

Citizen Science - Improving Critical Thinking Skills

Seminar roadmap

- 🌱 Sources of information
- 🌱 The CRAP test
- 🌱 Assessment examples - products and practices
- 🌱 Correlation vs. causation

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- 🌱 Gray - not peer reviewed, professional audience
- 🌱 Popular - not peer reviewed, general audience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

- 🌱 Credibility of the source
 - 🌱 Author's credentials and qualifications?
 - 🌱 Publisher?
 - 🌱 Website urls?
- 🌱 Relevance to managed landscapes
 - 🌱 Crop production or urban landscapes?
 - 🌱 Geographic or other constraints on usability?
- 🌱 Accuracy
 - 🌱 Science-based?
 - 🌱 Objective?
 - 🌱 Current?
 - 🌱 Well-written?
- 🌱 Purpose
 - 🌱 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

Misapplied science

Products

- Antitranspirants
- Epsom salts
- Gypsum
- Hydrogels (“water crystals”)
- Phosphate fertilizer

Practices

- Amending soil before planting
- Foliar fertilizers

Overextrapolated science

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

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.

Dr. Linda Chalker-Scott

WSU Associate Professor and Extension Horticulturist

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)