

Dirty Hands, Engaged Minds: Cultivating Knowledge using School Gardens

A project sponsored by

Benton County Master Gardeners

Growing Up Green Committee

In Cooperation with the University of Arkansas Division of Agriculture
Cooperative Extension Service, Benton County

The logo for the University of Arkansas, featuring the letters 'U of A' in a stylized, red, serif font.

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION

University of Arkansas System



Gardening Statistics

- \$29.5 billion spent on US lawns/gardens in 2013 (\$347/household)
- US Regional food gardening breakdown
 - 29%, South; 26%, Midwest; 23% West; 22%, NE US
- 54% of food gardeners are women
- Economics of food gardening (2008)
 - \$2.5 billion spent nationwide with \$21 billion estimated return on investment
- Most popular garden vegetables planted
 - Tomatoes, 86%
 - Cucumbers, 47%
 - Sweet peppers, 46%
 - Onions, 32%
 - Sweet corn, 23%



Source: National Gardening Association

School Gardens in Arkansas

- Delta Garden Study
 - Bayyari Elementary, Springdale
 - Harrisburg Middle School
 - Marshall High School
- Food Corps
 - Holt Middle School, Fayetteville
 - Yellville-Summit Middle School
- Gibbs International Magnet Elementary School and Dunbar Magnet Middle School, Little Rock
 - public/private partnership between Little Rock Parks and Recreation and Gibbs and Dunbar schools
 - 2 acre outdoor classroom



AR Science Standards Related to Gardening and Horticulture

- 2nd grade
- ESS.8.2.1
 - Conduct investigations, soil components (sand, silt, clay, organic matter)
- ESS.8.2.2
 - Recognize, discuss soil properties (color, texture, water retention, suitability for plant growth)
- ESS.8.2.3
 - Conduct investigations determining best soil for bean growth

AR Science Standards Related to Gardening and Horticulture

- 3rd and 4th Grades
- NS.1.3.3, NS.1.4.3
 - Conduct scientific investigations
- NS.1.3.4, NS.1.4.5
 - Communication regarding scientific investigations
- NS.1.3.7, NS.1.4.8
 - Predictions, hypotheses based on prior knowledge, observations
- LS.4.4.1
 - Recognize environmental adaptations of plants and animals

AR Science Standards Related to Gardening and Horticulture

- 3rd and 4th Grade, Continued
- PS.7.3.2 and PS.7.4.1
 - Calculate, interpret changes in temperatures using the Celsius scale
- ESS.8.4.4
 - Evaluate the impact of water pollution
- ESS.8.3.10
 - Construct and read a rain gauge

AR Science Standards Related to Gardening and Horticulture

- 5th and 6th Grade
- NS.1.5.2, NS.1.6.2
 - Experimental design (hypothesis, replication, sample size, controls, variables)
- NS.1.5.3, NS.1.6.3
 - Data calculations (mean, median, mode, etc.)
- NS.1.5.5, NS.1.6.5
 - Communicate results , conclusions from scientific inquiry
- NS.1.5.6, NS.1.6.6
 - Strategies for long-term, accurate data collection

AR Science Standards Related to Gardening and Horticulture

- 5th and/or 6th Grade, continued
- NS.1.5.8, NS.1.6.8
 - Observation, prediction in theory development
- NS.1.5.9, NS 1.6.9
 - Examples of hypotheses, laws, theories
- LS.2.5.7, LS.2.5.10
 - Role of chlorophyll in photosynthesis
 - Demonstrate process of cellular respiration
- LS.2.6.5
 - Model and explain function of leaves, roots, stems, flowers

School Gardens Can Serve as an Outdoor Lab for Multiple Grade Levels



Garden can be a single bed on the school campus, cover $\frac{1}{2}$ acre of ground with multiple crops, or consist of containers maintained in the classroom. They are school specific.



Examples of Garden Lab Activities

- All tied to Arkansas Standards
 - 2nd grade: measure sand, silt, clay content of soils used to germinate seed; evaluation of seedling vigor based on soil type and effects on plant parts
 - 3rd grade: students design an experiment to test the effects of various mulches on soil temperature, then write their conclusions and/or recommendations for the best mulch to use on assorted cool season and warm season crops

Examples of Garden Lab Activities

- All tied to Arkansas Standards
 - 4th Grade: students study the effects of tillage method on water quality of runoff, calculating the mass of soil loss based on samples collected in the garden
 - 5th Grade: Use a SPAD meter to determine chlorophyll concentration in plant leaves. Compare warm vs. cool season crops, different fertilization rates, grown in light vs. shade, etc.
 - 6th Grade: create a crop ecosystem in which crops compete with weeds (for water, nutrients, light) established in varying densities, thereby impacting crop growth

Students Help Manage Garden

- Learn crop production requirements and considerations
- Gain appreciation of work involved in food production
- Experience production of the fruits of their labor, literally



Teachers Set Course of Garden Project

- Participating teachers/schools are encouraged to determine
 - Garden size/type
 - Crop selection
 - Production goals
 - Educational goals
 - Other collaborating faculty



Master Gardener Collaboration

- Master gardeners assist teacher with garden planning
 - Size/location
 - Crop selection
 - Garden management
 - Troubleshooting
- Master gardeners can provide student instruction as requested by the teacher
 - Master gardeners are eager to share their garden skills
- University of Arkansas Cooperative Extension faculty assist master gardeners and classroom teachers with instruction and garden management as needed



School Requirements: for a Traditional In-Ground Garden

- Administrative Support
- Supportive maintenance staff (suck up to these folks with free vegetables!)
- A relatively flat piece of ground
- A reliable water source close to the garden
- Room for equipment storage somewhere close to the garden

Garden Funding Sources

- Arkansas Farm Bureau (\$500, new sites; \$250 matching funds for existing sites)
- Beaver Water District (rain gardens fully funded)
- Lowes (variable amounts)
- Arkansas Forestry Association Foundation
- Arkansas Environmental Education Association (up to \$500)
- Project Learning Tree GreenWorks! Grant (up to \$3000)

Classroom Scenario

- Second grade classroom
- Soils unit in two weeks
- Teacher calls Benton County Master Gardeners; schedule a date for MG to assist with instruction
- MG bring all supplies required for lesson (see handout)

Classroom Scenario

- 5th Grade Classroom
- Unit on experimental design next month
- Establish hypothesis: Fertilization rates affect plant growth
- Teacher calls Benton County Master Gardeners; MG's assist students planting vegetable (squash) seed, fertilized at varying rates
- Pots arranged in a replicated block; take growth measurements as plants grow (see handout)
 - MG's assist with data collection per stated experimental methods; teachers can analyze data with students (mean, median, mode, range) at their convenience

Junior Master Gardener Program

- Available to students in grades 3-5 (Level One)
- Specific lessons reinforce Arkansas science standards and can be used by teachers and MG for garden/lab instruction
- Certain JMG lessons also cover language and fine arts, mathematics, and social studies standards
- If desired, an entire class can be certified as junior master gardeners

Next Steps

- Interested in partnering with master gardeners?
- Contacts:
 - Anita Mane, Benton County MG
 - 479-855-3227 anita_mane@yahoo.com
 - Leon Willis, Benton County MG
 - 479-586-8140 rlwillis05@gmail.com
 - Lou Japer, Benton County MG
 - 479-855-4762
 - Neal Mays, Agriculture Agent, Benton County, UA Cooperative Extension Service
 - 479-271-1060 nmays@uaex.edu

Thanks!

