Horticultural Zombies – Debunking landscape myths

Seminar roadmap

- Sources of information
- Evaluating information
- Assessment examples
  - Products
  - Practices
- 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- Gray – not peer reviewed, professional audience
- Popular – not peer reviewed, general audience

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

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 applied to settings outside the efficacy window)

No consistent, reliable supporting science

- Products
  - Compost tea
  - Conditioners
  - Kelp products
  - Organic product safety
  - Vitamin B-1 transplant fertilizer
  - Wound dressings
- Practices
  - Biodynamics
  - Companion planting
  - Fertilizer injections
  - Hügelkultur
  - Lasagna mulching
  - Leaving rootballs intact
  - Permaculture

Because none of these products or practices are supported with sufficient scientific evidence, they should not be used or recommended.

Claim: Root balls must be left intact during transplanting

- About B&B and container root balls
  - Surrounded by clay or soilless media
  - Often too deeply buried
  - Often have fatal root flaws
- Scientific summary on bare rooting
  - Eliminates multiple barriers to root establishment (burlap, clay, etc.)
  - Allows detection and correction of root flaws
  - Guarantees planting at grade

2. Misapplied science

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

Claim: phosphate fertilizer enhances root growth of new transplants

- About phosphorus
  - Most urban soils have enough phosphorus
- Scientific summary
  - Phosphorus competes with iron and manganese uptake
  - Excess phosphorus Inhibits mycorrhizal fungi, so roots work overtime
  - Excess phosphorus pollutes aquatic systems

3. Overextrapolated science

- Corn gluten meal (CGM)
- Harpin
- Mycorrhizal and probiotic inoculants

Claim: microbial inoculants improve root growth and plant establishment

- Scientific summary
  - In the greenhouse
    - Inoculants can work in container plant production to "jump start" sterile media
  - In the landscape
    - Healthy soils have their own populations of mycorrhizae
    - Unhealthy soils won't support mycorrhizae

Science-based alternatives:

- Avoid applications of any chemicals before thorough diagnosis of landscape problems
- Test soils before adding any amendments
- Add organic material as "slow food" after planting
- Use coarse woody mulches
  - Control weeds
  - Add nutrients slowly
  - Do not restrict water and gas movement
  - Protect and enhance soil health
  - Support native populations of beneficial microbes

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

Claim: Mulching newly transplanted trees will increase evaporation

Gilman, E.F., R.C. Beeson and D. Meador. 2012. Impact of mulch on water from a container substrate and native soil. *Arboriculture and Urban Forestry* 38(1):18-23.

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

Claim: Glyphosate causes human diseases

Samsel, A. and S. Seneff, 2013. Glyphosate's suppression of cytochrome P450 enzymes and amino acid biosynthesis by the gut microbiome: pathways to modern diseases. *Entropy* 15:1416-1463.

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

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Email: lindacs@wsu.edu
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/
Washington State University Extension publications: http://gardening.wsu.edu/(peer-reviewed fact sheets on many topics of interest)

Mycorrhizae - http://cru.cahe.wsu.edu/CEPublications/FS269E/FS269E.pdf
Scientific literacy - http://cru.cahe.wsu.edu/CEPublications/EM100E/EM100E.pdf
Wood chip mulches - http://cru.cahe.wsu.edu/CEPublications/FS160E/FS160E.pdf