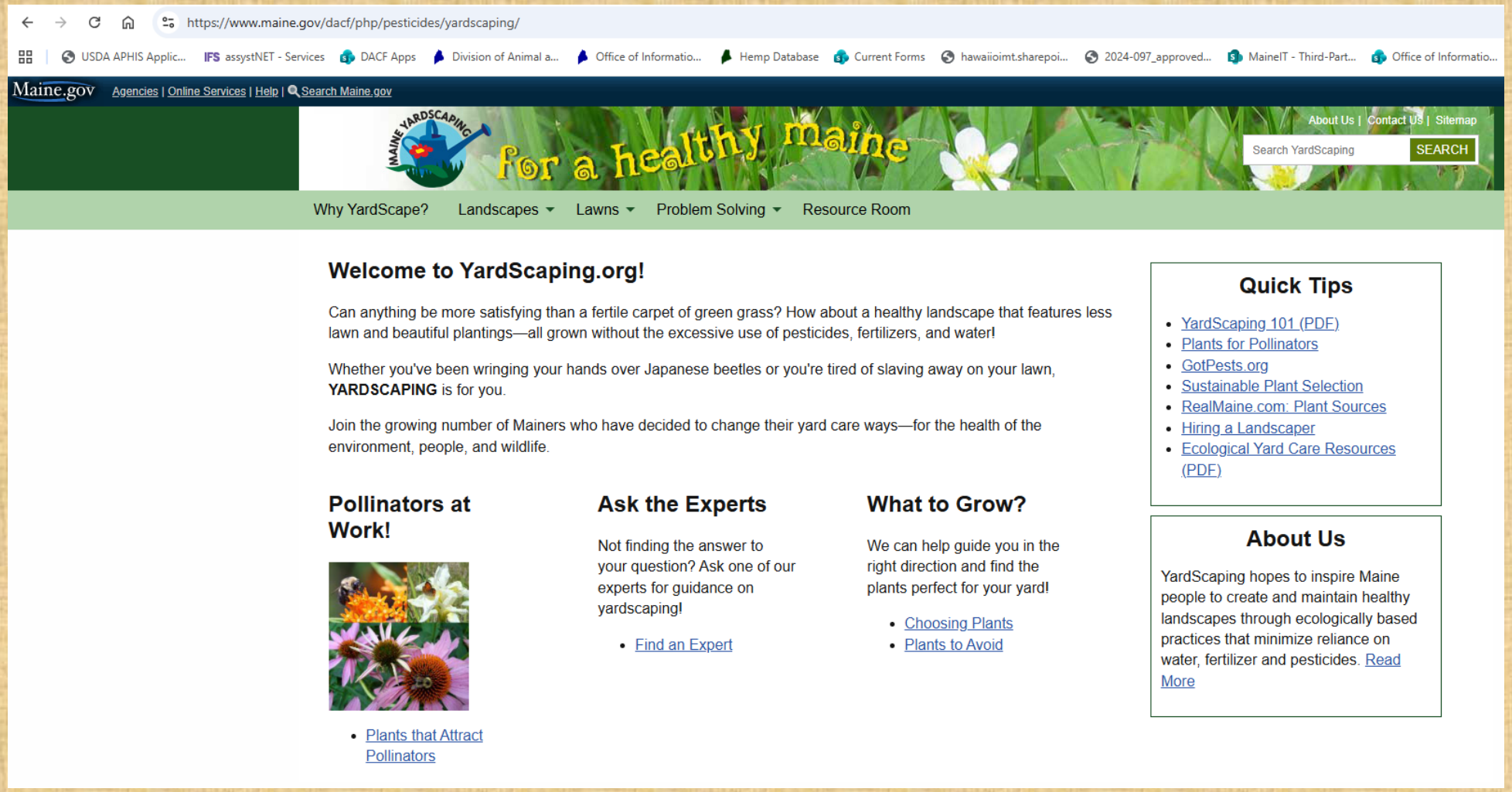
If you must apply pesticides apply properly & be cautious

- Only treat infested areas
- Spot treatments conserve beneficial organisms
- Avoid use of combination products like weed & feed

25-foot untreated buffer zone required next to waters and wetlands

- Applies to all terrestrial **"broadcast"** pesticide applications
  - Except stinging insect and arthropod vector control, and
  - Man-made Ag wetlands, e.g., Cranberry bog areas
- Variances may be granted if the Board approves and protections are reasonably equivalent

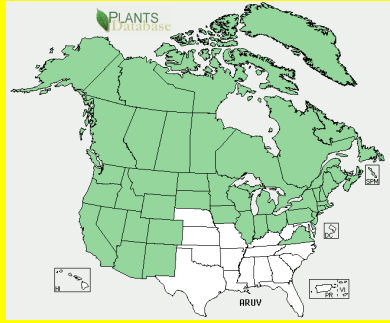
Where to learn more



http://www.yardscaping.org

Native Groundcovers for the

Sunny Well-Drained Landscape



Arctostaphylos uva-ursi **Bearberry**

Native Groundcovers for the

Sunny Well-Drained Landscape

Rhus aromatica 'Gro-Low'

Fragrant Sumac

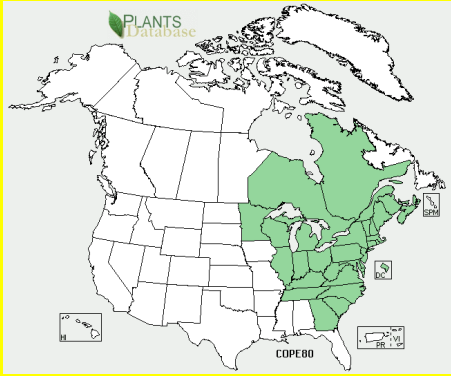
Native Groundcovers for the

Sunny Well-Drained Landscape

Uvularia sessilifolia **Wild Oats**

Native Groundcovers for the

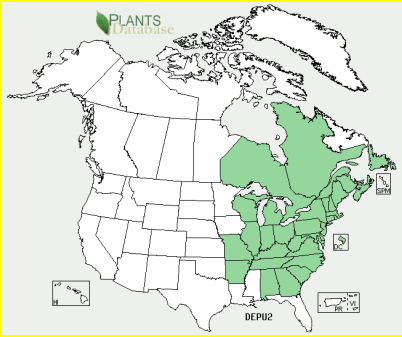
Sunny Well-Drained Landscape



Comptonia peregrina **Sweetfern**

Native Groundcovers for the

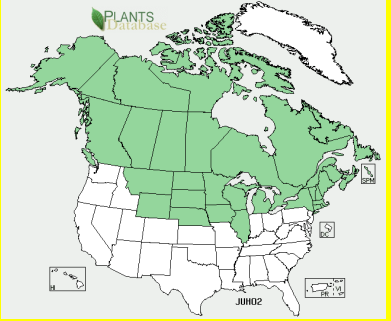
Sunny Well-Drained Landscape

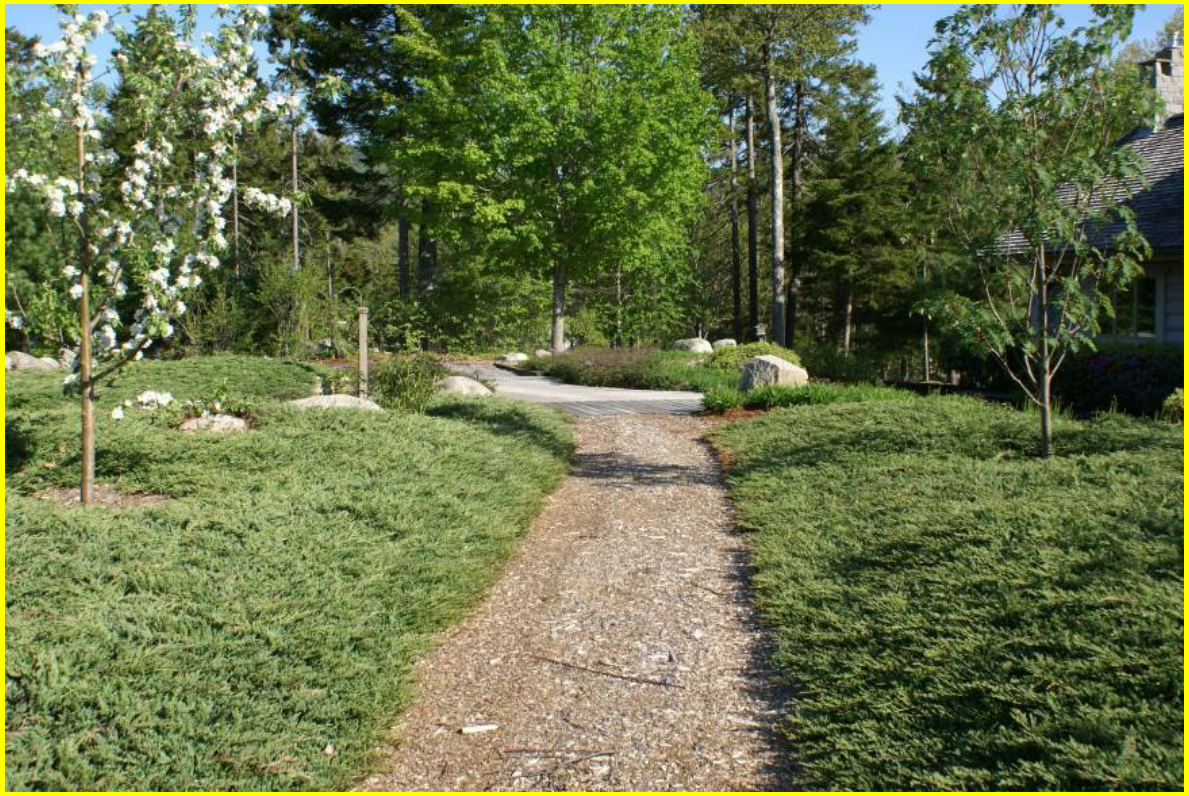


Dennstaedtia punctilobula **Hay-scented fern**

Native Groundcovers for the

Sunny Well-Drained Landscape

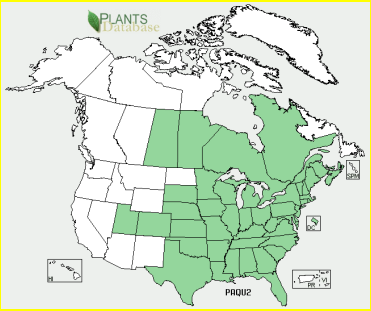




Juniperus horizontalis **Creeping Juniper**

Native Groundcovers for the

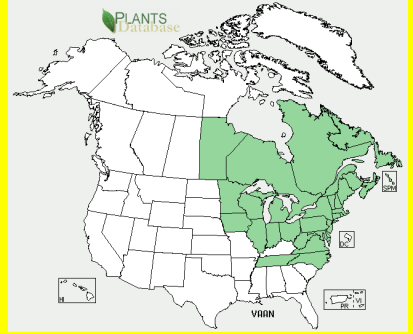
Sunny Well-Drained Landscape



Parthenocissus quinquefolia **Virginia Creeper**

Native Groundcovers for the

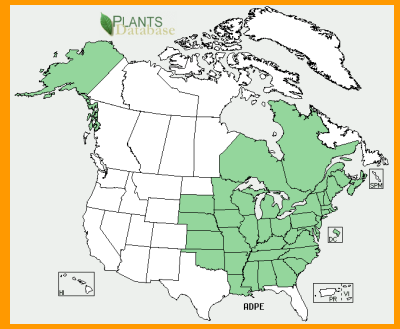
Sunny Well-Drained Landscape



Vaccinium angustifolium **Lowbush Blueberry**

Native Groundcovers for the

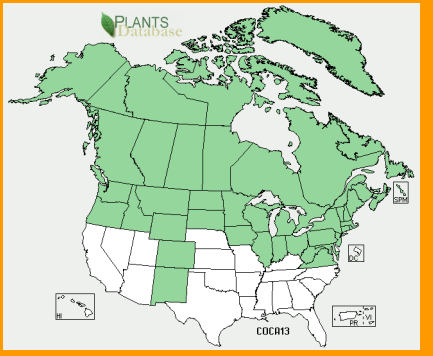
Shady Woodland Landscape



Adiantum pedatum **northern maidenhair fern**

Native Groundcovers for the

Shady Woodland Landscape



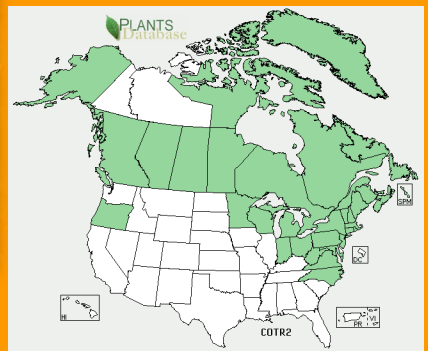
***Chamaepericlymenum canadense* bunchberry**

Native Groundcovers for the

Shady Woodland Landscape

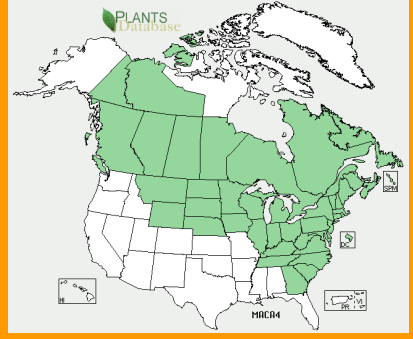
Gaultheria procumbens
Wintergreen or teaberry

Coptis groenlandica
Goldthread



Native Groundcovers for the

Shady Woodland Landscape



Maianthemum canadense **Canada Mayflower**

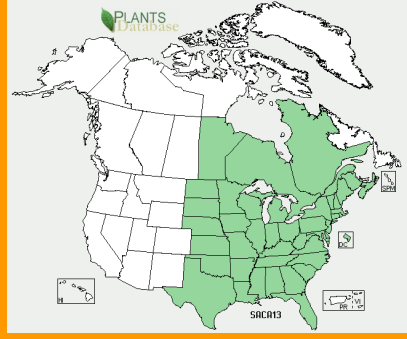
Native Groundcovers for the

Shady Woodland Landscape

Polygonatum pubescens **Hairy Solomon's seal**

Native Groundcovers for the

Shady Woodland Landscape



Sanguinaria canadensis **Bloodroot**

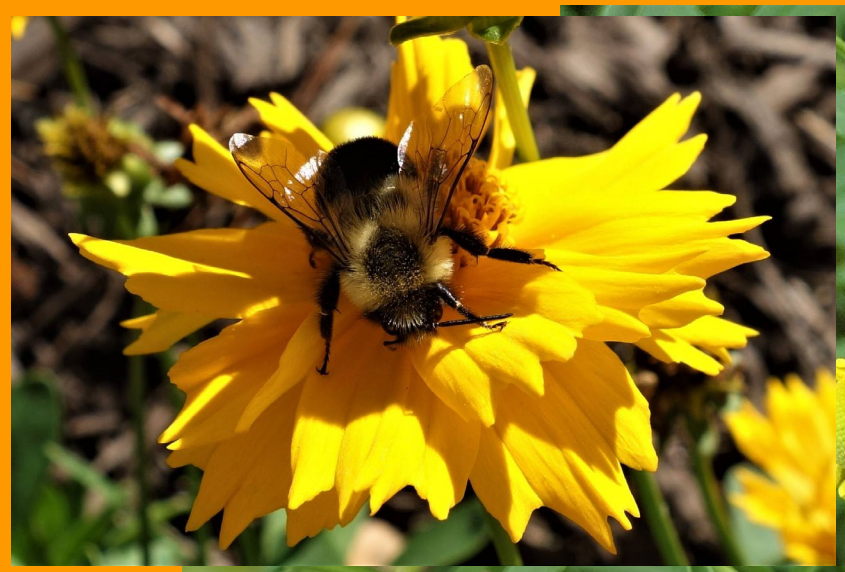
Native Groundcovers for the

Shady Woodland Landscape

Tiarella cordifolia **foam flower**

Landscape Diversity?

VS



MAINE DEPARTMENT OF AGRICULTURE CONSERVATION & FORESTRY

Maine & Northeast Native Plants to Provide Resources for Beneficial Insects



Gary Fish
Maine State Horticulturist
gary.fish@maine.gov

Why Native Plants?

Native plants can provide beneficial insects with nectar and pollen.

May also help minimize reliance on pesticides and increase pollination.

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Sustainable Agriculture Research and Education

Beneficial Insect Requirements

Alternate host/prey

Shelter
- Moderated microclimates
- In-season refuges
- Overwintering sites
- Nesting sites

Food
- Nectar
- Pollen

Native Plants

Benefits

- Enhance native biodiversity
- Re-create imperiled habitats
- Not invasive
- Adapted to local climate
- Habitat permanency

Disadvantages

- Greater initial cost
- May have longer establishment times

Bloom Timing of Native Plants Attractive to Beneficial Insects

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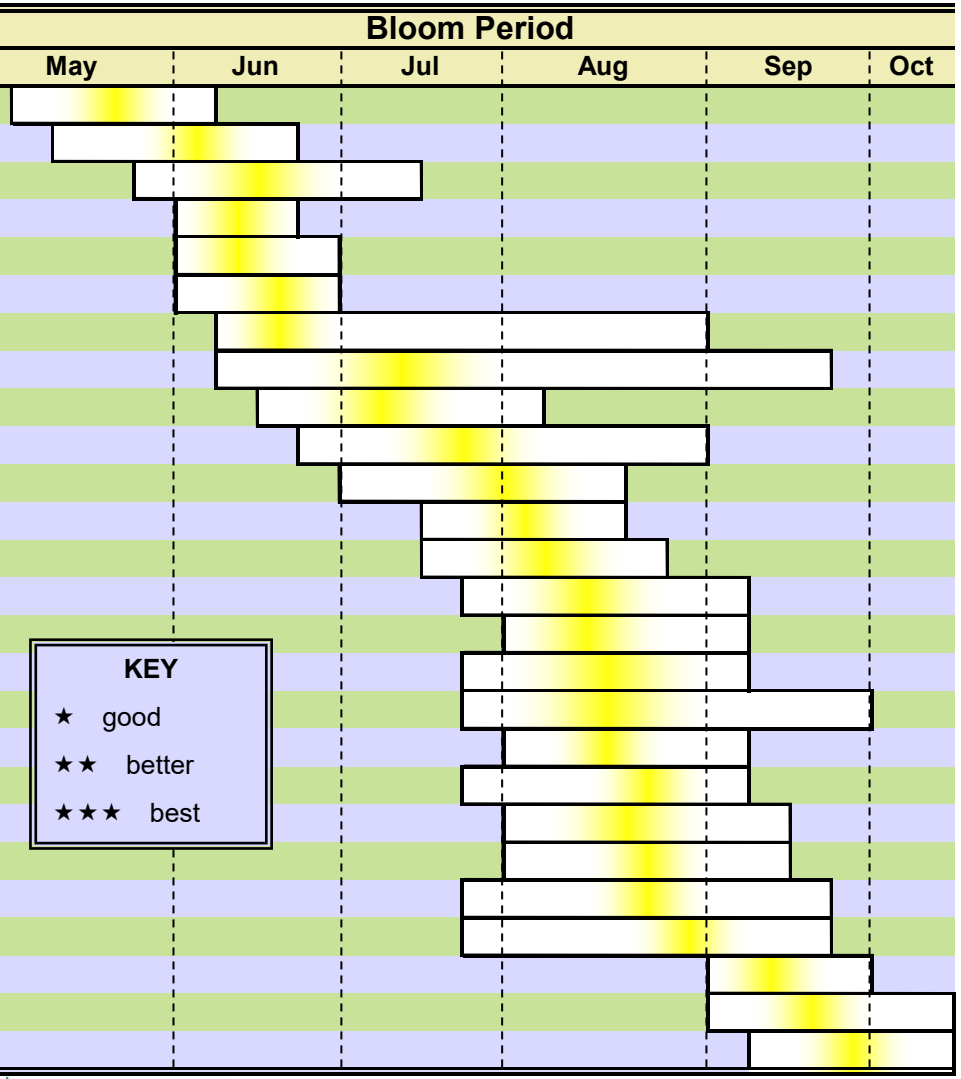
Native plant	Natural enemies	Bees
wild strawberry	★★	★
golden Alexanders	★★★	★★
Canada anemone	★★★	★
penstemon	★★	★★
angelica	★★★	★
cow-parsnip	★★★	★
sand coreopsis	★★★	★
shrubby cinquefoil	★★★	★
hemp dogbane	★★★	★
Lance-leaved figwort	★★	★★
swamp milkweed	★★	★★
Culver's root	★★	★★★
cutleaf coneflower	★★★	★★
meadow garlic	★	★★
meadowsweet	★★★	★★
yellow giant hyssop	★★	★★★
horsemint	★★★	★★
New York ironweed	★★	★★
woodland sunflower	★★★	★★★
false Indian plantain	★★	★★
common boneset	★★★	★★
blue lobelia	★★★	★★★
thin-leaved sunflower	★★★	★★
showy goldenrod	★★	★★★
New England aster	★★★	★★
smooth aster	★★	★★



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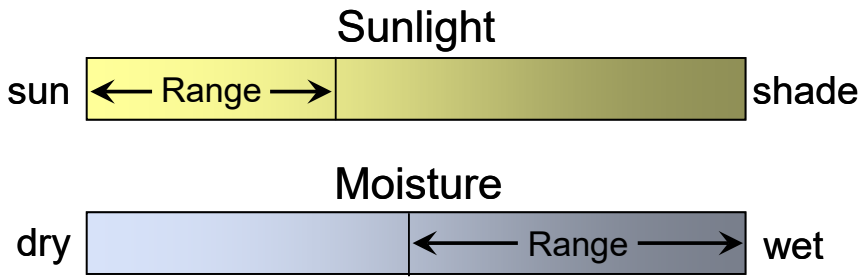
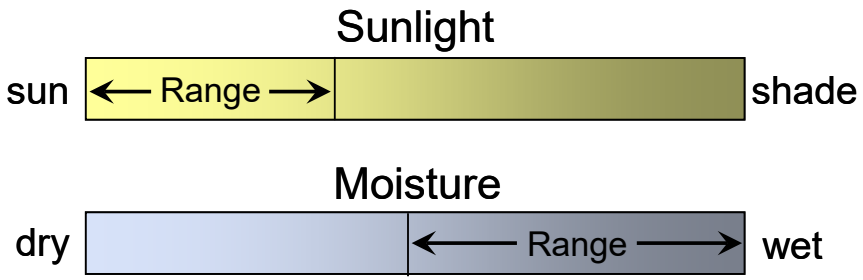
Wild strawberry *(Fragaria virginiana)*

- Natural enemies: ★★☆
  chalcid wasps
- Bees: ★☆☆
  sweat bees and small carpenter bees
- Bloom: mid-late May



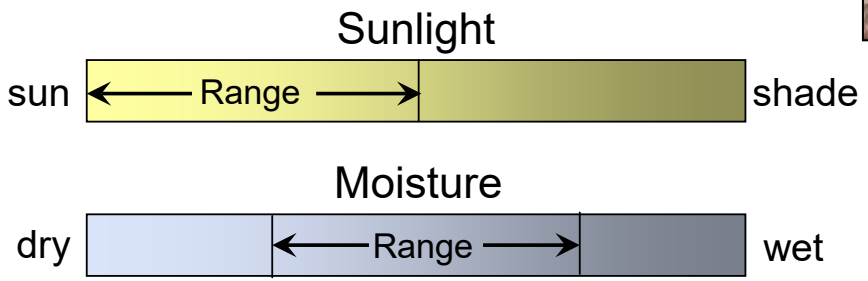
Golden alexanders *(Zizia aurea)*

- Natural enemies: ★★★
  chalcid wasps, robber flies
- Bees: ★★☆
  yellow-faced bees, digger bees, sweat bees, and cuckoo bees
- Bloom: late May - mid June



Canada anemone *(Anemone canadensis)*

- Natural enemies: ★★★
  minute pirate bug, dance flies, chalcid wasps
- Bees: ★☆☆
  sweat bees
- Bloom: throughout June



Penstemon *(Penstemon hirsutus)*

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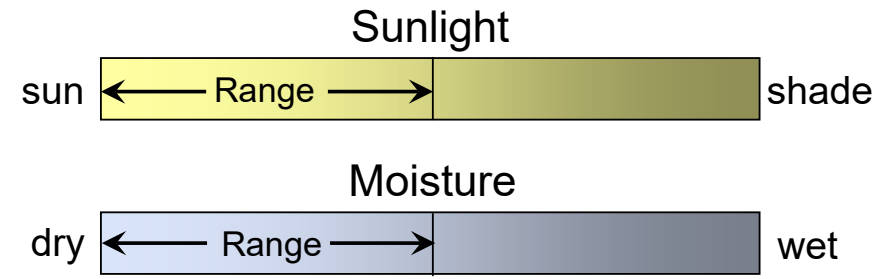
- Natural enemies: ★★☆
  chalcid wasps and minute pirate bug
- Bees: ★★☆
  large carpenter bees, small carpenter bees, and bumble bees
- Bloom: late May - mid June



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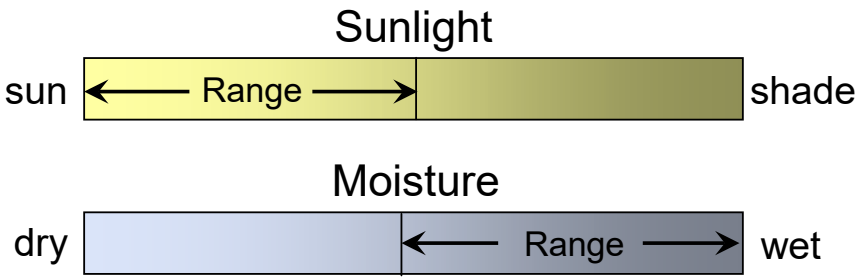
Angelica *(Angelica atropurpurea)*

- Natural enemies: ★★★
  bald-faced hornet, dance flies, minute pirate bug
- Bees: ★☆☆
  sweat bees
- Bloom: early June



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Common cow-parsnip *(Heracleum maximum)*

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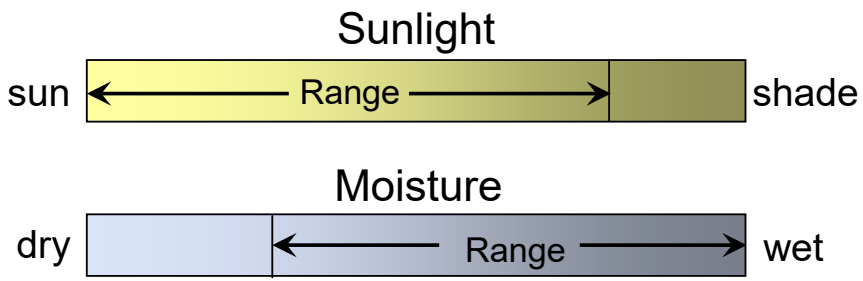
This plant can be toxic and cause phytophoto dermatitis

- Natural enemies: ★★★
  yellow jackets and flower flies
- Bees: ★☆☆
  yellow-faced bees and sweat bees
- Bloom: mid June



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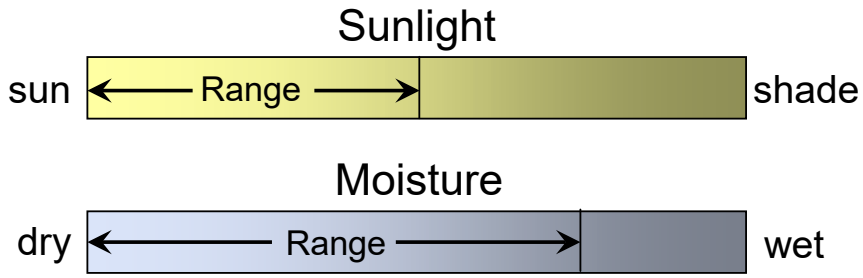
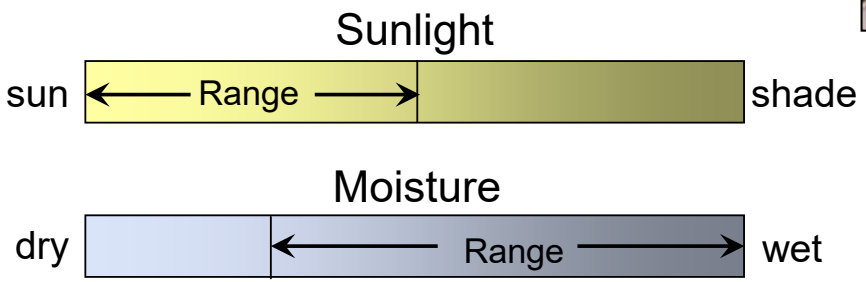
Sand coreopsis *(Coreopsis lanceolata) VA & WV native*

- Natural enemies: ★★★
  jumping spiders, minute pirate bug and predatory thrips
- Pollinators: ★☆☆
  sweat bees, bumble bees, butterflies
- Bloom: June - August



Shrubby cinquefoil *(Dasiphora floribunda)*

- Natural enemies: ★★★
  minute pirate bug, chalcid wasps, spiders, dance flies
- Bees: ★☆☆
  yellow-faced bees and sweat bees
- Bloom: July - September



Hemp dogbane *(Apocynum cannabinum)*

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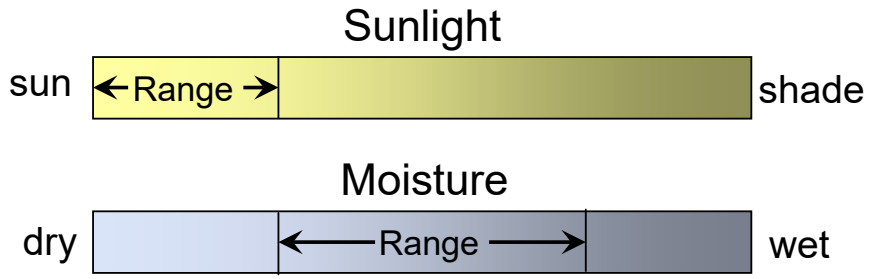
This plant can be toxic to people and animals

- Natural enemies: ★★★
  small milkweed bugs, chalcid wasps, crab spiders, lady beetles
- Pollinators: ★☆☆
  Butterflies, yellow-faced bees and sweat bees
- Bloom: late June - July



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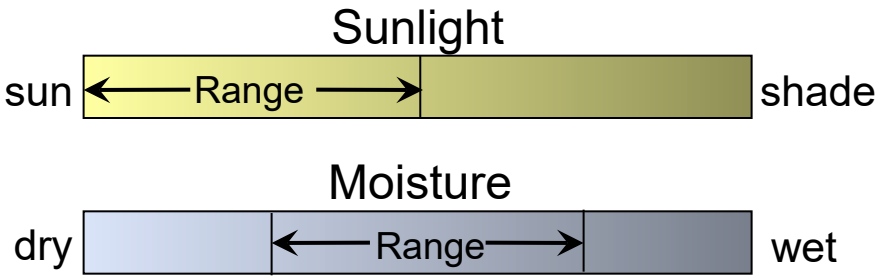
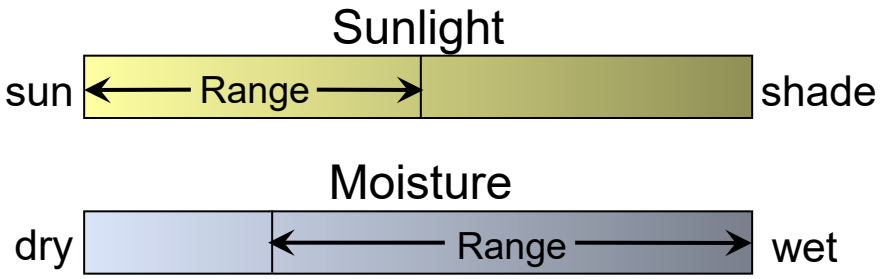
Lance-leaved figwort *(Scrophularia lanceolata)*

- Natural enemies: ★★☆
  paper wasps, dance flies, flower flies, and ants
- Bees: ★★☆
  butterflies, mason bees, sweat bees, and bumble bees
- Bloom: late July – early August



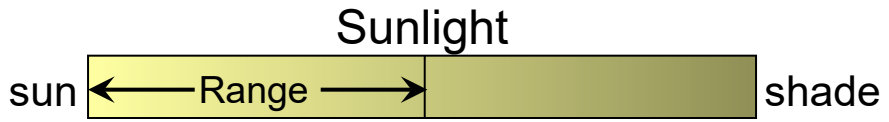
Swamp milkweed *(Asclepias incarnata)*

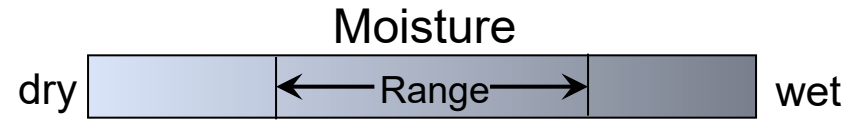
- Natural enemies: ★★☆
  chalcid wasps, digger wasps
- Pollinators: ★★☆
  yellow-faced bees, sweat bees, butterflies, and large carpenter bees
- Bloom: mid July – mid August



Culver's-Root *(Veronicastrum virginicum)*

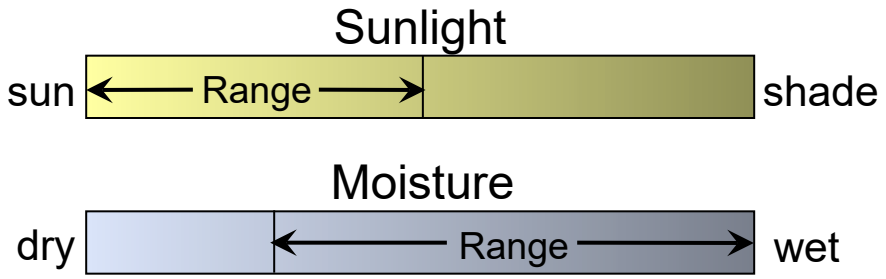
- Natural enemies: ★★☆
  minute pirate bug, flower flies, and wasps
- Bees: ★★★
  sweat bees, small carpenter bees, and bumble bees; also highly attractive to honey bees
- Bloom: late July – early August





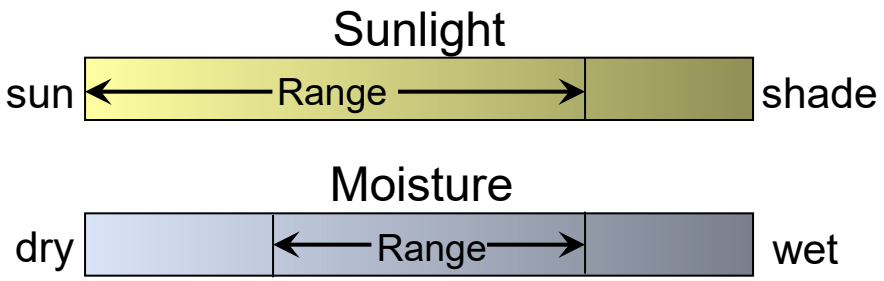
Cutleaf coneflower *(Rudbeckia laciniata)*

- Natural enemies: ★★★
  chalcid wasps, minute pirate bug, spiders
- Pollinators: ★★☆
  sweat bees, digger bees, cuckoo bees, small and large carpenter bees butterflies, and bumble bees
- Bloom: late July - mid August



Meadow garlic *(Allium canadense)*

- Natural enemies: ★☆☆
  minute pirate bug, crab spiders
- Bees: ★★☆
  sweat bees, bumble bees, and wool carder bee
- Bloom: throughout August



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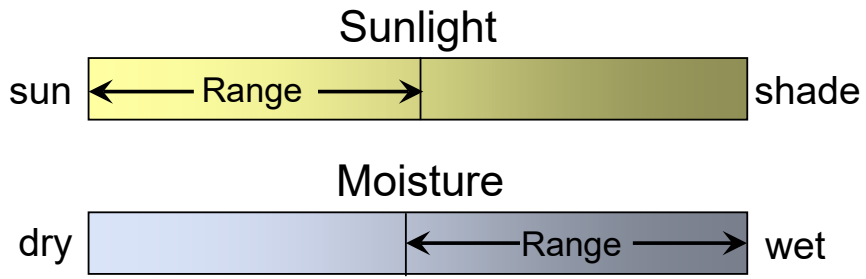
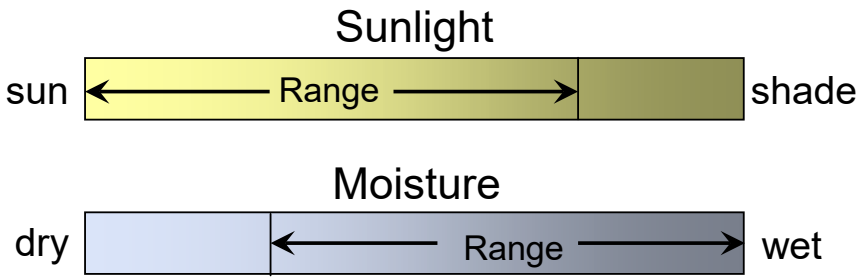
Meadowsweet (*Spiraea alba*)

- Natural enemies: ★★★
  flower flies, minute pirate bug and chalcid wasps
- Bees: ★★☆
  yellow-faced bees, digger bees, sweat bees, and bumble bees
- Bloom: throughout August



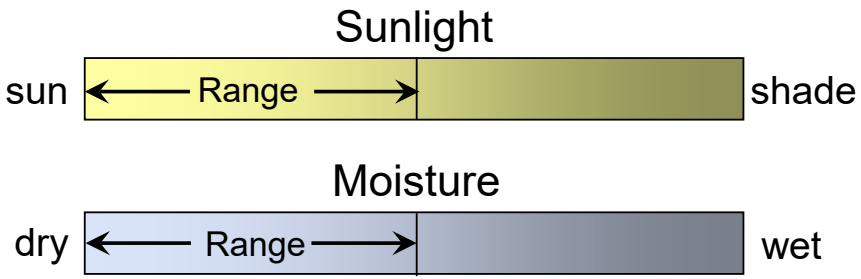
Yellow giant hyssop *(Agastache nepetoides)*

- Natural enemies: ★★☆
  minute pirate bug, soldier beetles, spiders, dance flies, chalcid wasps
- Pollinators: ★★★
  butterflies, yellow-faced bees, sweat bees, and bumble bees
- Bloom: throughout August



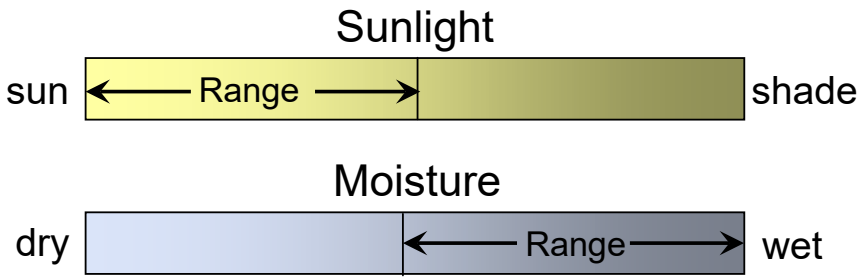
Horsemint *(Monarda punctata)*

- Natural enemies: ★★★
  mud-dauber wasp, soldier beetle, predatory plant bug
- Bees: ★★☆
  large carpenter bees, digger bees, and bumble bees
- Bloom: throughout August



New York Ironweed *(Vernonia noveboracensis) NE native*

- Natural enemies: ★★☆
  flower flies, and chalcid wasps
- Pollinators: ★★☆
  sweat bees, leafcutter bees, cuckoo bees, small carpenter bees, and bumble bees
- Bloom: throughout August



Woodland sunflower *(Helianthus divaricatus)*

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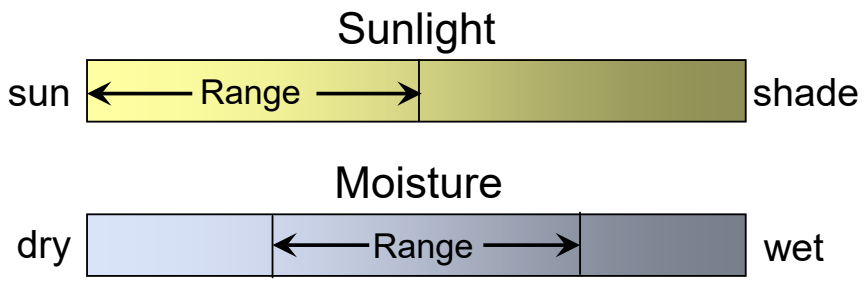
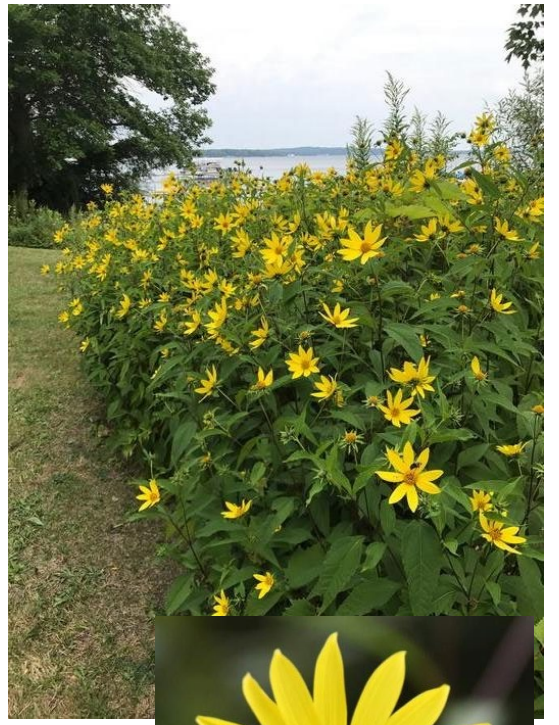
- Natural enemies: ★★★
  chalcid wasps, minute pirate bug, soldier beetle, and flower flies
- Pollinators: ★★★
  butterflies, sweat bees, leafcutter bees, small carpenter bees, digger bees, and bumble bees
- Bloom: throughout August





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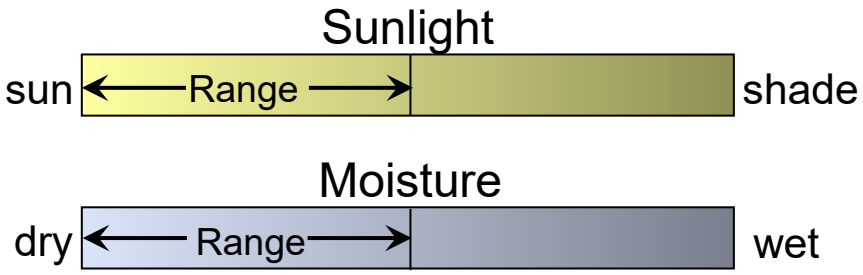
False Indian plantain *(Senecio suaveolens) MA native*

- Natural enemies: ★★☆
  minute pirate bug, chalcid wasps, soldier beetle
- Bees: ★★☆
  sweat bees, digger bees, and bumble bees
- Bloom: throughout August



Common boneset *(Eupatorium perfoliatum)*

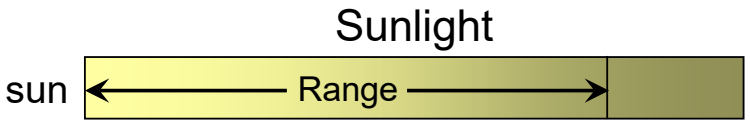
- Natural enemies: ★★★
  minute pirate bug, predatory plant bug, wasps, soldier beetle, spiders
- Pollinators: ★★★
  butterflies, sweat bees, small carpenter bees, digger bees, and bumble bees
- Bloom: August – early September

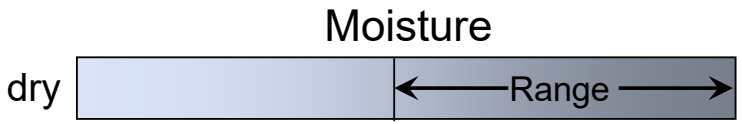
Sunlight

Moisture

Blue lobelia *(Lobelia siphilitica)*

- Natural enemies: ★★★
  minute pirate bug, chalcid wasps, soldier beetle, lady beetles, predatory plant bug
- Bees: ★★★
  yellow-faced bees, sweat bees, small carpenter bees, and bumble bees
- Bloom: August – early September





Thin-leaved sunflower *(Helianthus decapetalus)*

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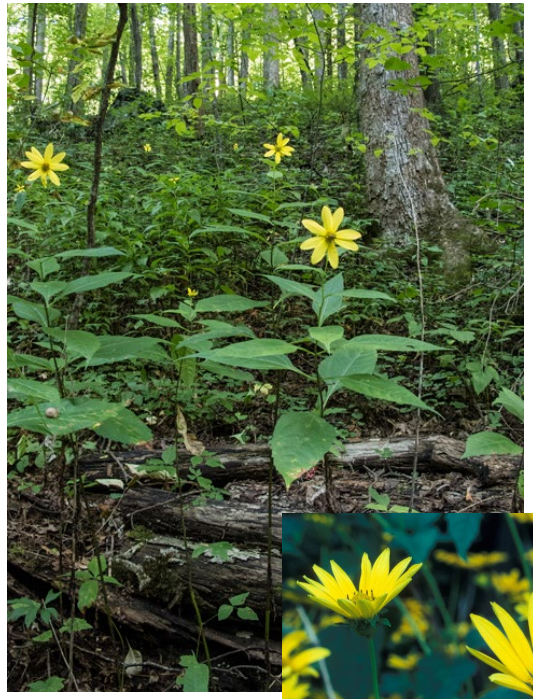
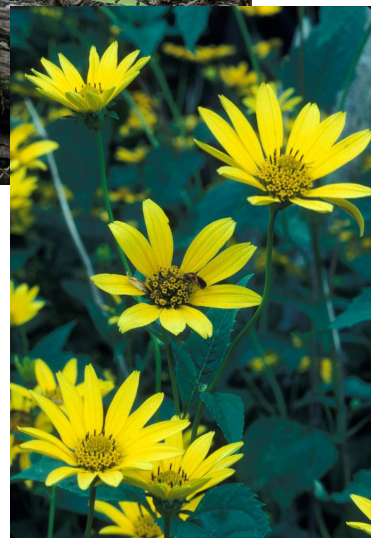
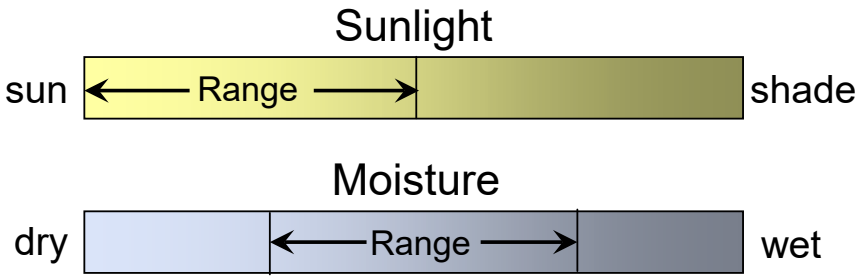
- Natural enemies: ★★★
  chalcid wasps, soldier beetle, minute pirate bug, crab spiders
- Bees: ★★☆
  sweat bees, digger bees, and bumble bees
- Bloom: July – August







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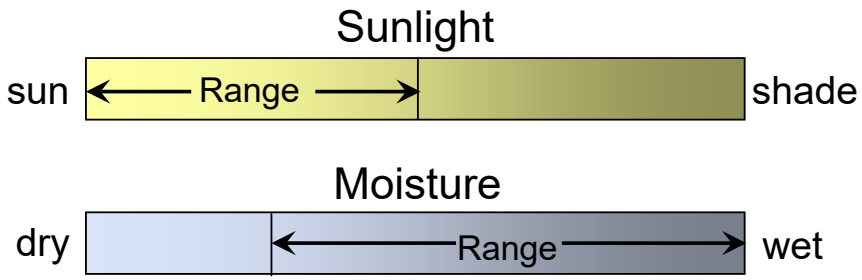
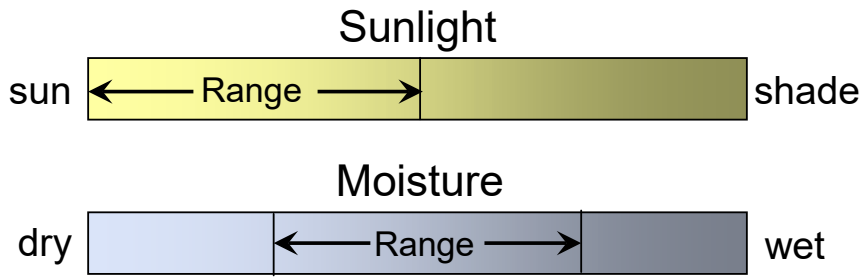
Showy goldenrod *(Solidago speciosa)*

- Natural enemies: ★★☆
  minute pirate bug, chalcid wasps, paper wasps, lady beetles, and spiders
- Pollinators: ★★★
  butterflies, yellow-faced bees, Andrenid bees, sweat bees, small and large carpenter bees, digger bees, and bumble bees
- Bloom: August - October



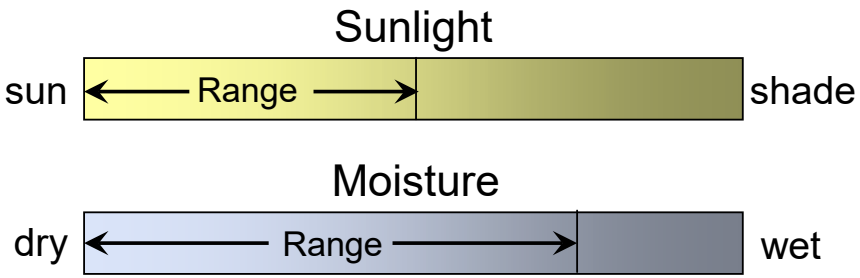
New England aster *(Aster novae-angliae)*

- Natural enemies: ★★★
  flower flies, chalcid wasps, and dance flies
- Bees: ★★☆
  digger bees, sweat bees, small carpenter bees, and bumble bees
- Bloom: throughout September



Smooth aster *(Symphyotrichum laevis)*

- Natural enemies: ★★☆
  minute pirate bug, spiders, and wasps
- Bees: ★★☆
  carpenter bees, sweat bees and bumble bees
- Bloom: mid September – early October



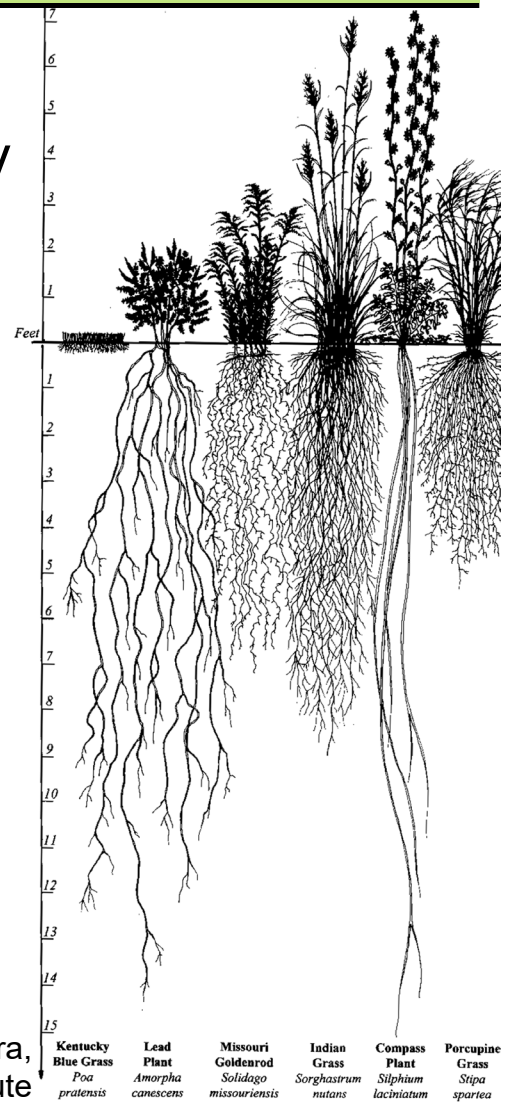
Native grasses

- Can be an important addition, where they

  1. Provide structural support for wildflowers

  2. Fill in gaps that wildflowers can't fill early in establishment, decreasing weed pressure

  3. Have root systems of different depths that complement wildflowers

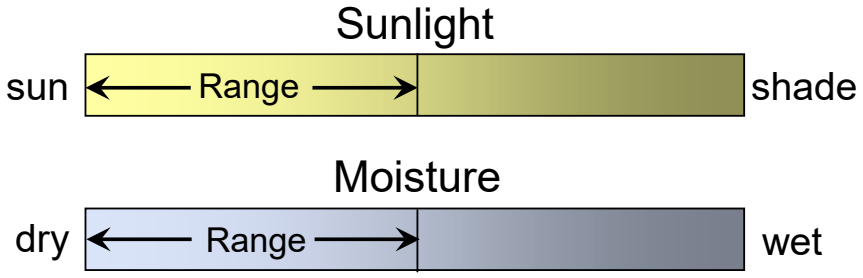


Heidi Natura,
Conservation Research Institute

Canada wild rye *(Elymus canadensis)*

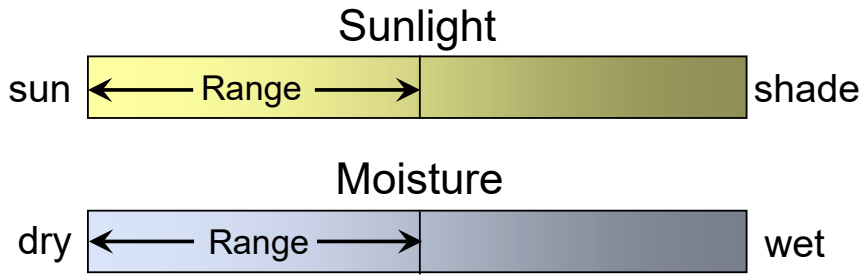
- Attracts Wildlife
  Host Plant, Pollinators, Other Wildlife

- Tolerance
  Drought Tolerant, Deer Resistant, Salt Tolerant



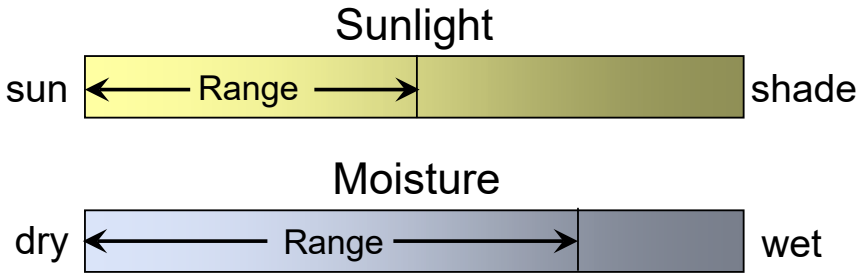
Little bluestem *(Andropogon scoparius)*

- Attracts Wildlife
  Host Plant, Pollinators, Other Wildlife
- Tolerance
  Drought Tolerant, Deer Resistant, Salt Tolerant



Switch grass *(Panicum virgatum)*

- Attracts Wildlife
  Host Plant, Pollinator Powerhouse Plant, Attracts Songbirds
- Tolerance
  Drought Tolerant, Urban Environment, Salt Tolerant



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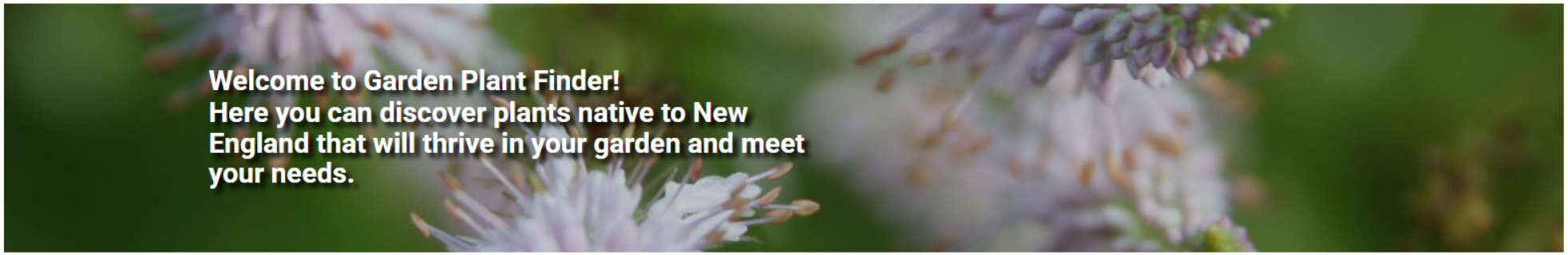

Additional Information

- About Ecoregions, Cultivars and More

Search for plants by name using "quick search," or narrow your results based on plant type, flower color, New England Level 3 ecoregion, exposure, moisture, bloom season, and even cultivation status. Specify whether to show results that meet *all* or *any* of your search criteria by toggling the box at the bottom of the page. You can also use our search tool to access information about the full range of plants sold at Garden in the Woods and Nasami Farm.

Check out our Important Definitions page to learn more about ecoregions, cultivation status, and why certain plants are included in this database.

Note: This site is still under development, and is being regularly updated and improved to make it a more comprehensive resource. To alert us of site functionality problems, please contact **ulorimer@nativeplanttrust.org** .

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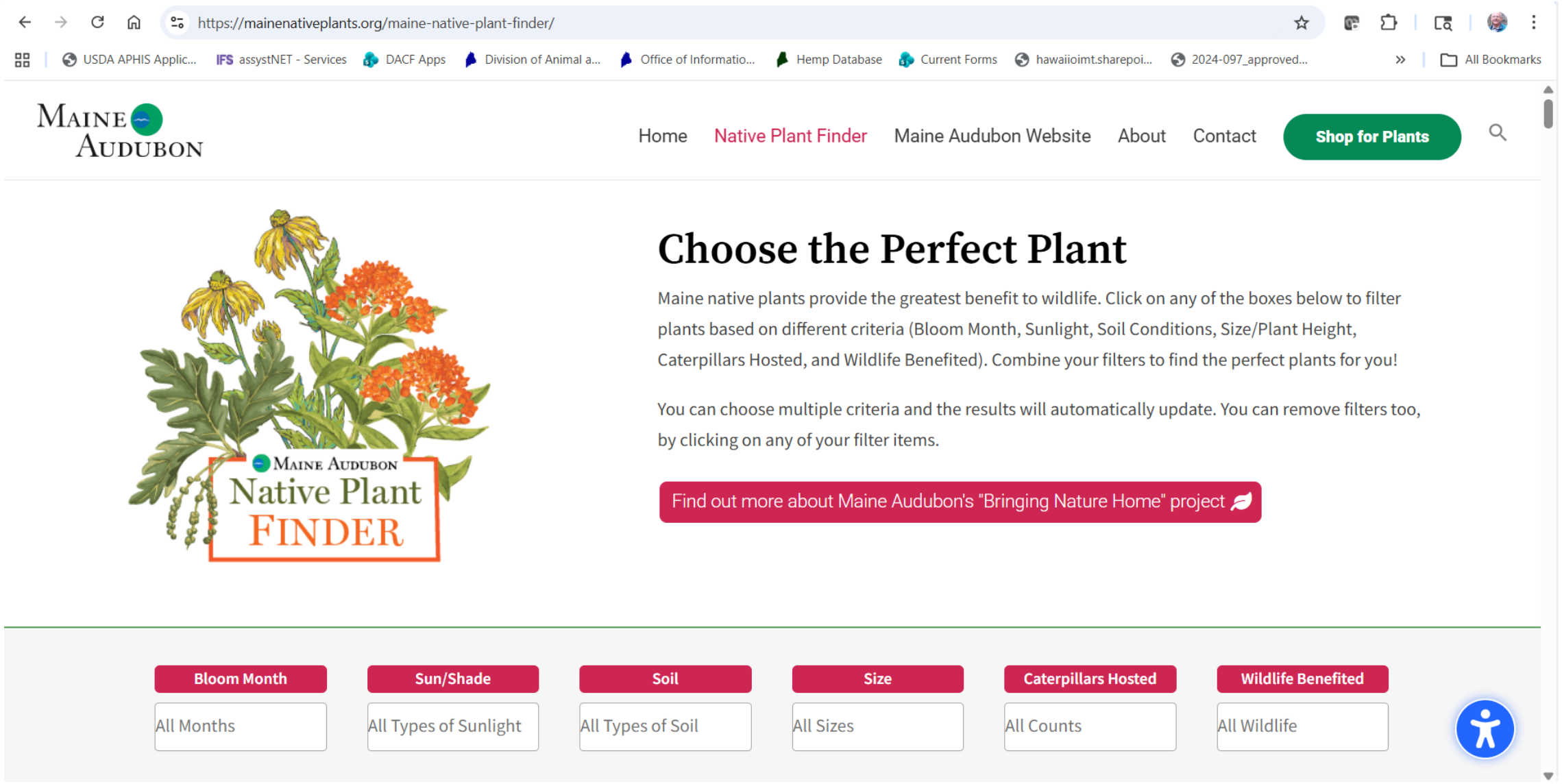

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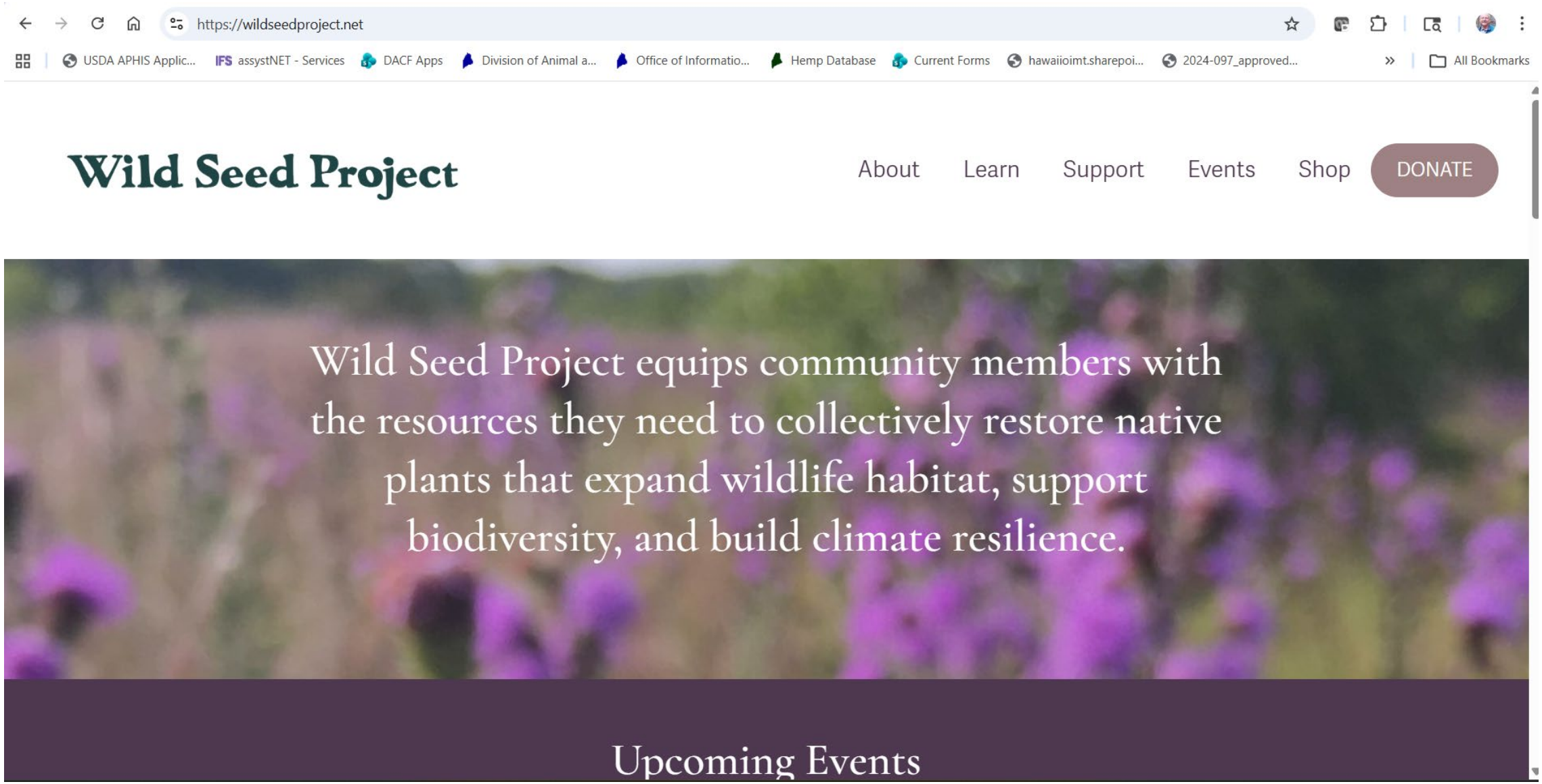

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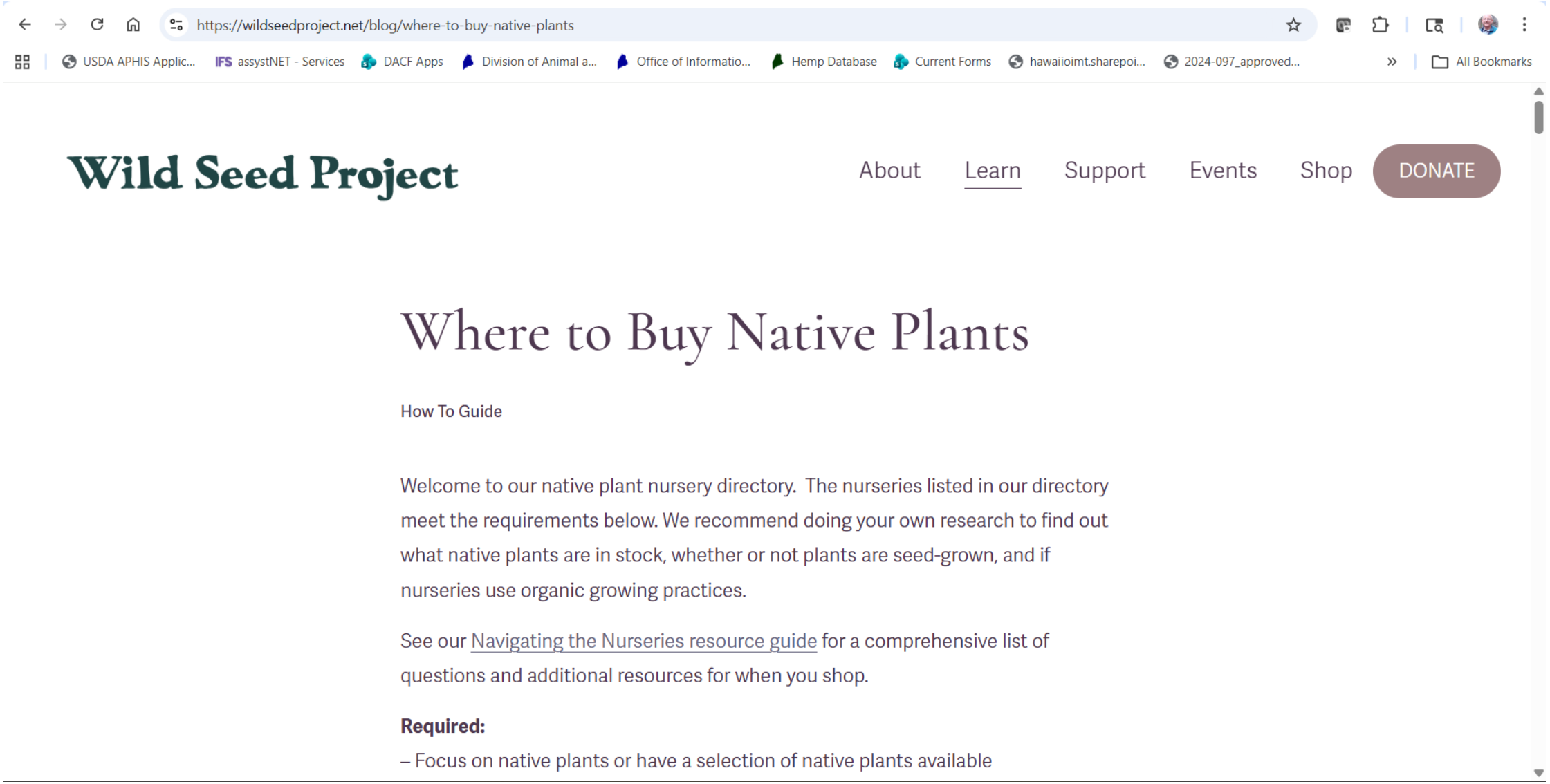

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