

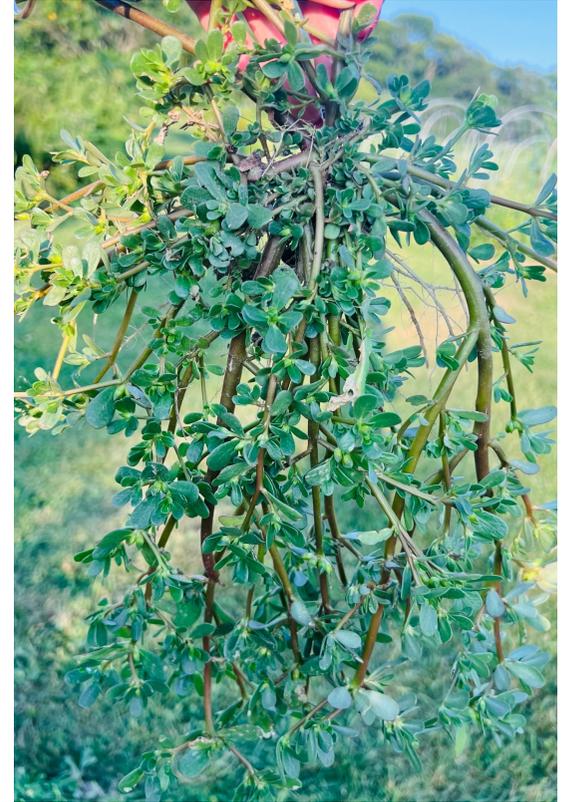
Managing Weeds In and Around the Greenhouse

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What is a weed?

- The Weed Science Society of America defines a weed as ‘**a plant that causes economic losses or ecological damage, creates health problems for humans or animals, or is undesirable where it is growing**’
- Weed Seed bank - The sum of the viable weed seeds in the soil profile
- Factors that influence weed seed bank –production practices, mode of weed seed introduction, weed population and mortality factors



Characteristics of a 'weed'

Plant species with:

- Short life cycles
- Rapid growth
- High environmental adaptability
- Ability to thrive in disturbed soil
- Dormancy
- High reproductive ability
- Seeds that can move into and around a greenhouse easily



Weed presence = High labor cost = Reduced plant quality and market value

4 groups of weeds



Spore-
producing



Grass-like

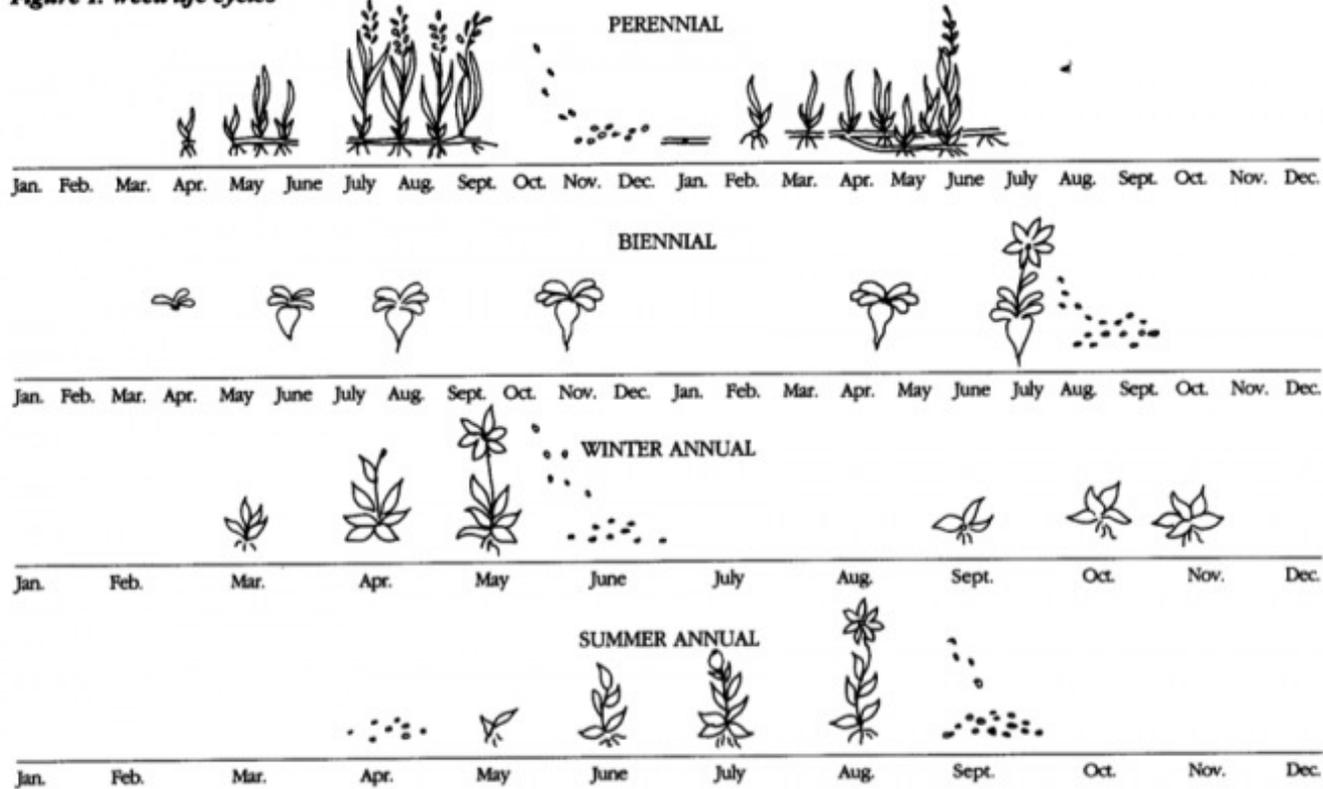


Herbaceous
broadleaf



Woody

Figure 1. Weed life cycles



- Macdonald, H. (2004) Geologic Puzzles: Morrison Formation, *Starting Point*. <http://serc.carleton.edu/introgeo/interactive/examples/morrisonpuzzle.html>

Where are weeds in greenhouses?

- Weeds are a persistent problem in greenhouses, hoophouses, propagation houses and other enclosed structures
- Weeds can be found growing:
 - within the containers of stock plants
 - liners
 - finished plants
 - in container drain holes
 - under benches
 - near walkways



How do weeds move into greenhouse?

- Wind/air movement
- equipment
- humans and other animals
- plant material
- stored growing media



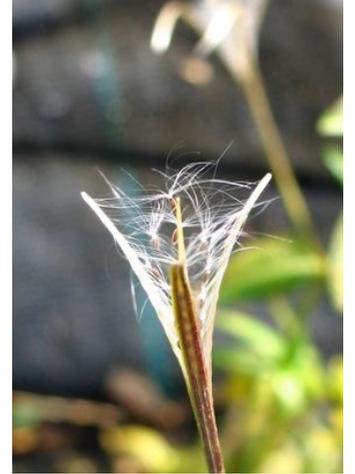
Horseweed (marestail)



Common groundsel



Dandelion



Willowherb

Weeds can move by animal vectors

- Dodder seeds can be dropped into houses by birds landing on air vents.



**Weed seed vectors:
equipment, soil components, clothing**

On clothing and
equipment



Weeds like Carolina geranium
have structures which allow
for 'hitchhiking' when they
are mature.



How do weeds move around **in** the greenhouses?

- Self propulsion/ explosive dehiscence (e.g., bittercress, creeping woodsorrel, yellow woodsorrel, mulberry weed)



Bittercress



Creeping woodsorrel



Yellow woodsorrel



Mulberry weed

How do weeds move around **in** the greenhouses?

- Air movement
- Human traffic
- Plants, media, pots
- Irrigation (Liverwort, moss, Birdseye pearlwort)



Liverwort



Moss



Birdseye pearlwort



Common greenhouse weeds



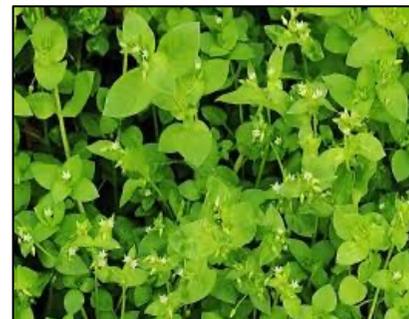
Yellow Woodsorrel



Spotted Spurge



Hairy bittercress



Common Chickweed



Mulberry weed



Annual bluegrass



Large Crabgrass



Sowthistle

Yellow Woodsorrel (*Oxalis stricta*)

Habitat: Drain holes of containers or on media surface; Found in full- and partial-sun



Growth Habit: Usually upright and readily branching, but may also grow prostrate

Shoot: Stems light green and slightly hairy. Leaves are palmately compound, alternate



Inflorescence: Three flower stalks branch from a single main stalk. Flowers yellow, have 5 petals. Flowers spring through fall

Fruit and Seeds: Capsule fruit- Mature capsules explosively dehisce when touched.



Willowherb (Epilobium spp.)

- Easy to ignore until infestations get large
- Small, four-petaled flowers that are usually **pale pink to white**.
- Produces long, needle-like pods (capsules) – explosive spread (60K per plant)
- Moisture loving plant
- Manage: Sanitation (watch incoming liners/ plants), hand pull, Mulch



Hairy Bittercress (*Cardamine hirsuta*)

- Rapidly growing winter or summer annual
- Often found in irrigated or shaded areas but can grow in full sun
- Dense basal rosette or upright growth
- Leaves compound with 2 to 8 alternately arranged leaflets & larger terminal leaflet
- Mostly hairy leaves initially develop from a basal rosette
- Flowers small, white, 4 petals, in terminal clusters
- Fruits narrow, ~1-inch long, upward-pointing capsules
- Fruits explosively eject numerous small seeds (explosive dehiscence)



Common groundsel (*Senecio vulgaris*)

- Summer or winter annual capable of multiple generations per year.
- Leaves: Alternate, sparsely hairy to smooth with variable leaf shape with irregular lobes and coarsely toothed margins
- Numerous yellow, cylinder- to cone-shaped flower heads are produced in clusters at the stem ends.
- On attaining maturity, the bracts open to reveal a ball of white-tufted seeds.
- The seed is enclosed in a single- seeded, wind-disseminated fruit that forms in a white, approximately 0.5-inch-wide puffball collection



Large Crabgrass (*Digitaria sanguinalis*)

- Prostrate to ascending summer annual
- Both leaf surfaces and sheath are densely hairy
- Leaves are generally shorter, wider and more tapered than those of most other grasses
- Prostrate to ascending stems may reach 3 feet tall, capable of rooting at the nodes
- Each plant is capable of producing thousands of yellowish brown, narrow oval to lance-shaped seeds



Barnyardgrass (*Echinochloa crus-galli*)

- Erect summer annual
- Hairless leaves, occasionally with a few hairs near the base, are rolled in the bud and up to 20 inches long. Leaves have a distinct midvein and are rough to the touch on both surfaces
- Erect, thick, hairless, up to 5-foot tall stems are round to flattened in cross-section
- Stems are bent, branched, purple-tinted at base
- Seedhead consists of several coarse, thick branches that occur in an upright to nodding terminal panicle
- The green, purple to brown panicle yields tan to brown, shiny oval seeds



Fatoua villosa
(mulberry weed or crabweed)

- Summer annual
- Likes moist, shady environments
- Seeds will 'pop' from capsules when ripe



Horseweed (marestail)

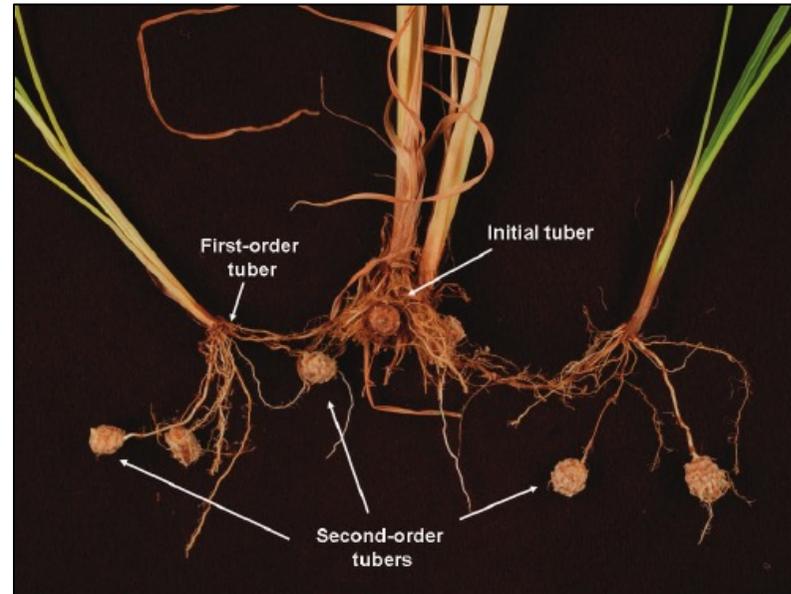
Conyza canadensis

- Winter or summer annual (forms a rosette and a bolt)
- Produces a massive, branched panicle at the top with hundreds of tiny, inconspicuous white-to-greenish flowers.
- Seed rain – Wind carried (200K seeds per plant)
- Highly competitive
- Manage: Early detection, hand pull, Mulching, cover cropping



Yellow Nutsedge

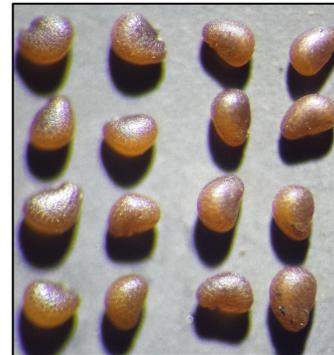
- Shoots triangular, borne individually from a tuber or basal bulb
- Leaves yellow-green color
- Produce deep fibrous roots, rhizomes, and distinct tubers
- Tubers are produced on rhizomes, or underground stems
- Buds on tubers sprout and grow to form new plants



Birdseye Pearlwort (*Sagina procumbens*)

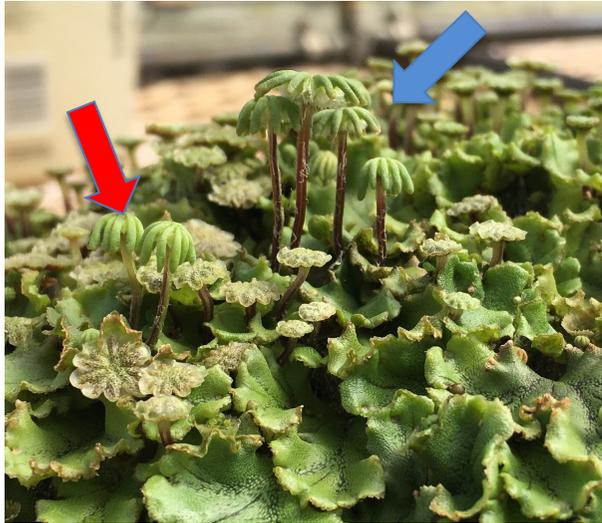


- Grows well where moisture is abundant
- Winter Annual or perennial
- Mat-forming plant
- Narrow leaves in a rosette, ending in a bristle-like point
- Root system: Shallow slender taproot, divides very frequently into secondary roots.
- Blooming period: mid- to late spring
- Flowers: white, very minute
- Seeds: Very tiny, dispersed by wind
- The pearlwort seedlings are frost tolerant and can survive and grow in temperate climates



Liverwort (*Marchantia polymorpha*)

- Its name derives from the liver-shaped form of thalloid – no true roots or leaves
- A nonvascular, primitive, spore-bearing bryophyte
- Grows on shaded moist soil and rocks in damp habitats
- Often grows in gardens, paths and greenhouses



Antheridiophores, Archegoniophores, Gemmae

***Nostoc* sp. or cyanobacteria or blue green algae**

- Slimy and slippery in presence of moisture
- Composed of aggregated and entangled trichomes (chains of cells)
- Macroscopic mats and gelatinous colonies
- Cause safety issue for nursery growers and workers
- Control:
 - Sanitation
 - Chemicals such as TerraCyte PRO, Zeritol, and Scythe have shown some effective control



Traveling Companions?

‘Southern’ weeds that we may see in the north as
temporary pests
~ usually infesting plants or media brought in from
southern areas



long stalk
Phyllanthus



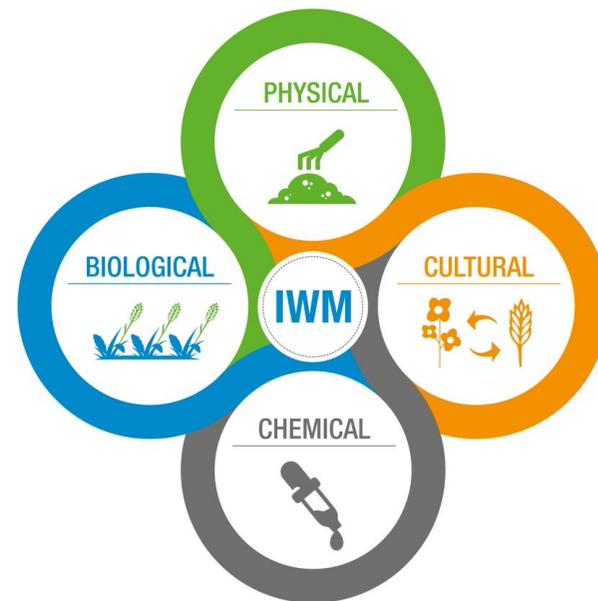
Eclipta



Several Spurge species

Integrated Weed Management

- There is usually more than one approach to managing weeds
- Scouting and prevention = first line of defense
- Weed log - Knowledge of weed seed germination/ seedling emergence ecology
- Other approaches: Physical, mechanical, chemical
- Integration of methods = sustainability
- Balance cost, labor, and crop safety



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Thank you!

Let's stay in touch!
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