**Clean WaterR³: Integrating Research and Extension to Help Specialty Crop Growers Reduce, Remediate, and Recycle Water**

Sarah A. White¹, James S. Owen², John C. Majsztrik³, Bridget Behe³, Bert Crege⁴, R. Thomas Fernandez⁵, Paul R. Fisher⁶, Laurie Fox⁶, Charlie R. Hall⁶, Darren Haver⁶, Daniel R. Hitchcock⁶, Dewayne L. Ingram⁷, Saurav Kumar⁸, Alexa Lamm⁹, John Lea-Cox⁶, Lorence R. Oki⁶, Jennifer L. Parke¹⁰, Andrew Ristvey⁶, David Sample⁶, Cassandra Svet⁴, Laura S. Warner¹, R. Christopher Wilson⁴

¹Clemson University, ²Virginia Tech, ³Michigan State University, ⁴University of Florida, ⁵Texas A&M University, ⁶University of California - Davis, ⁷University of Kentucky, ⁸University of Maryland, ⁹Oregon State University

**Why Clean WaterR³?**
- Access to high quality water for irrigation is increasingly limited
- Growers reluctant to use recycled water because of contaminants (diseases, salts & pesticides) that could limit plant growth

Our transdisciplinary, SCRI-funded team of researchers and grower partners (from across the US) are working to encourage recycling and reuse of remediated irrigation runoff by:
- Developing online grower decision support tools
  - Integrate socioeconomic & biological data to enhance decision making resources
  - Case-studies with treatment technologies
- Research and select runoff treatment technologies to manage contaminants
- On-farm trials & evaluation of treatment technology efficacy
- Online tool evaluation
- Economic assessment validation
- Research planning

**Grower Input & Collaboration:**
11 collaborating growers
9 advisory board members
- On-farm trials & evaluation of treatment technology efficacy
- Online tool evaluation
- Economic assessment validation
- Research planning

**Grower focused website for outputs:** cleanwater3.org

**Trans-disciplinary research to increase water recycling:**
- Outreach & data delivery the focus
- Grower interviews (25+) for sociological assessment
- Economic components ground cost of change (yes/no) in practice
- Biological components combine to reduce and remediate pollutants
- Model development integrates biological & socio-economic data into simple, interactive, online tools

**Grower focused website for outputs:**
- FAQs
- Videos
- Tools

Related sites
- Research results
- Reports

**Online decision making tools** will be hosted on this site

**Reduction - Remediation - Recycle:**
- Biology & modeling to create predictive tools

**Manage Irrigation:**
- Reduce nutrients, pesticides & diseases in runoff

**Treatment Technologies:**
- Remediate diseases & agrochemicals in irrigation runoff water

**Recycled runoff:**
- Clean water for irrigating container crops

**Lab and on-farm evaluation of treatment technologies**
- Filter socks: sediment & phosphorus management
- Floating treatment wetlands: nutrients & diseases
- Mechanical filters: sediment & particulate

---

Reducing nutrient, pesticide, and disease loads leaving production areas (A) can enhance efficacy of treatment technologies (BMs) (B) and ultimately support use of recycle water (C) by growers. This information combine in model-based (D)“decision support tools” to aid in grower use of recycle water.

---

**Sociology interviews**
- How to present data
- Motivating factors to change practice
- Barriers to change in practice

**Economic studies**
- Economic assessment
- Life cycle analysis (LCA)
- Loss evaluation (Why is plant dead?)

**LCA Global warming potential comparison:**
- Liner to #3: 0.048 kg CO₂e
- iPhone 6S+ (3 yr life cycle): 95 kg CO₂e
- Cotton fabric: 2 kg CO₂e / kg fabric

---

This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2014-51181-22372.