Kill Your Weeds . . . With Weeds

Presented by Kathy Connolly, February 2026

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Kathy@SpeakingofLandscapes.com, website: www.SpeakingofLandscapes.com

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Overview

Many people seek short plants to fill spaces, often referring to them as ground covers. Another common goal is to find "ground covers that 'hold out the weeds'?" These goals are reasonable, but the answers are a bit complex.

If you are trying to defend against a growing number of "super-weeds," the answer is, "Sorry, but no, there are no groundcovers to do that job before extensive site preparation." Phragmites, knotweed, mugwort, black swallowwort, barberry, burning bush, goutweed, kudzu, bull thistle,

and non-native invasive vines, such as porcelainberry, appear to lack effective competitors among regional native plants.

Yet, there are desirable native plants and temporary cover crops[1] that may exclude other, less aggressive invasive plants. With appropriate removal of weeds, and good site preparation, some ground covers may be very effective at keeping space relatively free of unwanted plants.

How do plants compete for space?

Plants compete with one another for light, water, nutrients, germination sites, canopy space, and pollinators. Plants also recruit soil microbes as partners in their competition for space.

Agricultural scientists Frank A. Einhellig and James A. Rasmussen write in their article on allelopathy at Encyclopedia.com, *"It is rare that plants are unaffected by neighboring plants."*

Below, see some competitive strategies plants use to establish themselves and thrive.

1. Light competition: Plants with the biggest leaves win the most sunlight. For instance, hay-scented ferns on woodland edges have fronds that cross and hover densely at ground level. Few can deny its ability to exclude other plants. This plant's tendency to dominate both shady and sunny sites through rhizomes can be troubling in some circumstances.

In other cases, leaf canopies hug the ground, reducing opportunities for other plant seedlings to succeed. Some native examples of ground-hugging leaves include pussytoes (*Antennaria plantaginifolia and A. neglecta*), wild strawberries (*Fragaria virginiana*), and barren strawberries (*Geum fragarioides*). These plants also have dense, rhizomatous root systems that further enable them to dominate space. Some form small patches, such as pussytoes, while wild strawberries (true strawberries) and barren strawberries (not true strawberries!) can cover extensive spaces. When creating a planting plan, look for plants with leaves that can "steal" light from unwanted competitors.

Some plants leaf out very early, thus robbing other early plants of sunlight. Roundleaf ragwort (a.k.a. roundleaf groundsel, *Packera obovota*) is one such native plant, as is its cousin golden ragwort (a.k.a. golden groundsel, *Packera aurea)*.

Among non-native, invasive plants, garlic mustard (*Alliaria petiolata*) and lesser celandine (*Ficaria verna*) are two notorious examples. In addition, their broad basal leaves and tendency to allelopathy have negative impact on some native spring ephemerals.

[1] It can be valuable to employ cover crops and other temporary plants during the site preparation phase.

3. Herbaceous spread: Plants that spread by stolons and rhizomes are often good candidates as dense groundcovers. Examples include wild strawberries *(Fragaria virginiana*), creeping phlox (*Phlox stolonifera),* and wild ginger (*Asarum canadense)*.

4**. "Placeholders"** Tap-rooted plants can grow among shallow-rooted plants, filling in the ground cover. Some examples include orange butterfly-weed (*Asclepias tuberosa),* pale purple coneflower (*Echinacea pallida),* and roundhead bush clover *(Lespedeza capitata)*.

5. Opportunism and unique adaptations: Some plants can become well established where few others can survive. Look for evidence of unique adaptations while doing plant research.

Moss is a great example; it attaches to surfaces with "rhizoids." Moss has no roots. Mosses compete well in places unfriendly to rooted plants, such as soil with very low or high pH, deep shade, areas under mature trees, areas with little or no soil, compacted soil, and areas with high humidity.

Other plants are adapted to specific, extreme environments. For instance, rock polypody ferns live on bare rock and shady cliffs. Low-bush blueberries can cover rocky "balds," areas with very little topsoil where almost nothing but moss and lichen grow. American beach grass can thrive in 100 percent sand.

Yet other plants can repel attacks through chemistry. White snakeroot (*Ageratina altissima*) can thrive in areas with heavy deer pressure due to its chemistry.

5. Allelopathy: A plant can exude toxic substances that discourage germination and seedling development in other plants. Allelopathy is a common phenomenon among plants worldwide, but the amount of exudate and its seasonality vary widely. [2] [3] [4] Allelopathy most frequently occurs through roots, but rainfall over leaves, and decaying plant parts may also contribute to this defense system.

Note: Evidence of allelopathy in lab tests may not predict the presence or amount of allelopathy in field conditions. Some plants, such as cereal rye, suppress other plants under laboratory conditions. In field conditions, however, they don't always seem to have the same measurable effect.[5]

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[1] See Biol Invasions (2021) 23:367–371, "Allelopathy is pervasive in invasive plants,"

https://link.springer.com/article/10.1007/s10530-020-02383-6.

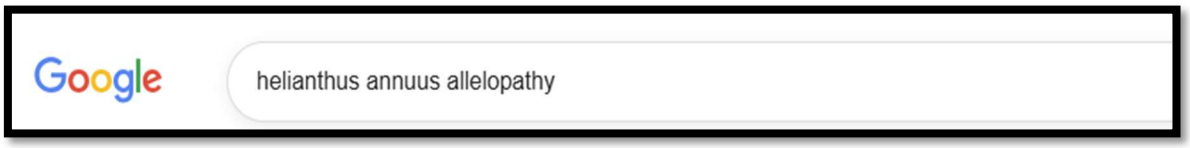
[3] Allelopathic Properties of *Lamiaceae* Species: Prospects and Challenges to Use in Agriculture. Plants 2022, 11,1478. https://doi.org/10.3390/plants11111478

[4] Coal Mine Reclamation with Native Allelopathic Plants, https://warnercnr.colostate.edu/frs/coal-mine-reclamation-nativeallelopathic-plants/

[5] Cereal Rye Cover Crop for Weed Suppression, https://ipcm.wisc.edu/blog/2022/05/cereal-rye-cover-crop-for-weed-suppression/

Both native and non-native plants use allelopathy. Agricultural studies have shown that some native sunflowers (*Helianthus spp*.), milkweeds (*Asclepias spp*.), and goldenrods (*Solidago spp*.) exhibit allelopathic properties that can be detrimental to field crops.[6] Members of the mint family are often allelopathic in garden settings. Native wild ginger (*Asarum canadense*) grows densely by rhizomes in shady spaces, and some sources have identified allelopathy in its root exudates.

Allelopathy research hint: Use this search engine "hack" to identify plants with allelopathic tendencies: Place a botanical name in a search engine window and follow the name with the word "allelopathy," excluding the quotes. This approach will produce an AI summary, along with literature citations.



Sources of information on plant toxicity to humans and animals:

- North Carolina Extension Gardener Plant Tool Box: https://plants.ces.ncsu.edu/
- ASPCA Toxic and Non-toxic Plants List https://www.aspca.org/pet-care/animal-poisoncontrol/toxic-and-non-toxic-plants

6. Resistance to herbivory. Plants that resist deer, rabbits, and other plant-eaters have an obvious competitive advantage, and may be successful ground covers. Herbivore resistance is often related to the following characteristics:

- Fuzzy leaves (Mountain mint?)
- Bad-tasting substances in leaves and branches. (These substances may also be involved with a plant's allelopathy, see above.) (White snake-root?)
- Scents unwelcome by an animal. (Lavender?)
- Other mechanical deterrents, such as thorns and briers.

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6 https://www.researchgate.net/publication/256486001_Biology_and_control_of_common_milkweed_Asclepias_syriaca

Also see: Allelopathic effects of Canada goldenrod leaf extracts on the seed germination and seedling growth of lettuce reinforced under salt stress. https://pubmed.ncbi.nlm.nih.gov/30547327/

7. Manipulations of microbial populations: Plants control microbial populations in their locations with root exudates. (This is separate from allelopathy.) They can favor "friendly" microbial populations or disfavor microbes needed by competitor plants.

Rating scales that describe plant behavior

Plant scientists, ecologists, and horticulturists have developed a range of scales to describe plants' opportunism, dispersal tendencies, and unique competitive adaptations. These scales are based on extensive plant research, and the explanations are technical. Nonetheless, they can be especially useful when complex planting decisions are under consideration or unexplained plant failures need to be addressed.

See a discussion of various approaches to rating plants' behavior in landscapes in "Perennial Plant Sociability Metrics" by Brandon George, 2021.[7] A few of these are listed below:

- Plant sociability scales. *(for example:* Grime C-S-R Scales) For a discussion of this method, see Jared Barnes' website: https://meristemhorticulture.com/planted/2019/2/23/pin-the-plant-on-the-triangle or Benjamin Vogt's https://prairieup.com/product/plant-sociability-index/

- R-K Ecological Succession. This concept describes the succession of plants after a disturbance. "R" plants, often called pioneer or ruderal plants, are the first to colonize, having seeds that are dispersed by wind or animals. They tend to tolerate disturbed sites, but are short-lived. Dandelions are a classic example of pioneer plants in barren fields. "K" plants are often called establishment plants. They enter a disturbed ecosystem later, possibly after pioneer plants have improved the habitat for more difficult-to-establish plants. https://en.wikipedia.org/wiki/Ecological_succession

- Ecoregional Floristic Quality Assessment. These studies assign a "coefficient of conservatism" to native plants, a numeric description of their likely "fidelity" to specific undisturbed (natural) habitats. The C-value scale ranges from 0 to 10, with plants rated 10 likely to be least tolerant of disturbed or "unnatural" conditions, thus having the most specific habitat requirements. These values vary by region. This is an evolving research process and has not been completed for every region of the US. Wikipedia provides a good introduction: https://en.wikipedia.org/wiki/Floristic_Quality_Assessment.

- ***Hint*:** Use this search term for Indiana plant rating list: *"floristic quality assessment Indiana"*

[7] Perennial Plant Sociability Metrics, Brandon George, 202, https://www.academia.edu/50824088/Perennial_Plant_Sociability_Metrics_Tools_to_Interpret_Designed_Plant_Communities_for_Public_Gardens1

Cover Crops for Site Preparation and "Place Holding"

- Contribution of Cover Crop Mulches to Weed Management: https://ipm.cahnr.uconn.edu/contribution-of-cover-crop-mulches-to-weed-management/
- Managing Cover Crops in Spring: https://extension.uconn.edu/publication/managing-cover-crops-in-spring/
- Cover cropping Home Garden Fact Sheet: https://extension.unh.edu/resource/cover-cropping-home-garden-fact-sheet
- How to Choose Cover Crops: https://www.americanmeadows.com/content/clover-grass/howto/choose-cover-crops
- Benefits of Cover Crops vs. Companion Crops: https://www.ernstseed.com/benefits-cover-crops-vs-companion-crops/
- Johnny's Selected Seeds Cover Crops Library: https://www.johnnyseeds.com/growers-library/farm-seed-cover-crops/growers-library-farm-seed-cover-crops.html
- Cereal Rye Cover Crop for Weed Suppression, https://ipcm.wisc.edu/blog/2022/05/cereal-rye-cover-crop-for-weed-suppression/

Naturalized Low-mow Lawns:

- University of Minnesota: https://beelab.umn.edu/bee-lawn
- Cornell Botanic Gardens: https://cornellbotanicgardens.org/explore/on-campus-naturalareas/native-lawn-demonstration-area/all-about-our-native-lawn/

Competitive Native Ground Covers

Based on personal observation and literature search, the plants listed below may be good competitors that reduce opportunities for unwanted plants. As always, study the site and the plant's characteristics and site requirements before making a choice.

Low-growing—Under 1'

Sedges: Healthy fine-leaf sedges such as Pennsylvania, Appalachian, White-tinged, and Rosy sedges create a ground-level canopy in conditions where few other plants are as vigorous. Sedges prefer part to full shade. *Carex pensylvanica, C. woodie, C. Appalachica, C. albicans, and C. rosea* are good choices for the northeast and mid-Atlantic. See the valuable Mt. Cuba Center guide to sedges, "Carex for the Mid-Atlantic Region" https://issuu.com/mtcuba/docs/22034-carex_report-final121922. (Free download)

Barren strawberry: *Geum fragarioides* (A.k.a. Waldsteinia fragarioides) is a ground-hugging shade lover that holds its own among unwanted ground-huggers such as creeping Charlie and ground ivy. Be aware that *Geum fragarioides* may be easily confused within the nursery trade with a nonnative relative, *Geum ternatum* (a.k.a. *Waldsteinia ternatum*).

Wild strawberry: This plant is adaptable to various conditions, from moist to dry and from part shade to full sun. Once established, it covers the ground densely. Light foot traffic and occasional mowing don't seem to hurt it. Stoloniferous, aggressive. Its native cousin, woodland strawberry, *Fragaria vesca*, tolerates more shade.

Canada Wild Ginger: The plant thrives in moist shade and part shade, where it appears to crowd out ground-level competitors. I have found it slow to establish. *Asarum canadense* shows up on some lists as possibly allelopathic.

Meehan's mint: *Meehania cordata* is a non-aggressive mint that does well in a number of environments, including areas under trees.

Heuchera: *Heuchera villosa, Heuchera americana*. This shallow-rooted plant spreads a broad canopy and tolerates most shade conditions. Midwestern and southern native.

Foamflower: *Tiarella cordifolia*. The plant spreads slowly by stolons into small patches. It works well as a filler. Shade-tolerant.

Woodland stonecrop: *Sedum ternatum* is both drought and shade-tolerant. It is a good candidate for rock gardens and under trees.

Pussytoes: The leaves of *Antennaria plantaginea*, *A. rosea*, and *A. neglecta* form dense, ground-hugging leaf covers that seem to eliminate competition. In addition, at least one source refers to pussytoes as allelopathic.[8]

Medium height 1' – 3'

Wild petunia: *Ruellia humilis* is known for its ability to withstand a relatively broad range of conditions, including heat and drought once established. Midwest native.

Lance self-heal or heal-all: *Prunella vulgaris* and the related Northeastern native, *Prunella vulgaris ssp. lanceolata,* are low-care, vigorous plants that tolerate many conditions. Its flowers are about 12" tall, but the leaves form a dense, low-growing canopy that seems to deter ground-level competitors. It can be used in low maintenance "bee lawns" because it can take occasional mowing, according to University of Minnesota Bee Lab. (https://beelab.umn.edu/bee-lawn)

[8] Coal Mine Reclamation with Native Allelopathic Plants, https://warnercnr.colostate.edu/frs/coal-mine-reclamationnative-allelopathic-plants/

Taller, 3' +

Bergamot, *Monarda fistulosa*, grows to 5' tall and forms dense stands that exclude other plants. A strong spreader with potential allelopathic effects, according to several studies.[9]

Mountain mint, *Pycnanthemum muticum*, forms dense stands up to 4' tall that seem to defy invasion by other plants. Very deer resistant.

Rough goldenrod, *Solidago rugosa*, forms dense colonies about 4-5' tall in sunny, dry spaces. The 'Fireworks' cultivar is particularly dense when established, and it is shorter and less aggressive than the Canada goldenrod.

Flat-top goldentop, *Euthamia graminifolia,* is very similar in habit to rough goldenrod. It is a close relative of the goldenrod (*Solidago)* genus.

White snake root, *Ageratina altissima,* competes by allelopathy and is highly deer resistant. It is also toxic to cattle and humans; use with caution.

Ostrich fern: *Matteuccia struthiopteris* is an aggressive fern in both shade and sun. Very few plants appear to compete with it. The same is true of hay-scented fern, *Dennstaedetia punctilobula*.

More plants: Broad basal leaf coverage, persistent through growing season (rosette or other form)

The basal leaves of the following plants persist, even after the taller flowers have gone by: Cutleaf coneflower (*Rudbeckia laciniata*), heart-leaved groundsel (*Packera obovata*), golden groundsel (*Packera aurea*), wine cups, (*Callirhoe involucrata)*.

Books

The Gardener's Guide to Prairie Plants by Neil Diboll and Hillary Cox. Excellent reference for home gardeners. Tons of charts and tables, including root characteristics and plant longevity.

The Dynamic Landscape by Nigel Dunnett and James Hitchmough. Updated, 2026. Advanced practitioners guide.

[9] https://pmc.ncbi.nlm.nih.gov/articles/PMC9461344