Garden Zombies! Myths that will not die

Seminar roadmap

- Sources of information
- Evaluating information
- Assessment examples: products, practices, and phenomena
- Good and not-so-good science

Sources of information

- Scientific – peer reviewed, academic audience
- Gray – not peer reviewed, professional audience
- Popular – not peer reviewed, general audience

Assessment of products and practices

- No supporting science (no research; inconsistent or negative results; poor quality research or reporting)
- Misapplied science (agricultural products and practices applied to nonagricultural settings)
- Overextrapolated science (products and practices with limited efficacy outdoors, and perceived phenomena with no landscape-level evidence)

Evaluating information using the CRAP test

- **C**redibility of the source
  - Author's credentials and qualifications?
  - Publisher?
  - Website urls?
- **R**elevance to managed landscapes
  - Crop production or urban landscapes?
  - Geographic or other constraints on usability?
- **A**ccuracy
  - Science-based?
  - Objective?
  - Current?
  - Well-written?
- **P**urpose
  - Educational or commercial?
  - Political, ideological, cultural, religious, or personal biases?
  - When in doubt, consult with relevant discipline experts

No consistent, reliable supporting science

- Products
  - Balanced fertilizers
  - Compost tea
  - Conditioners
  - Kelp products
  - Organic superiority
  - Vitamin B-1 transplant fertilizer
  - Wound dressings
- Practices
  - Biodynamics
  - Companion planting
  - Fertilizer injections
  - Hot weather watering
  - Hügelkultur
  - Lasagna mulching
  - Leaving rootballs intact
  - Native plant superiority
  - Retrenchment pruning

Because none of the above are supported with sufficient scientific evidence, they should not be used

Claim: Companion plants "use tables to select compatible species"

- Companion planting includes
  - Polyculture and intercropping
  - Phytoremediators
  - Nitrogen fixers
  - Nurse plants
- Companion planting is not
  - Astrological charts for gardeners
  - Interpretation of crystal patterns
  - Based on permaculture (a pseudoscience)

Claim: Native species are the best choices to support landscape biodiversity

Facts:

- Definitions of "native" and "alien" are value judgments, not scientific terms
- Not all introduced species are invasive
- Urban areas do not have natural environmental conditions
- Native species are often not adapted to urban conditions
- Introduced species provide ecological benefits
- Vegetation diversity, structure and function more important to biodiversity than nativeness

2. Misapplied science

- Products
  - Antitranspirants
  - Epsom salts
  - Gypsum
  - Hydrogels ("water crystals")
  - Phosphate fertilizer
- Practices
  - Amending soil before planting
  - Foliar fertilizers

Claim: Water crystals protect plants in heat-stressed, drought-prone situations, by absorbing water, then releasing it gradually as plants need it"

- About hydrogels
  - Acrylamide polymers
  - Absorb large amounts of water
  - Used in cosmetics, disposable diapers, tissue enhancement
- However, water crystals
  - …are broken down quickly by microbes, sunlight and fertilizers, so…
  - …are only a temporary fix to droughty soil conditions
- Scientific summary
  - Variable effectiveness in field studies; no long term benefit
  - As crystals dry out, they absorb water from the soil
  - Studies have found mulches to be more cost-effective

3. Overextrapolated science

- Products
  - Corn gluten meal (CGM)
  - Harpin
  - Mycorrhizal/probiotic inoculants
- Phenomena
  - Allelopathy and black walnuts
  - Humus formation

Claim: Don't plant under black walnut trees – the juglone will kill other plants

- Allelopathy – what is it?
  - Correlative evidence
  - Juglone
- Evidence for allelopathy
  - In the lab – petri dish experiments
  - In the greenhouse
  - In the landscape
- How conflating correlation to causation causes all kinds of embarrassing problems

Good and not-so-good science

1. Good quality research but poor reporting

- Often due to researcher bias
- Selective highlighting of results (often with statistical errors) in the abstract or summary
- Downplaying or omitting other results

2. Poor quality research

- Common with authors with no expertise in field
- Conflating correlation with causation
  - A correlation between two variables does not mean that one causes the other
  - Controlled studies can determine causation but not always feasible
  - Correlations can be valuable, but only if examined rigorously and eliminating other possible causes of the observed phenomenon

Look at the body of research. If a paper is at odds with most other papers, it must withstand increased scrutiny.

Dr. Linda Chalker-Scott, WSU Professor Emerita and Extension Urban Horticulturist
URL: http://www.theinformedgardener.com (white papers on many of these myths)
Blog: http//www.gardenprofessors.com
Books: http//www.sustainablelandscapesandgardens.com
Facebook page: http://www.facebook.com/TheGardenProfessors
Facebook group: https://www.facebook.com/groups/GardenProfessors/
Publications: https://www.researchgate.net/profile/Linda_Chalker-Scott/publications