2022 Update Mtg Jan 26: What's New in the Weed World?

WHAT'S NEW IN THE WEED WORLD

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JANUARY 26, 2022

UMassAmherst

Cranberry Station

NEW FACT SHEETS

https://scholarworks.umass.edu/cranberry_factsheets/

- Yellow Loosestrife
- Japanese Knotweed
- Phragmites

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Japanese Knotweed

Japanese Knotweed is an invasive, herbaceous, perennial geophyte. It is listed by the Invasive Species Specialist Group (ISSG 1998–2000) as one of the 100 worst invasive alien species in the world. Japanese Knotweed is native to Asia, but was brought to the US in 1877 as an ornamental plant (herbarium record, University of Massachusetts Amherst, Amherst, Massachusetts, USA).

Japanese Knotweed by Randy Prosta

It can now be found in riparian areas and habitats strongly disturbed by man since it prefers nutrient rich habitats where water is readily available (Beerling, 1994). In cranberry bogs in Massachusetts, Japanese Knotweed has been more commonly found in bog ditches rather than on the bog itself (Sandler 51).

Taxonomy

Japanese Knotweed's classification has been debated by taxonomists so it can be seen with various different scientific names including *Fallopia japonica, Pleuropterus cuspidatus, Pleuropterus zuccarinii, Polygonum cuspidatum/compactum, Polygonum zuccarinii, and Reynoutria japonica*. In Europe researchers are split between *Reynoutria japonica* and Polygonum, while in North America researchers typically use *P. cuspidatum* (Global Invasi
Species Database, 2021)

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Yellow Loosestrife

Taxonomy

Yellow Loosestrife's scientific name is *Lysimachia terrestris*. It is recognized as a part of the Loosestrife family (Lythraceae) by some sources and a part of the Primrose Family (Primulaceae) by others. Yellow Loosestrife also goes by a variety of common names including swamp-loosestrife, swamp candles, and bulb-bearing loosestrife (Magee, 1981; Dwelley, 2000). Yellow Loosestrife can be abbreviated to YLS.

Yellow Loosestrife on a Cranberry Bog

to 3 feet tall and can
ited leaves and yellow

es can grow to 4
wide. Leaves are
e in size towards the base and tip of the stem. They are
ched directly by its base. Middle and upper leaves have purple
the season (Magee, 1981). When they are vegatative, these
ine, 1995).

Flowers: The flowers are about ⅜ inches across and about ⅓ inch wide with 5 sepals and 5 petals. Yellow Loosestrife flowers are yellow and streaked with dark lines. The center of the flowers appear darker due to the presence of a ring of red or purple dots at the base of the petals. Flowers are arranged in thin 10 inch long spikes at the tip of the stem. The spikes are loose

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Phragmites

Identification

Phragmites australis/communis, also known as common reed, is a perennial grass. Phragmites can grow 8-12 feet tall with long, flat leaves that are about 24 inches long and 2 inches wide. Purple flowers can be seen August-September and will turn white/brown over time. These flowers are arranged in panicles that can be up to 12 in long with extending ascending branches (Magee, 1981). The flowering portion of the plant has long silky hairs. Phragmites may be confused with wild rice but it can be differentiated because Phragmites have strong rootstocks so it is more difficult to pull up (Fassett, 1980).

Phragmites australis by Richard A. Howard, from USDA- NRCS PLANTS database

From USDA-NRCS PLANTS database. Created by NRCS National Wetland Team.

The stem of the plant is hollow and round and is held upright by long, stout, hairy rhizomes. 70% of the plant's biomass consists of the roots and rhizomes (Sandler et al., 2015). Phragmites spread through these rhizomes as well as through seeds. It was thought that Phragmites reproduce primarily through vegetative growth since viable seeds are rarely found, but in a 2015 North American study it was found that 84% of new common reeds along roads in southern Quebec originated from seeds rather than plant fragments. Once initiated, however, it was found that local stands spread through vegatative growth (Uva et al., 2021; Albert et al., 2015). During the winter rigid stems can persist and continue to bear plume-like seed heads (Uva et al., 2021).

Phragmites is believed to have originated from the Middle East, but today in North America

KERB EMERGENCY EXEMPTION REQUEST SUBMITTED

- MDAR approved expedited request Jan 18, 2022
- Should be on its way to EPA by Feb
- Use permitted April 15-June 30, 2022
- Must report to MDAR any use by Nov 30, 2022
- PRIA (Pesticide Registration Improvement Act) date: August 20, 2022
- Time-limited tolerance for cranberry expires Dec 31, 2022

CLIMATE CHANGE AND WEEDS

BRIEF INTRO

It's all about biology!

PLANTS ADAPTING TO CHANGING CLIMATE

- Can adapt rapidly
- Plasticity; changes in shape, root systems
- Hybridization
- Shift to clonal reproduction
- Flowering shifts with latitude
- Life history shifts
- Occupy broad niches in non-native env
  - Canada goldenrod (NA native), problem in China (Wan et al. 2017)

Weeds on Bogs:
NEW! Invasives (native/non-native)
OLD! Competitive Natives

TRENDS / EXAMPLES OF ADAPTATION AND INVASION

- **Poleward spread due to warming** (Clements and DiTommaso 2011)
  - Johnsongrass (perennial, C4 grass), initially spread via ecotypes with cold-adapted rhizomes (Warwick et al. 1986)
  - Overwintering better as annual; competing strongly with corn (Paterson et al. 2020)
- **Range expansion related to changes in rainfall** (Young et al. 2017)
  - Yellow starthistle usually constrained by low rainfall is increasing distribution with hi spring rain (Bradley et al. 2009)
  - Able to increase growth and reproduction with increased CO_2 (Dukes at al. 2011)
- **Increase dispersal and establishment due to extreme climate events** (Colleran and Goodall 2015)
  - Flooding events increased spread and establishment of Rugosa rose, Japanese knotweed, Carex spp., Phragmites (Toagas-Tellier et al 2015)

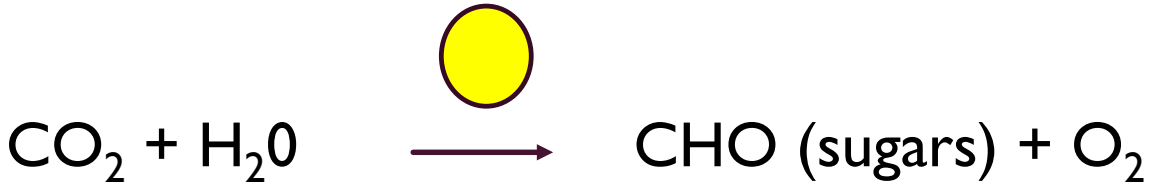
SOME PLANTS DO WELL IN WARMER, CO_2-RICH ENV

- **Poison ivy** (Mohan et al. 2006):
  - Grows faster, larger in higher levels of CO_2, warmer soil T.
  - Produces more urushiol; more itchy
  - Human disturbance favors PI (Jelsko, VA Tech; Poison Ivy Guy)

ANOTHER EXAMPLE…

- ***Panicum capillaire***
  Witchgrass
  (Wu et al. 2021):
  - Summer annual, C4 plant
  - Increased seed germination at >20 C
  - Highly tolerant to moisture stress
  - Viable in seed bank >4 years

PHOTOSYNTHESIS – LIGHT AND DARK REACTIONS



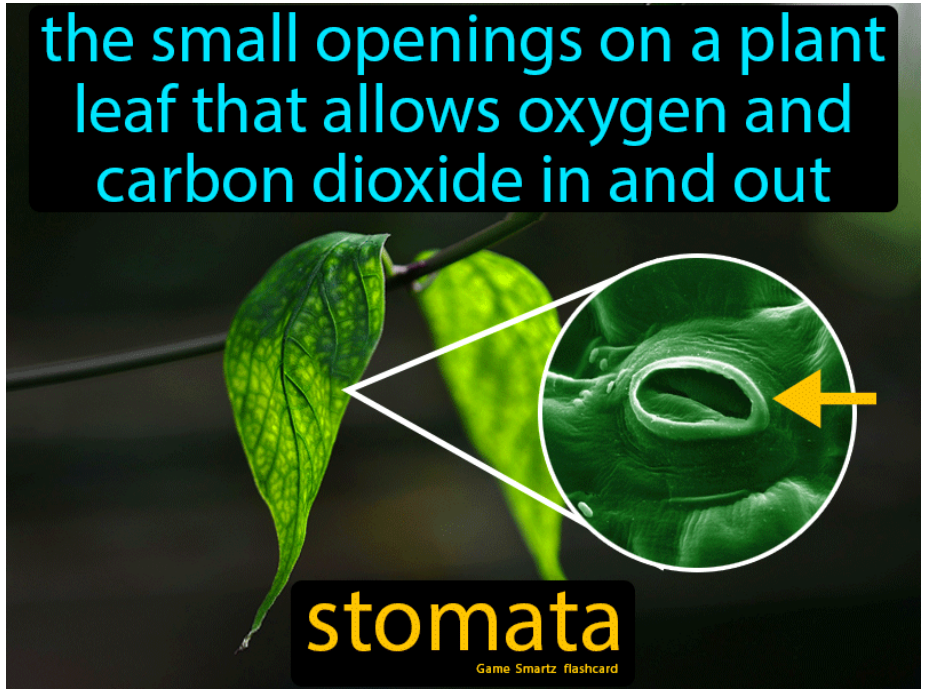
Light energy into chemical energy

- Molecules (NADPH, ATP) produced in light reaction
- Enter the Calvin Cycle (dark reaction)
- RuBisCO is used to fix carbon; make sugar plus more energy

RuBisCO (enzyme): ribulose-1,5-bisphosphate carboxylase/oxygenase

PHOTORESPIRATION – I'M STRESSED!!

- If it gets too hot or dry, plants close their stomata to prevent water loss
- Level of CO_2 entering plant goes down and O_2 level goes up
- Photorespiration occurs….
  - RuBisCO carries O_2 instead of CO_2
  - lose fixed CO_2; less sugars; wastes energy
  - inefficient



RuBisCO (enzyme): ribulose-1,5-bisphosphate carboxylase/oxygenase

PHOTORESPIRATION – TO COPE OR NOT TO COPE

- **C3:** no special features to combat photorespiration
  - Vast majority of plants including cranberry
- **C4:** fix carbon dioxide and perform Calvin Cycle in separate cells
  - Crabgrass, sugarcane, corn (many grasses), tomatoes, redroot pigweed
  - Combats photorespiration, more efficient production of sugars
- **CAM plants:** minimize photorespiration by fixing carbon dioxide (night) and performing Calvin Cycle (day) at separate times
  - Cacti

CAM=Crassulacean acid metabolism

SHORT-TERM OUTCOMES OF ADAPTING TO ENV STRESS

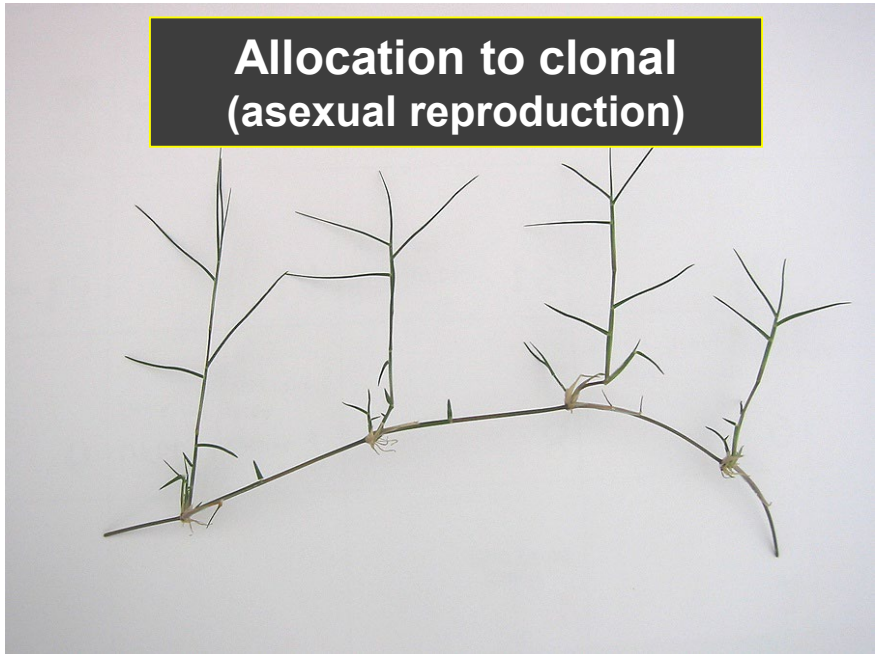
- Photosynthesis is more efficient
- More carbohydrates are produced
- Plants are bigger, better reproduction

CRANBERRY WEEDS THAT SHOULD PROSPER

- **Broomsedge bluestem** *(Andropogon virginicus)*
- **Little bluestem** *(Schizachyrium scoparium)*
- **Other *Panicum* species**
- **Poison ivy** *(Toxicodendron radicans)*

Warm-season perennials!
C4 plants

HOW GRASSES CAPITALIZE ON BEING C4



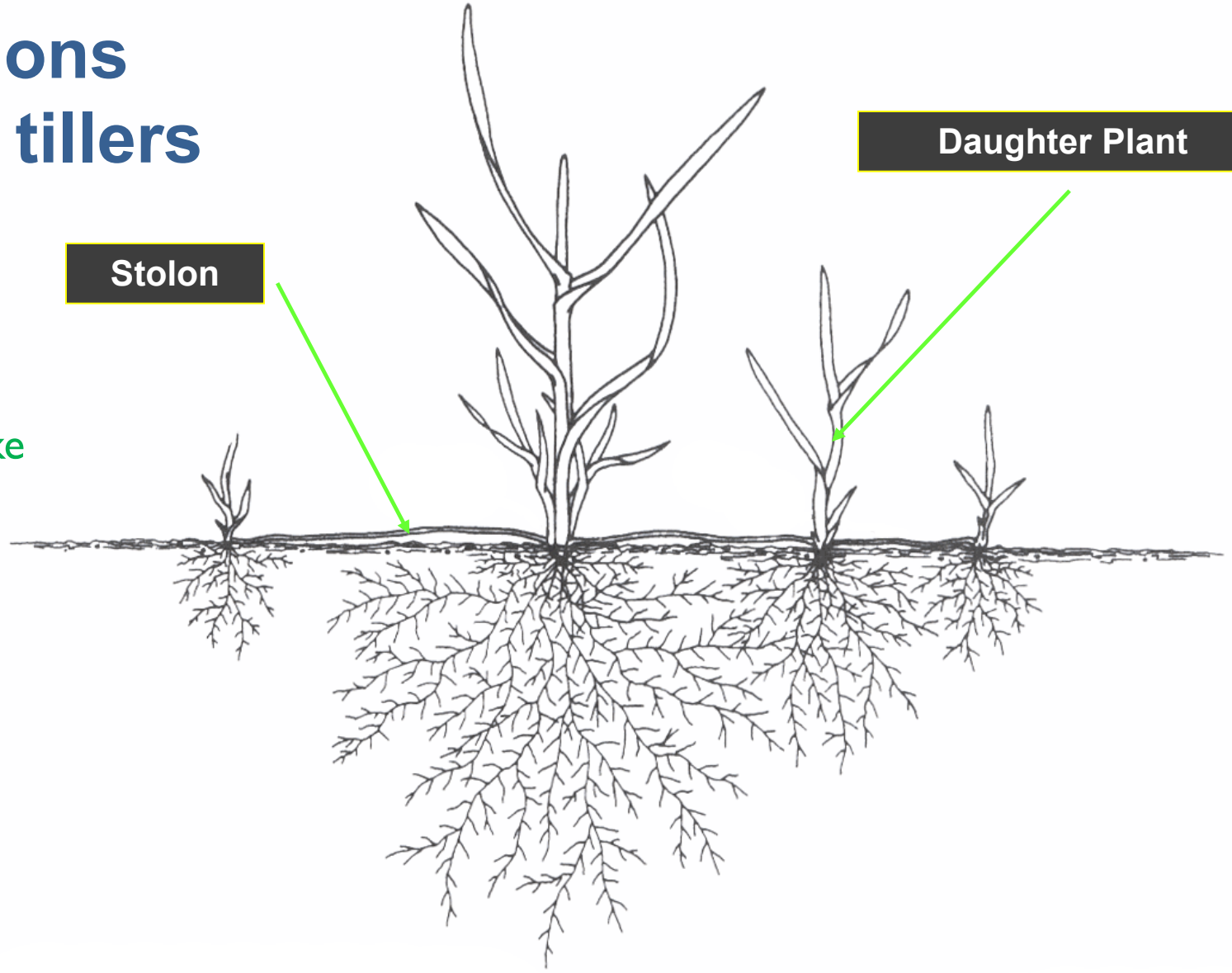
Allocation to clonal
(asexual reproduction)

Seed Bank
(sexual reproduction)

Grow bigger
(use resources)

Stolons and tillers

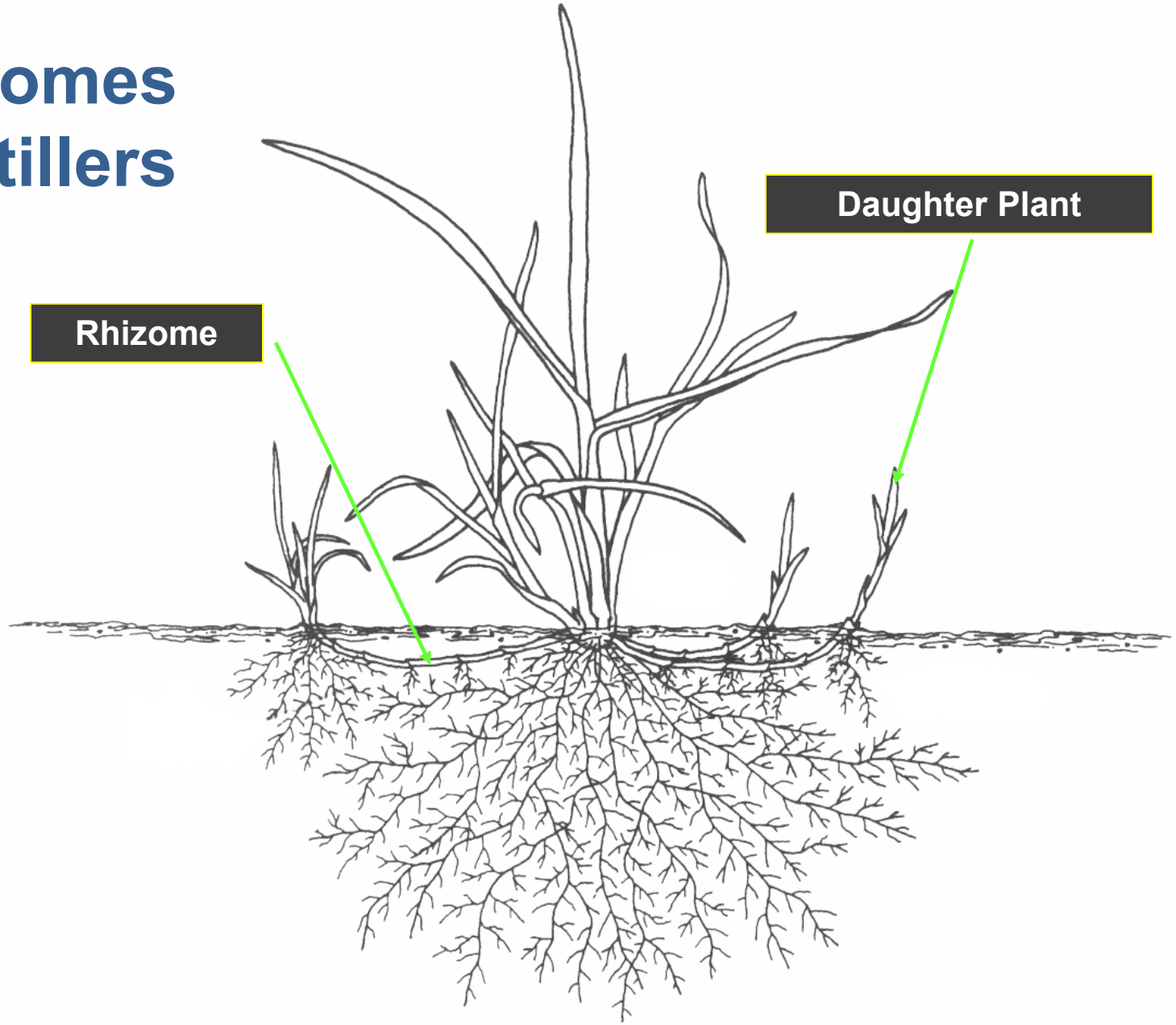
Dewberry grows like this too



Stoloniferous Growth Habit

Rhizomes and tillers

Broomsedge and LBS have rhizomes

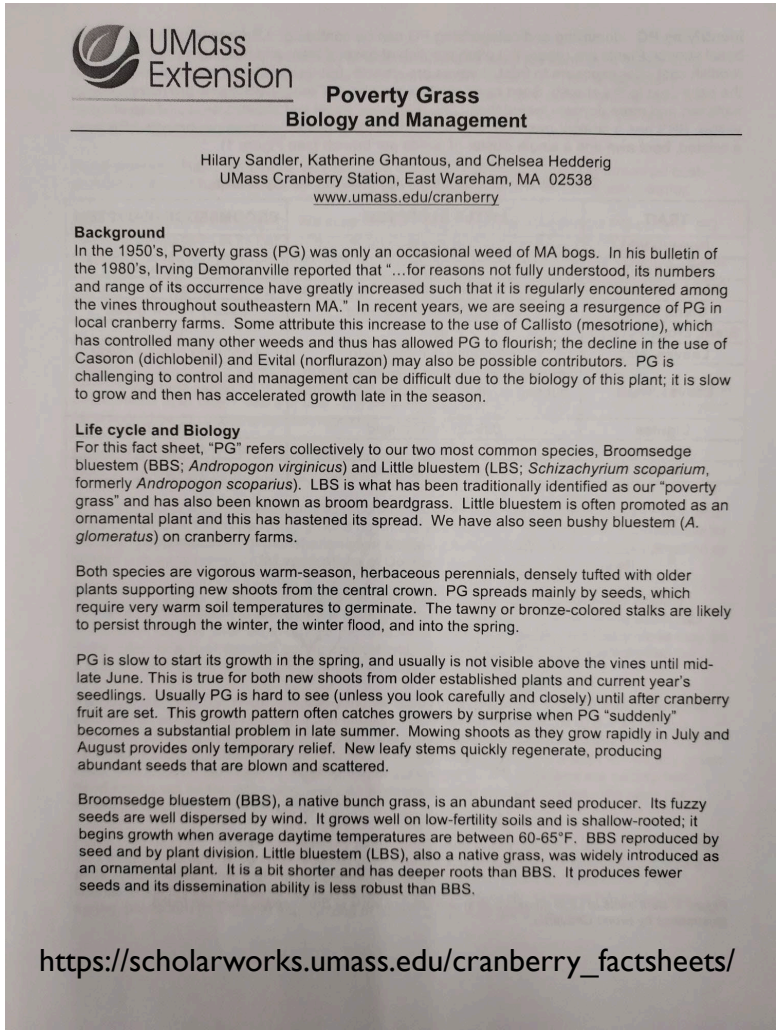


OUR CHALLENGE

- Document/understand environmental stress/changes
  - Insects, diseases, and weeds
  - Crop
- Conduct research relevant to cranberry production
- Develop management options

EXAMPLE: POVERTY GRASS

- PREVENTION: Control young plants, new infestations early and often
- Mow before seeds are formed (and mow again)
- Chemigate with IntensityOne, usually >1 time is best (controls plants)
  - Before seedheads form; growth comes on quickly!
  - Caution at roughneck stage; floral deformities may occur
- If mowing late, remove seedheads from the bog
- Devrinol (late spring) helps to reduce seed germination



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Poverty Grass
Biology and Management

Hilary Sandler, Katherine Ghantous, and Chelsea Hedderig
UMass Cranberry Station, East Wareham, MA 02538
www.umass.edu/cranberry

Background
In the 1950's, Poverty grass (PG) was only an occasional weed of MA bogs. In his bulletin of the 1980's, Irving Demoranville reported that "...for reasons not fully understood, its numbers and range of its occurrence have greatly increased such that it is regularly encountered among the vines throughout southeastern MA." In recent years, we are seeing a resurgence of PG in local cranberry farms. Some attribute this increase to the use of Callisto (mesotrione), which has controlled many other weeds and thus has allowed PG to flourish; the decline in the use of Casoron (dichlobenil) and Evital (norflurazon) may also be possible contributors. PG is challenging to control and management can be difficult due to the biology of this plant; it is slow to grow and then has accelerated growth late in the season.

Life cycle and Biology
For this fact sheet, "PG" refers collectively to our two most common species, Broomsedge bluestem (BBS; *Andropogon virginicus*) and Little bluestem (LBS; *Schizachyrium scoparium*, formerly *Andropogon scoparius*). LBS is what has been traditionally identified as our "poverty grass" and has also been known as broom beardgrass. Little bluestem is often promoted as an ornamental plant and this has hastened its spread. We have also seen bushy bluestem (*A. glomeratus*) on cranberry farms.

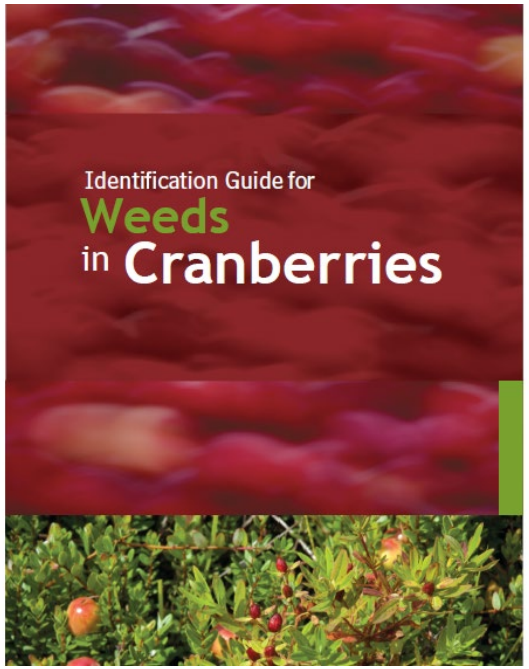
Both species are vigorous warm-season, herbaceous perennials, densely tufted with older plants supporting new shoots from the central crown. PG spreads mainly by seeds, which require very warm soil temperatures to germinate. The tawny or bronze-colored stalks are likely to persist through the winter, the winter flood, and into the spring.

PG is slow to start its growth in the spring, and usually is not visible above the vines until mid-late June. This is true for both new shoots from older established plants and current year's seedlings. Usually PG is hard to see (unless you look carefully and closely) until after cranberry fruit are set. This growth pattern often catches growers by surprise when PG "suddenly" becomes a substantial problem in late summer. Mowing shoots as they grow rapidly in July and August provides only temporary relief. New leafy stems quickly regenerate, producing abundant seeds that are blown and scattered.

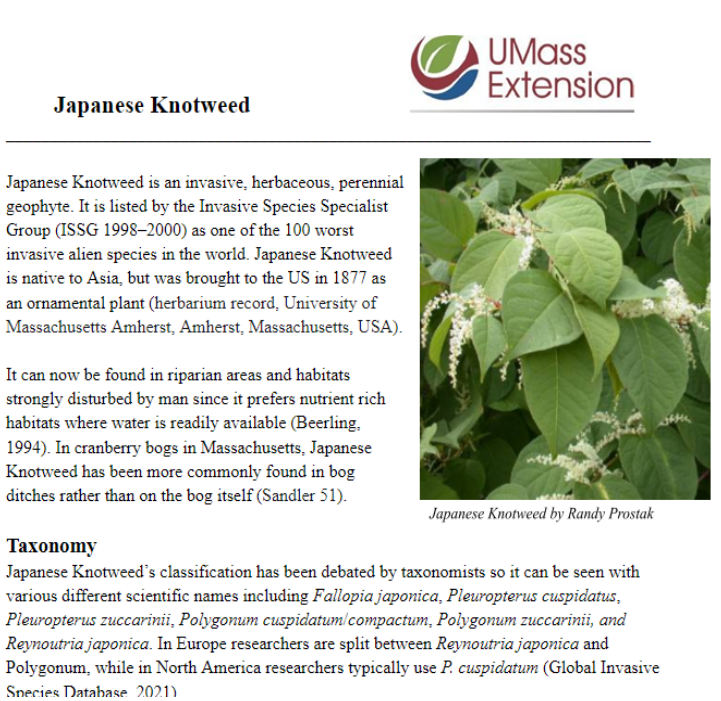
Broomsedge bluestem (BBS), a native bunch grass, is an abundant seed producer. Its fuzzy seeds are well dispersed by wind. It grows well on low-fertility soils and is shallow-rooted; it begins growth when average daytime temperatures are between 60-65°F. BBS reproduced by seed and by plant division. Little bluestem (LBS), also a native grass, was widely introduced as an ornamental plant. It is a bit shorter and has deeper roots than BBS. It produces fewer seeds and its dissemination ability is less robust than BBS.

https://scholarworks.umass.edu/cranberry_factsheets/

SCOUT / ID / SHARE OBSERVATIONS



Copies $25 at Station



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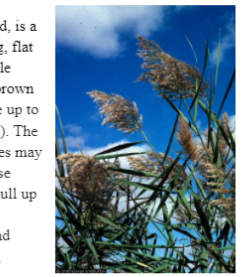

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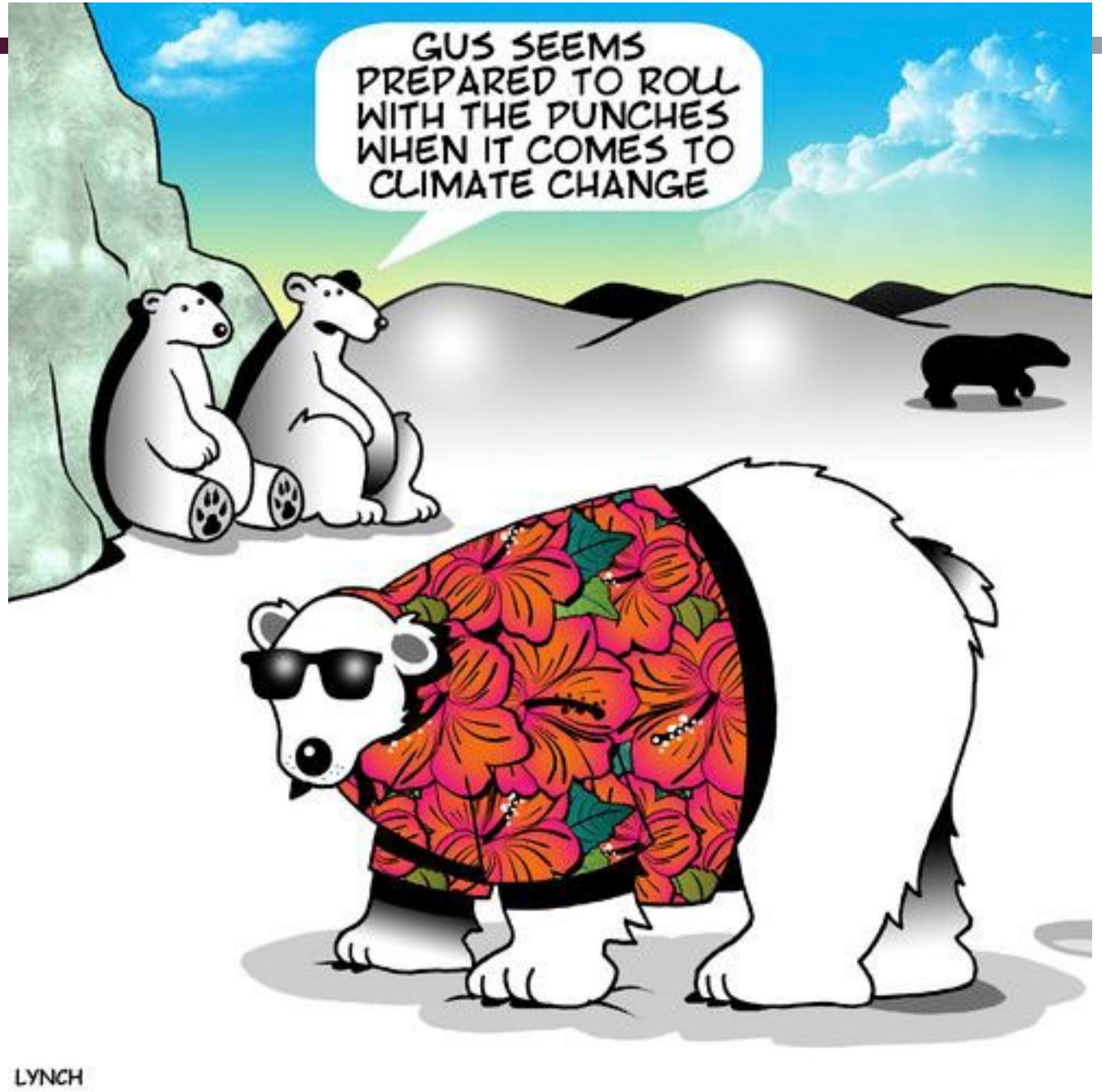
GUS SEEMS PREPARED TO ROLL WITH THE PUNCHES WHEN IT COMES TO CLIMATE CHANGE
LYNCH