

Scientific Literacy for Master Gardeners

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- 🌱 Gray - not peer reviewed, professional audience
- 🌱 Popular - not peer reviewed, general audience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

- 🌱 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

No consistent, reliable supporting science

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

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

2. Misapplied science

Products

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

Practices

- Amending soil before planting
- Foliar fertilizers

3. Overextrapolated science

Products

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

Phenomena

- Allelopathy and black walnuts
- Humus formation

Science-based alternatives:

- Avoid automatic applications of pesticides, fertilizers, or any other chemical before thoroughly diagnosing 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
- Rely on science-based evidence for making recommendations

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 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