



College of Tropical Agriculture and Human Resources  
University of Hawai'i at Mānoa

# **School Garden Basics Workshop For Educators**



UNIVERSITY of HAWAI'I  
MASTER GARDENER

College of Tropical Agriculture & Human Resources

## **Introduction to School Garden Programs**

**by O'ahu Master Gardeners in cooperation with Kōkua Hawai'i Foundation**

# School Garden Basics

## *Six Modules*

- **Introduction to School Garden Programs**
- **Soils and Composting**
- **Life of Plants**
- **Natural Environment of Hawai'i**
- **Let's Plant**
- **Insects, Disease, and IPM**



# **Introduction to School Gardens: Objectives**

- **Local and National Support Systems**
- **Farm to School Programs are more than gardens**
- **Relationship – to the planet, to each other**
- **Components of School Garden Program**
- **Create a Peace Garden**



# Welcome to the Movement!



## O‘ahu Farm to School Network (OFSN)

## Hawai‘i Farm to School & School Garden Hui (HFSSGH)

- Workshops for Educators
- Network communication via listserv and website

## Hawai‘i Environmental Education Alliance

- Hawai‘i Environmental Literacy Plan created
- Register your school/organization at [heea.org](http://heea.org)!



# Growing the Movement!



- ✓ Register at [www.heea.org](http://www.heea.org)
- ✓ Join the O‘ahu Farm to School Network  
[uhmgsg@gmail.com](mailto:uhmgsg@gmail.com)
- ✓ For Statewide Initiatives Visit  
[www.hawaiischoolgardenhui.org](http://www.hawaiischoolgardenhui.org)



# National Initiatives

National Farm to School Network

No Child Left Inside Act of 2011

Healthier US Schools Challenge

Let's Move! Initiative

National Green Ribbon Schools Program



# Farm to School Programs

## Garden-Based Learning

School Gardens

## Nutrition Education

Nutrition Basics and Culinary Arts

## Healthy School Food

Snacks, Meals, Celebrations

## Waste Reduction

Waste Audits and Composting

## Agricultural Literacy

Farm Field Trips, Farmer and Chef Visits

## Family and Community Outreach

Wellness-Focused Family Nights and Events



# RELATIONSHIPS

## *People, Place, Planet*



# Benefits of School Garden Programs

- ✓ Contribute positively to students' attitude and behaviors toward local, healthy food
- ✓ Promote increased consumption of fruits and vegetables and other healthy choices
- ✓ Influence teacher knowledge, attitudes, and lifestyles
- ✓ Lead to positive change in parents' shopping patterns and family diets



# Components of Successful School Garden Programs

1. **Garden/Green Team**
2. **Garden & Program Design**
3. **Maintenance**
4. **Safe and Healthy Habits**
5. **Connecting to the Curriculum**
6. **Building Resources**
7. **Sharing the Bounty**



# **1. Garden/Green Team is Essential!**

- ✓ Broad Representation**
- ✓ Collaboration and Communication**
- ✓ Raise Awareness, Interest and Participation**
- ✓ Team Meets Regularly (Monthly or Quarterly)**



## 2. Garden & Program Design



Example 1:  
**Raised Beds/“Instant” Gardens**



## Example 2: Sheet Mulch Gardens





# *Waikiki Elementary Food Farm*



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# 3. Maintenance

- ✓ Start small
- ✓ Daily and weekly during class, recess, and after school garden club
- ✓ Paid garden educator
- ✓ Watering, weeding, feeding
- ✓ A place for tools and materials
- ✓ Plan for care during school holidays





**Storage Shed & Tools**

## **Garden Signs**



## 4. Safe and Healthy Habits

- ✓ See Handouts for Details
- ✓ Proper Hand Washing
- ✓ Safety in the Garden
- ✓ Safe Harvesting and Food Handling
- ✓ A Culture of Respect



## **5. Connecting to the Curriculum**

- ✓ **General Learner Outcomes (GLOs)**
- ✓ **All Subject Areas**
  - ✓ **STEM (Science, Technology, Engineering, Math)**
  - ✓ **Language Arts and Fine Arts**
  - ✓ **Social Studies**
  - ✓ **Health and Physical Education**
- ✓ **Schooling for Sustainability**



## 6. Building Resources

- ✓ Create a Wish List; Reduce-Reuse-Recycle
- ✓ Request Donations; Community Partners
- ✓ Green Grants and Fundraising Ideas at [www.kokuahawaiiifoundation.org](http://www.kokuahawaiiifoundation.org)
- ✓ Master Gardener Helpline: 453-6055  
online help at <http://www.ctahr.hawaii.edu/UHMG/Oahu>
- ✓ Connect With Other Educators Via the O‘ahu Farm to School Network ([uhmgsg@gmail.com](mailto:uhmgsg@gmail.com) to sign up)



## **7. Sharing the Bounty**

- ✓ **Work as a community within the class**
- ✓ **Share produce with families, teachers, administrators, staff and community**
- ✓ **Spread the word**
  - **School newsletter and website**
  - **Staff and PTA meetings, school events**
  - **Posters and press releases**



# Create a School Peace Garden

## Friendship Benches

Conflict Resolution and Peaceful Gathering

## Peace Tree(s)

Native Tree or Other

## Gardens That Address Global Issues

Hunger, Desertification, Habitat Loss and More

## Develop a Language and Culture of Peace at School

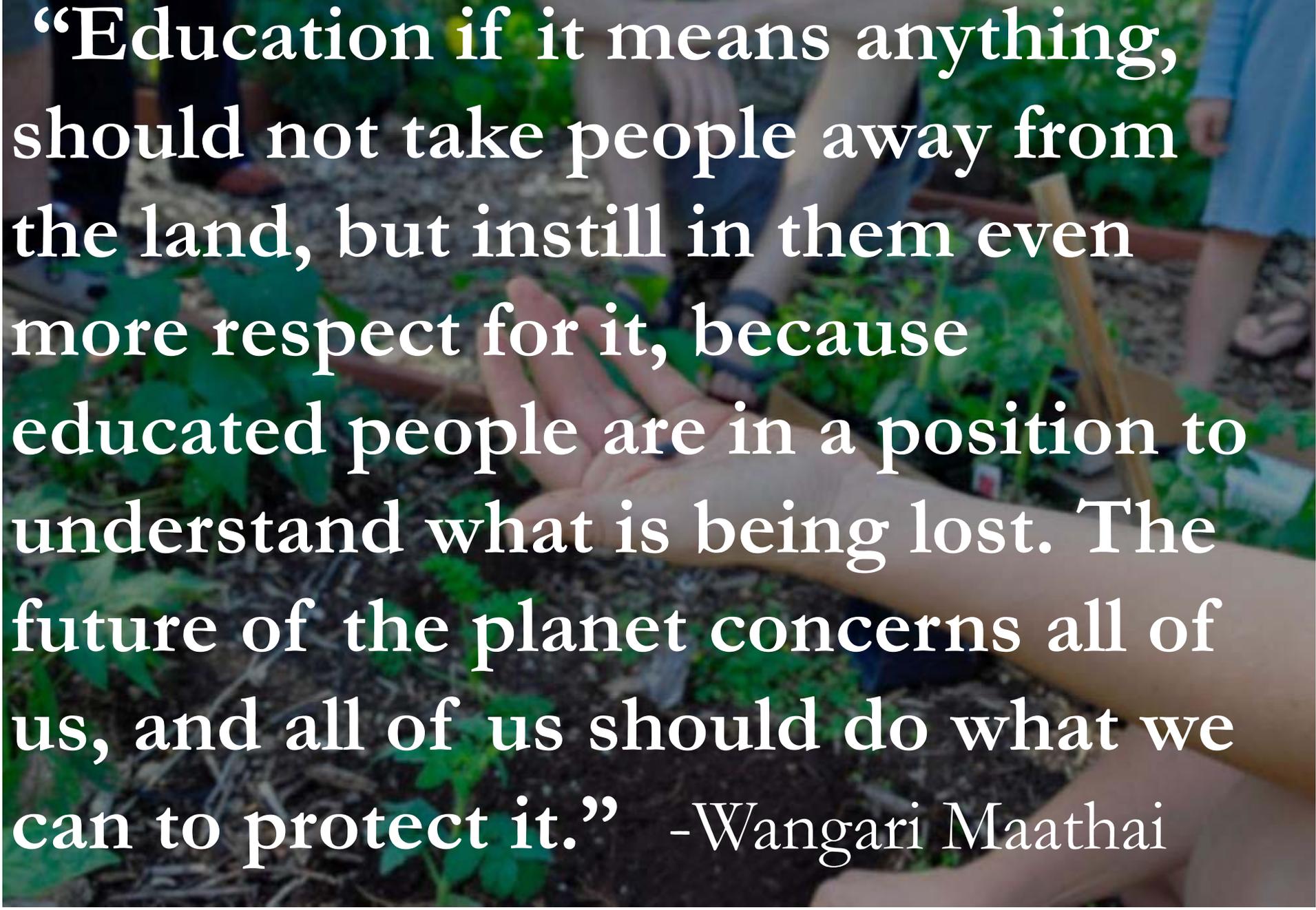
Peace and Mindfulness as Part of the Curriculum

## Annual Dedication

International Peace Day: September 21

## Register at [www.ihtec.org](http://www.ihtec.org)





“Education if it means anything, should not take people away from the land, but instill in them even more respect for it, because educated people are in a position to understand what is being lost. The future of the planet concerns all of us, and all of us should do what we can to protect it.” -Wangari Maathai





# NATIONAL FARM TO SCHOOL NETWORK

## Stay Informed

Join our membership  
[www.farmtoschool.org](http://www.farmtoschool.org)

Video  
[video.farmtoschool.org](http://video.farmtoschool.org)

Photos  
[bit.ly/farmtoschoolphotos](http://bit.ly/farmtoschoolphotos)

Twitter  
[twitter.com/farmtoschool](http://twitter.com/farmtoschool)

While many programs center on child nutrition, Farm to School offers a solution to improve the health of kids and communities. The National Farm to School Network focuses on children's health and education as well as on the economic health of the local farmers.

### What is Farm to School?

Farm to School is broadly defined as a program that connects schools (K-12) and local farms with the objectives of serving healthy meals in school cafeterias, improving student nutrition, providing agriculture, health and nutrition education opportunities, and supporting local and regional farmers. Farm to School at its core is about establishing relationships between local foods and school children by way of including, but not limited to: local products in school meals and local food related curriculum development and experiential learning opportunities through school gardens, farm tours, farmer in the classroom sessions, chefs in the classroom, culinary education, educational sessions for parents and community members, and visits to farmers' markets.



#### **HEALTH: Kids Win**

**All kids deserve access to nutritious, high quality food.** One-third of U.S. children are obese or overweight, and only 2% of children meet the Food Guide Pyramid daily serving recommendations. Schools operating a Farm to School program have shown increases in children's participation in the school meals program and consumption of fruits and vegetables.



#### **AGRICULTURE: Farmers Win**

**Farm to School supports farming families** by increasing market opportunities for farmers, fishers, ranchers, food processors and food manufacturers. Farm to School programs can open up the expansive school food market, estimated at more than \$12 billion a year to local farmers.



#### **ECONOMY: Communities Win**

**Farm to School strengthens the community.** Farm to School programs create opportunities for developing meaningful community relationships between schools, parents, and local farmers. For every dollar spent on local foods in schools, one to three dollars circulate in the economy.

#### **ABOUT US NOURISHING KIDS AND COMMUNITIES**

The National Farm to School Network sprouted from the desire to support community-based food systems, strengthen family farms, and improve student health by reducing childhood obesity. Funded in part by the W.K. Kellogg Foundation, the Network coordinates, promotes and expands the farm to school movement at the state, regional and national levels. The Network is a project of the Tides Center.

**The National Farm to School Network aims to enable every child to have access to nutritious food while simultaneously benefiting communities and local farmers.**

**Join us!! [www.farmtoschool.org](http://www.farmtoschool.org)**



The No Child Left Inside Act of 2011  
S.1372 H.R.2547

**Purpose:** The No Child Left Inside (NCLI) Act supports environmental and outdoor education in our nation's pre-K through 12 public schools. It provides incentives for states to create and implement State Environmental Literacy Plans to ensure that students have a basic understanding of the environment before they graduate. Environmental literacy is central to improving student achievement and engagement in science and other core subjects, to create a stronger economy through a prepared workforce, and to ensure a healthy environment.

**Supporting Organizations:** The No Child Left Inside Coalition is comprised of more than 2,000 environmental, educational, business, health care, faith-based, and other organizations from all 50 states, representing more than 50 million people.

**Legislative history:** In September 2008, the full House of Representatives overwhelmingly passed the No Child Left Inside Act in a bi-partisan vote of 293-109. Senator Jack Reed and Representative John Sarbanes reintroduced their bills in the 112<sup>th</sup> Congress on July 14.

**Legislative Content:**

- Incentives for states to create and implement State Environmental Literacy Plans to ensure their students are environmentally literate when they graduate. The content of the plans are left to states and no state is required to develop a plan.
- Grants to states to improve teacher quality and professional development to support implementation of environmental literacy plans in schools and school systems.
- Building national capacity through grants to state education agencies, local education agencies, institutions of higher education or nonprofit organizations for dissemination of proven environmental education models and studies of national significance.

**Need for Environmental Education:**

- Environmental education has a measurably positive impact on student achievement in science, reading, math, and social studies. It helps increase student motivation, critical thinking, and provides an academic pipeline to future careers in science and math.
- Environmental education “in the field” as part of the regular school curriculum gets kids outside, contributing to healthy lifestyles through outdoor recreation, exercise, play and experience in the natural world that is critical to helping prevent obesity and address other related health problems.
- Environmental education provides critical tools for a 21<sup>st</sup> Century workforce by providing students with the skills to understand complex environmental issues so they may make informed decisions in their own lives and find solutions for real world challenges facing us as a nation. Business leaders also increasingly believe that an environmentally literate workforce is critical to their long-term success.

**For More Information:**

Charlie Stek, Policy Director, NCLI Coalition, [charliestek@gmail.com](mailto:charliestek@gmail.com), 301-575-7957

Monica Healy, Government Relations Director, NCLI Coalition, [monhealy@gmail.com](mailto:monhealy@gmail.com), 202-244-5247

[www.nclicoalition.org](http://www.nclicoalition.org)

# HELP for Our Island Community

## The Hawai'i Environmental Literacy Plan



### What is it?

The Hawai'i Environmental Literacy Plan (HELP) will be a multi-agency plan to create a society – starting with our youth – that makes responsible choices on complex issues that affect their own lives, the lives of their families, their communities, and the world beyond our shores.

Environmental Literacy Plans are in development or already completed in 47 states in the U.S. due in part to the excitement generated by the No Child Left Inside Act (NCLI). With the HELP, Hawai'i will be in a strong position to ensure that environmental education (EE) in all its forms (e.g. outdoor and service learning, STEM, career pathways, etc.) is of high quality and available to all communities.

### What is the No Child Left Inside Act?

NCLI is federal legislation to ensure that every student achieves basic environmental literacy. The NCLI Act, when passed, would amend the Elementary and Secondary Education Act to include EE for the first time.

### Who will develop HELP?

The Hawai'i Environmental Education Alliance (HEEA), working closely with the Hawai'i Department of Land and Natural Resources and Hawai'i Department of Education, is developing the HELP. In order to create a plan that is appropriate and applicable in Hawai'i's communities, it is essential to involve environmental educators and all people interested in an environmentally literate Hawai'i.

### Who will benefit from HELP?

The proposed NCLI legislation would support public school implementation of approved state plans including professional development and transportation to service learning opportunities. However, the HELP will also benefit non-formal education organizations that provide services to public schools, independent and home schools that utilize EE resources, as well as businesses that are contributing to a green workforce in the new economy. We all benefit from a healthy environment.

### Why do we need HELP?

Simply put, there is inadequate funding for EE especially at the State level. With the HELP and the passage of NCLI, new funding would be provided for EE based on standards, teachers would be well trained to use the natural world as an extension of the classroom, and new partnerships can form.

### When will we have HELP?

We intend to complete the Hawai'i Environmental Literacy Plan by the end of 2011. To view the draft and learn more about the HELP, visit [www.heea.org](http://www.heea.org) or click [here](#).

### How can you get involved?

- Contact the congressional staff and share information about how the No Child Left Inside Act of 2011 (S.1372, H.R.2547) will positively impact Hawai'i. Have students call and write letters.
  - Senator Daniel Akaka, (202) 224-6361, 141 Hart Senate OB, Washington, DC 20510
  - Senator Daniel Inouye, (202) 224-3934, 722 Hart Senate OB Washington, DC 20510
  - Congresswoman Colleen Hanabusa, (202) 225-2726, 238 Cannon House OB, Washington, DC 20515
- Write or call Congresswoman Mazie Hirono, thanking her for co-sponsoring the No Child Left Inside Act: (202) 225-4906, 1410 Longworth House Office Building, Washington, DC 20515
- **Register your school, organization, or yourself with the Hawai'i Environmental Education Alliance at [www.HEEA.org](http://www.HEEA.org) and get monthly updates about grants, activities, and more.**
- Learn more about No Child Left Inside by visiting [www.nclcoalition.org](http://www.nclcoalition.org).



*America's Move to Raise a  
Healthier Generation of Kids*



# OUR PLEDGE

It's our move.

Our kids need to eat healthier food.

They need to be more active.

We all...parents, teachers, doctors, grocers and businesspeople...need to join together.

We can't let this generation grow up more likely to get diabetes, cancer or heart disease.

Let's Move on this crisis!

Our work! work! work! all-digital-all-the-time world isn't healthy for us or our kids.

We need ways for the whole family to band together.

Parents are looking for tips and tools.

To help our kids choose good food.

To help them learn that shooting hoops with friends beats shooting aliens with a laser.

Kids were meant to move!

If kids could be coaxed off computers, where would they go?

Is there a park in the neighborhood?

Is there a playground nearby?

Do their schools have enough sports facilities?

Where are they going to get that sixty minutes of activity needed each day?

Kids need places to move!

Our kids need to be eating healthier food.

We need to help our schools and grocery stores offer better options.

More fruit, less sugar. More vegetables, less fat.

More knowledge, fewer empty calories.

More cooperating to solve these problems.

Let's Move together!

We believe every kid has the right to a healthy childhood.

We can't let this be the first generation in our history to grow up less healthy than their parents.

The ingredients...better food + more activity...are clear.

Let's Move isn't just noble, it's a necessity.

It's not just a slogan, it's our responsibility

Are you with us? Let's Move!



## Promotional Flyer

### Take the HealthierUS School Challenge

Prove to students, parents, teachers, administrators, and the community that your school is one of the best in the Nation, committed to nutrition and physical activity!

Apply for a Bronze, Silver, Gold—or even the highest of honors—a Gold of Distinction award. To be certified, a school must meet the following criteria:

- Be enrolled as a Team Nutrition School (don't worry, it's free!)
- Offer reimbursable lunches that demonstrate the principles of the *Dietary Guidelines for Americans* and meet USDA nutrition standards
- Provide nutrition education to students
- Provide students opportunities to engage in physical activity
- Maintain an Average Daily Participation for reimbursable lunches:
  - All schools: No ADP criteria for schools applying at the Bronze level.
  - Elementary and Middle Schools: At least 60 percent (of school enrollment) at the Silver level or 70 percent for Gold and Gold of Distinction level.
  - High Schools: At least 45 percent (of school enrollment) at the Silver level or 65 percent at the Gold and Gold of Distinction level.
- Adhere to guidelines established by the USDA Food and Nutrition Service (FNS) for all foods served/sold in schools
- Implement a Local Wellness Policy

### What is the Challenge?

Obesity is a growing health concern for children in the United States. The USDA believes that schools can take a leadership role in helping students learn to make healthier eating and active lifestyle choices. Many schools have already improved their school nutrition environments, found ways to increase opportunities for physical activity, and provided more nutritious and healthier choices for their students.

FNS encourages schools to make these changes and has established the **HealthierUS School Challenge** to recognize schools that improve their school environment with nutritious foods, physical activity, and nutrition education.

Review the complete criteria on the Team Nutrition Web site at:

[teamnutrition.usda.gov](http://teamnutrition.usda.gov)



# Hawaii Green Ribbon Schools

Hawaii State Department of Education

Google

search text

search text

Go

- doe.k12.hi.us
- k12.hi.us



## *Congratulations to Hawaii's Green Ribbon Schools!*

**Pahoa High & Intermediate, Ewa Makai Middle, Waikiki Elementary, and Hawaii Preparatory Academy**, a private school, were selected as Hawaii's nominees to the U.S. Department of Education's Green Ribbon Schools program.

The applications were reviewed and the winners chosen by a committee made up of representatives from Hawaii Energy, the Hawaii Chapter of the U.S. Green Building Council, Kokua Hawaii Foundation, and the Hawaii Association of Independent Schools.

**Kalani High and Kahuku High & Intermediate** were also recognized by the Hawaii State Department of Education for their energy conservation and environmental efforts.

The Green Ribbon Schools program honors schools that have significantly reduced their environmental impact and achieved energy efficiency, positively impacted the health of their students and staff, and produced students with high levels of environmental and sustainability literacy. The national award was established this school year to set a high bar for schools, provide incentives to schools already on the road to achieving high standards, and propel others to move toward providing a healthy, sustainable education and learning space.

The U.S. Department of Education announced on April 23 that **Ewa Makai Middle and Hawaii Preparatory Academy** were among 78 schools nationwide named [U.S. Department of Education Green Ribbon Schools](#). Hawaii is among 29 states and D.C. with schools receiving the first-ever awards.

Visit the U.S. DOE website for more information at:  
<http://www2.ed.gov/programs/green-ribbon-schools/index.html>



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## DEVELOP THE GARDEN TEAM

*An Essential Support Network*

- **Broad Representation:** Involve as many people as possible from diverse roles to ensure good communication and long-term sustainability of your school garden program. This team may also be in the form of a 'green team' that links many 'green' projects at the school. Be sure to include:
  - ✓ Administrators
  - ✓ Teachers
  - ✓ Custodians
  - ✓ Students
  - ✓ Parents
  - ✓ PCNC (Parent Community Network Coordinator, works with volunteers at the school)
  - ✓ Cafeteria Staff
  - ✓ After-School Staff
  - ✓ Community Volunteers
  - ✓ Garden Educator: Talk with school administration about hiring a Garden Educator through a Part Time Teacher position or other; find matching funds through grants or fundraising.
- **Collaboration:**
  - ✓ Partner with your school's Wellness Committee (Note: All Hawai'i DOE schools are required to implement the DOE wellness policy guidelines).
  - ✓ Make this an ALL SCHOOL EFFORT!
- **Raising Awareness, Interest and Participation:**
  - 1) Be present in the garden to welcome interested families and staff.
  - 2) Recruit parents at morning drop-off.
  - 3) Submit regular updates to the school newsletter. Place events on the main school calendar.
  - 4) Create a photo poster board and have a booth at school events (e.g. fairs and family nights).
  - 5) Hold a garden open house.
  - 6) Make presentations for school staff and parent organizations.
  - 7) Send home fliers and post them around school (e.g. announcing Team meetings, garden club signups, and garden work days).
  - 8) Submit a media press release for big events (with approval from the school administration).
  - 9) Document the gardens with photos, videos, drawings, garden journals, poetry and more.
  - 10) Weigh garden produce and keep a log of how much has been grown and how it has been used.
- **Meeting and Communicating Regularly:**
  - 1) Determine who is/are the lead team contacts who coordinate communication.
  - 2) Clarify goals and assignments/roles.
  - 3) Create a program budget and a program line item in the school or parent organization's budget.
  - 4) Meet monthly or quarterly to share updates and establish priorities and tasks.
  - 5) Work in the garden together and share a healthy snack.
  - 6) Send a brief written update to the entire group for those that weren't able to attend a meeting.
  - 7) Use emails/listservs, google documents, online calendars, etc. to keep in touch.
  - 8) Keep a garden journal to note important information (e.g. planting dates, etc.).
  - 9) Continue to spread the word! Share your activities with the school community and beyond.

## DESIGN THE PROGRAM

*Vision, Goals, Actions*

- ***Elements of a Farm To School Program:***
  - ✓ Garden Education - hands-on growing experience through school gardens
  - ✓ Nutrition Education - nutrition basics, food sampling, culinary arts
  - ✓ Healthy School Food - staff education, scratch cooking, locally sourced fresh whole foods for snacks, meals, and celebrations
  - ✓ Agricultural Literacy - farm field trips, school visits by farmers and chefs
  - ✓ Waste-Reduction - cafeteria waste audits, composting programs
  - ✓ Family and Community Outreach - make wellness a part of all school events; recruit volunteers for the program
  - ✓ Create your school's own combination according to the direction of your team
  
- ***Planning the Growing Areas***
  - ✓ Ownership: Involve students and Garden Team in the planning, implementation, and maintenance.
  - ✓ Location: Full to partial sun, access to water, proximity to classrooms.
  - ✓ Size: Classroom/grade-level gardens and/or communal school gardens.
  - ✓ Type: Raised beds, sheet mulch, container gardens, hydroponics, aquaponics.
  - ✓ Pathways: Essential garden element to protect integrity of the soil; walk in pathways only.
  
- ***Building Soil:***
  - ✓ Aerobic Composting: Create living soil amendment using wood chips, yard and garden wastes, shredded paper, food wastes.
  - ✓ Vermicompost (worm bins): Create living fertilizer using shredded paper and food wastes (fruits and vegetables).
  - ✓ Bokashi: Break down food wastes (all kinds) using beneficial microorganisms; bury in garden soil or compost pile.
  
- ***Peace Gardens:***
  - ✓ Friendship Benches: Conflict resolution and peaceful gathering space
  - ✓ Peace Tree(s): Native tree or other
  - ✓ Gardens That Address Global Issues: Hunger (grow food), desertification (plant trees), habitat loss (grow host plants for native species and pollinators), etc.
  - ✓ Develop a Language and Culture of Peace at School: Peace and mindfulness as part of the curriculum
  - ✓ Annual Dedication: Any day, or International Peace Day: September 21
  - ✓ Register Your School's Peace Garden at [www.ihtec.org](http://www.ihtec.org)
  
- ***Cultivate Diversity***
  - ✓ Food - companion plants, diverse plants = diverse beneficial organisms (soil food web, pollinators, pest predators); save seeds
  - ✓ Flowers - host plants and nectar plants for pollinators
  - ✓ Medicinals - culinary herbs, comfrey, noni, 'olena, ginger, laukahi, papaya
  - ✓ Native Hawaiian Plants - discover what is appropriate in your area
  - ✓ Tropical and Perennial Plants - well suited for Hawai'i's environment, fewer pests, longer living
  - ✓ Trees - fruit trees, mulch trees, native trees, sacred trees

## MAINTAIN THE GARDENS

*Helping The Gardens Thrive*

### • *Tips on Maintenance*

- ✓ **Start Small:** You can always expand! Do what is manageable for your team.
- ✓ **Garden Club:** Organize a club that meets weekly (or more often) after school or at lunchtime.
- ✓ **Recess Time:** Recruit parents and teachers to be recess monitors in the garden for students.
- ✓ **Watering:** 1) Younger students may use buckets and cups for watering by hand; older students may use a hose with fan sprayer; 2) Classes may share responsibility for their grade-level's garden beds (taking turns as a class throughout the week); 3) Gather a team of parents to take turns watering throughout the week; 4) Create a bin with water key, timer, sprinkler head, and garden journal for each grade level; 5) Explore automatic irrigation options (note: drip irrigation is generally more efficient and healthier for the garden as leaves do not get wet).
- ✓ **Weeds:** 1) Always start a garden by laying cardboard over the grass to kill it (with soil or sheet mulch materials on top); 2) Maintain a barrier to grass around gardens by laying down cardboard and covering with a thick (6") layer of wood chips; replace/replenish about twice a year; 3) Regular weeding (daily to weekly) keeps things under control!
- ✓ **Pests and Disease:** 1) Keeping your soil healthy (with adequate nutrition and watering) is the first and most important defense; 2) Grow the right plant for the right place and time of year; 3) Remove affected plant parts or plants; 4) Cultivate a diversity of plants to attract beneficial insects and/or discourage pests (e.g. many types of herbs, marigolds, nasturtiums); 5) If necessary use simple, safe sprays with garlic, chili pepper, and dish soap.
- ✓ **KEEP IT NATURAL:** Refrain from use of any synthetic "chemical"/non-organic pesticides, fertilizers, and other products, which (even though often considered safe) can be toxic to humans and other garden life. Talk with school administration and custodians about the banning the use of toxic chemicals (cleaning and yard products) on campus.

| <i>Daily</i>  | <i>Weekly</i>  | <i>Monthly</i>   | <i>School Holidays &amp; Summer Break</i>   |
|---|--|--|---|
| <ul style="list-style-type: none"> <li>• Daily watering schedules for students/classes/grades as needed.</li> <li>• Supplemental watering &amp; garden check-in schedule for adult leaders to be sure the gardens are being watered and well maintained.</li> </ul> | <ul style="list-style-type: none"> <li>• Weekly Garden Club to water, weed, harvest, tend compost, etc. (after school or lunchtime).</li> <li>• Weekly compost maintenance: clipping, layering, watering.</li> </ul> | <ul style="list-style-type: none"> <li>• Regular monthly garden work days open to all: after school or on weekends.</li> <li>• Regular weed-whacking/mowing/mulching around the gardens as necessary.</li> <li>• Monthly application of soil amendments (compost and vermicast)</li> </ul> | <ul style="list-style-type: none"> <li>• School Holidays: BE SURE that there are students/teachers/parents/volunteers committed to watering the gardens over school breaks and long weekends.</li> <li>• Summer Break: 1) Obtain firm commitment from summer school programs wishing to utilize the gardens; <u>or</u> 2) Have families adopt and tend the gardens; <u>or</u> 3) Create a school garden summer program; <u>or</u> 4) Put the gardens to ‘rest’ by covering the soil with compost and thick protective mulch* (regular watering is ideal); <u>or</u> 5) Plant cover crops (which require watering) and turn them into the soil before planting in the fall.</li> </ul> |

\*Mulch from Hawaiian Earth Products (partially composted) is preferable to rough wood chips for use inside the garden beds.

## BUILD YOUR RESOURCES

*Cultivating Abundance*

- **Reduce, Reuse Recycle:** Save money with these suggestions:
  - ✓ Use recycled and 'found' materials whenever possible.
  - ✓ Borrow tools and equipment. Consider sharing with other schools, or contact your Garden Network for ideas and assistance.
  - ✓ Secure donations (see below).
  - ✓ Keep an eye out for free items online: [www.craigslist.org](http://www.craigslist.org), [www.freecycle.org](http://www.freecycle.org).
  - ✓ Network in the community for people willing to lend advice or a helping hand.
  - ✓ Integrate the garden program into existing, funded programs.
  - ✓ Handout: "Farm To School Resources For Hawai'i Educators" (Kokua Hawai'i Foundation)
  
- **Donations:**
  - ✓ Create a wish list of supplies and other needs. Post it online and in the school newsletter.
  - ✓ Approach local businesses, parents, community members, and community organizations for donations of funds, supplies, and volunteer time.
  - ✓ Create a simple brochure to describe the project and how supporters can contribute.
  - ✓ Recognize and thank donors, volunteers, and sponsors. Have the students write and send thank you letters.
  
- **Fundraising:**
  - ✓ Set specific goals; celebrate results!
  - ✓ Estimate costs for the entire project and develop a realistic budget.
  - ✓ Write grants (see Kokua Hawai'i Foundation's "Green Grants For Schools").
  - ✓ Hold a green fundraiser (see Kokua Hawai'i Foundation's "Green Fundraising Ideas For Schools").
  - ✓ Organize a student farmers market; seek produce donations from farmers and community members (see example at right).
  
- **Seek Support:**
  - ✓ Join your island's School Garden/Farm to School Network! Visit [www.hawaiischoolgardenhui.org](http://www.hawaiischoolgardenhui.org) for contact information.
  - ✓ Master Gardeners: O'ahu Help Line: 453-6055; [oahuMG@ctahr.hawaii.edu](mailto:oahuMG@ctahr.hawaii.edu)
  - ✓ Kokua Hawai'i Foundation: [aina@kokuahawaiiifoundation.org](mailto:aina@kokuahawaiiifoundation.org); [www.kokuahawaiiifoundation.org/aina](http://www.kokuahawaiiifoundation.org/aina)
  - ✓ Hawai'i School Peace Gardens Committee, [pdkhawaii@gmail.com](mailto:pdkhawaii@gmail.com)
  - ✓ CTAHR Free Publications: google (key words + CTAHR)



Sunset Beach Elementary School 'Aina Kine Club

## GARDEN PARTY PLANNING

### ONE MONTH IN ADVANCE

- Meet with teachers, administrators and groundskeepers to select the Garden Party date and plan the location of the garden beds, compost bins, and soil and mulch piles. Complete a 'Use of Facilities' form for the event if necessary.
- Create a Garden Party workday plan: See "Typical Workday Activities" listed on page 2.
- Order or solicit donations of soil, mulch, organic compost, vermicast, tools, and garden bed materials as needed. Plan for pickups and deliveries.
- Announce Garden Party date (fliers, newsletter, website). Recruit volunteers. Ask volunteers to bring supplies as needed: refillable water bottle (to cut down on waste), snack or potluck dish (healthy, waste-free), tools labeled with their name, cardboard, etc.
- Arrange for a few volunteers to lead a kids' activity on Garden Party day (e.g. seed saving; food prep with garden produce, such as pesto; planting seeds in newspaper pots; painting bucket gardens; creating garden signs; decorating milk cartons for plant pots; other garden and recycle art activities).

## THE WEEK BEFORE THE GARDEN PARTY

- Coordinate with school administration and groundskeepers for the unlocking of gates and nearby restrooms and classrooms (for electricity source) on Garden Party day.
- Ask the school administration to announce the Garden Party in the school's marquee and/or on bulletin boards around campus.
- Send fliers home to families and post the fliers around campus.
- Gather unwaxed, corrugated cardboard as needed (if building new raised beds or sheet mulch gardens and/or adding cardboard and mulch to garden pathways). Ask supermarkets and other stores for cardboard. Ask your school cafeteria and custodians to save cardboard.
- Gather tools, wheelbarrows, and pickup trucks.
- If building new garden beds, measure and mark the location of the beds with measuring tape and spray paint or flags.
- Coordinate with school for mowing/weed whacking around garden areas as necessary.
- Optional: Invite local officials, businesses, and community groups to participate in your school's Garden Party. Send out a press release to announce the event and your school's garden program.



## ONE DAY BEFORE THE GARDEN PARTY

- Thoroughly soak the ground with water where trenches for any new garden bed borders will be dug. This will make digging easier.
- Thoroughly soak the garden soil to facilitate digging.
- Write out the day's step-by-step activities on a white board.
- Optional: Take "before" photos of the garden areas.

## THE BIG DAY!

- Set up sign in and name tag area. Hang or post any banners or signs.
- Display the white board with step-by-step activities for the day.
- Set up kids' activity area.
- Set up snack, drink, and zero waste station.
- Set up cardboard prep station (remove most tape, staples and plastics, open and flatten boxes).
- As volunteers arrive direct them to sign in, create a name tag, label their tools, and help with cardboard prep.
- After cardboard is prepped and volunteers have arrived, gather the group and make a welcome announcement. Describe the activities for the day: kids' activity, snacks and drinks, label tools, garden work plan, thank yous, etc. Encourage safety via proper tool use, staying hydrated, and washing hands well after gardening and before eating. Take a group photo!
- Split into even groups with at least one supervisor in each group. Volunteers will need to be guided through the activities.
- When building new garden beds, take the time to do it right – the beds will be there for a long time!
- When finished, thank everyone for coming and make sure volunteers enjoy the snacks. **Good job!**



# How to...

## Plan and Run a Garden Party Workday



### TYPICAL WORKDAY ACTIVITIES

#### BEGINNING OF EACH SEMESTER

*(At Least One Week Before Planting):*

- Build garden beds, sheet mulch gardens, compost bins, trellises, and other structures as needed.
- Remove weeds, loosen and water garden soil.
- Harvest and sift compost.
- Add compost and other soil amendments to the garden soil (see "supplies" list).
- Add mulch around fruit trees.
- Add fresh cardboard and mulch to garden pathways.
- Create garden signs.



#### END OF SCHOOL YEAR:

- Harvest any remaining produce for volunteers to take home.
- Harvest and save seeds from the gardens.
- Remove weeds, loosen and water garden soil.
- Leave in place any perennial plants like herbs, collard greens, etc.
- Remove and chop old garden plants. Place chopped plant parts over the soil (except for weeds) and cover with a 2-3" layer of composted mulch. Water the layers well to aid decomposition. Take these steps to protect the garden soil and discourage weed growth over the summer.
- Add mulch around fruit trees.
- Add fresh cardboard and mulch to garden pathways.

## SUPPLIES

### GARDEN PARTY TOOLS

- Picks (at least one per bed)
- Shovels
- Rakes
- Garden hoes
- Pitchforks (great for mulch)
- Spade forks (to loosen soil)
- Buckets
- Wheelbarrows
- Hand tools
- Pruners and loppers
- Gloves (adult and child sizes)
- Rototiller (optional)
- Water keys
- Hose
- Drill and drill bits (if necessary)
- Saw (if necessary)
- Extension cord (if necessary)
- Permanent pens for labeling tools

### GARDEN BED MATERIALS

- Corrugated, unwaxed cardboard
- Newspaper (no magazines)
- Soil
- Mulch
- Soil amendments (compost, vermicast, composted manure, composted mulch)
- Garden bed materials: boards, posts, and screws

### COMPOST BIN MATERIALS

- Wooden Pallets
- Discarded bicycle tubes

### MARKING BED LOCATIONS

- Measuring tape
- Spray paint or flags

### OTHER WORKDAY SUPPLIES

- Sign in sheets, pens, and clipboard
- Folding table, tablecloth
- Name tags and pens
- Whiteboard and dry erase markers
- Banners or signs (to direct volunteers)
- First aid kit
- Camera
- Kids' activity supplies
- Snacks and drinks: Think zero waste, local, and healthy! (e.g. fresh fruits and ice water in beverage jug for reusable water bottle refills)
- Zero Waste Station: Buckets labeled for trash, compost, and recycling





## Student and Food Safety: Best Practices for Hawai'i School Gardens

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<sup>1</sup>Agricultural Development in the American Pacific; <sup>2,3,4,5</sup>CTAHR departments of <sup>2</sup>Plant and Environmental Protection Sciences, <sup>3</sup>Human Nutrition, Food and Animal Sciences, <sup>4</sup>Natural Resources and Environmental Management, <sup>5</sup>Tropical Plant and Soil Sciences; <sup>6</sup>Ash, Inc.; <sup>7</sup>Kōkua Hawai'i Foundation

There is a renaissance in school gardening in Hawai'i. It is a great time for school children because many subjects can be taught in a garden, and it gives students time outside with exercise during their school day. Books such as *Growing an Educational Garden at Your School*, by Colleen Carroll (National Tropical Botanical Garden, 1998) or *How to Grow a School Garden*, by Arden Bucklin-Sporer and Rachel Kathleen Pringle (Timber Press, 2010) can help get a garden off to a good start.

Even with renewed enthusiasm for school gardening, it is important to note that gardens and gardening are different than in the past. For example, there are more human pathogens in the environment, and more children are affected by allergies and asthma. Therefore, schools need to be more mindful of legal liabilities than in the past. This publication contains checklists that teachers, volunteers, and students can use to reduce risks found in the garden. The document is divided into advice about the students, the garden, and the food. It also mentions certain regulations of the Hawai'i departments of health and agriculture. Just like a pilot working through a printed "preflight" checklist before taking to the skies, going through these lists is a "best practice." All of the best practices in the following lists can be easily turned into curriculum topics, as they relate to STEM: science, technology, engineering, and math.

The following pages contain references to the many gardening resources provided by the University of Hawai'i at Mānoa, College of Tropical Agriculture and



Human Resources (CTAHR). One is the companion to this guide, *Best Food Safety Practices for Hawaii Gardeners* (<http://tinyurl.com/4s2e7cp>). To find additional resources, visit [www.ctahr.hawaii.edu/freepubs](http://www.ctahr.hawaii.edu/freepubs). Other resources are listed at the end of this publication.

### FOR THE STUDENTS . . .

#### Sun sense and hydration

Hawai'i students are often outside in the sun. They should take precautions to protect their skin from damaging UV sunlight and stay hydrated to prevent heat exhaustion or heat stroke. Protect students in the garden by having them

follow these steps:

- Have cool, potable (drinkable, municipal) water on hand and let students drink all they want whenever they feel thirsty. Use and label one-time-use cups with names, or encourage the use of reusable water bottles.
- Wear wide-brimmed hats and long-sleeved shirts.
- Wear light-colored clothes to repel the sun, rather than black or other dark colors.
- Wear glasses to protect against sun and other garden hazards.
- Wear sunscreen with a high SPF that blocks UVA and UVB rays. Some types contain insect repellent.
- Create a shaded area where the students can rest.
- Watch students for signs of heat stroke or heat exhaustion: increased thirst, weakness, fainting, irritability, muscle cramps, sweating, or fever.

### Safe handling of tools and supplies

Proper tools and supplies make gardening easier and often more productive. Be sure to demonstrate the correct, safe use of each tool. Make sure all tools are

- used only by students of an appropriate age and under adult supervision
- kept sharpened (as appropriate)
- stored properly in a locked container
- examined regularly for damage and replaced when needed
- placed on the ground in a safe manner
- put away properly when work is done.

### Personal protective equipment (P.P.E.) for students

Gardening can be hazardous, so it is a best practice to equip students with the appropriate P.P.E.

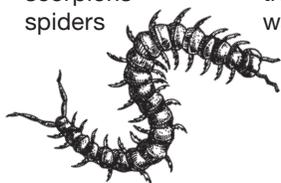
- Wear clear safety glasses (or sunglasses) on projects where eyes need protection.
- Covered shoes should be worn while working in the garden. Students should not be allowed to go barefoot or wear slippers in the garden; there are too many ways for them to get hurt.
- A dust mask should be on hand for use during potentially dusty jobs, such as turning compost.
- Have water on hand to flush eyes, if necessary.
- Have sturdy work gloves available for use with tools such as shovels and rakes.

### Animals that bite or sting in Hawai'i's gardens

There are beneficial animals in our gardens, many of them insects. The good ones help us control pests and break down plant materials to make soil and compost. The bad ones, however, can bite or sting us, or cause allergic reactions (just like poisonous plants). They can also attack our plants. *What Bit Me?* by Nishida and Tenorio (University of Hawai'i Press, 1993) provides a good summary of "bugs" in Hawai'i's gardens. Some children are hypersensitive to the bites or stings of bees, ants, or fleas, so they should come to the garden with proper attire and a personal response

ants  
bees  
beetles  
centipedes  
cockroaches  
fleas  
flies  
lice  
millipedes

mites  
mosquitoes  
scorpions  
spiders



thrips  
ticks  
true bugs  
wasps

kit. Because of this type of sensitivity, be mindful of the animals listed here in and around the garden. Also, make sure there is no standing water in the garden to reduce the chances of Dengue fever being transmitted by mosquitoes.

### Watch out for other physical dangers

Students are not always aware of their surroundings. Therefore, it is important to scan the garden environment for any dangers and remove or minimize them. These dangers can include:

- Wood preservatives—If constructing a raised bed, be aware of what might have been applied to the framing material to keep it from rotting or being eaten by insects. Many chemical wood preservatives, especially older ones found on recycled wood, can come off on hands and leach into the soil, becoming hazardous to humans. Since 2003, the EPA has regulated the use of heavy-duty wood preservatives. EPA advises not to use wood treated with most preservatives for edible crop production and around children. See options at <http://www.epa.gov/oppad001/reregistration/cca/>. Also avoid using rubber tires and granite as border materials. For raised bed borders in school gardens, its best to use untreated redwood or cedar lumber (naturally resistant to rot and insects), hollow tiles, stone, bricks, logs, or "plastic lumber" made of recycled plastic.
- Dry soil or compost can be full of molds and other fungi such as *Aspergillus fumigatus*. Small dust particles can also create problems for students with allergies or asthma. It is best if these dusty products are handled by an adult, or students whose parents have given permission to work with them.
- Students should wash their hands with soap and water after handling soil, compost, worms, or worm castings.
- Wooden poles, metal rebar, or anything sticking up or out can be tripped over or fallen on. Cover the tops of these hazards if they cannot be removed.
- Even if students wear covered shoes in and around the garden, their ankles are still exposed. Make sure short plant sticks, metal fence posts, rebar, and other discards are cleaned up.

### IN THE GARDEN . . .

#### Fertilizers

Fertilizers and other soil amendments provide plants with nutrients they need to grow. Some fertilizers, both organic and non-organic, carry the warning "KEEP OUT

OF REACH OF CHILDREN.” This is because they can be hazardous. For a school garden, fertilizers should be

- Used only as necessary—avoid the use of manure and biosolids; some products are approved for certified organic production. See: <http://www.omri.org>.
- Stored safely and off the ground to reduce the chance of run-off into water sources in the case of flooding.

### Pesticides

The EPA believes that children are significantly more sensitive to pesticides than adults. Pesticides, organic and synthetic, are applied to repel or kill pests. The suffix, -cide, means “to kill.” Spraying liquid dish soap to kill leafhoppers or using powdered borax to kill ants *is using pesticides*. Students should not apply pesticides. Some pesticides, organic and non-organic, carry the warning

“KEEP OUT OF REACH OF CHILDREN.” This is because they can be hazardous. Do not let anyone apply “experimental” pesticides on food crops that will be eaten. Check with your schools’ groundskeeper to see what and where any pesticides may be applied on school property. See the box below for more information. All pesticides should:

- be used avoided or used minimally in school gardens
- be labeled with a U.S. Environmental Protection Agency (EPA) registration number for *commercial agriculture* use (this is required for school gardens by the Hawai'i Department of Agriculture); do not use household products, such as baking soda or milk, as they are not specifically labeled as a pesticide and thus do not have precautionary information on the label for safe use

. . . continued on page 6

## Science-Based Knowledge: Organic vs. Non-Organic Chemicals and Pesticides

Confusion often arises when people speak of “chemicals,” “pesticides,” or ask what is allowed in “organic” production. Let’s try to clarify these three terms.

**Chemicals.** Humans consume chemicals to live. Merriam-Webster’s Medical Dictionary (2007) defines *chemical* as “a substance (as an element or chemical compound) obtained by a chemical process or used for producing a chemical effect.”

The Collins English Dictionary (2009) says *chemicals* are “any substance used in or resulting from a reaction involving changes to atoms or molecules, especially one derived artificially for practical use.”

Thus, the water we drink is a chemical. The foods we eat contain chemicals. In fact, the human body is made up of 60 basic elements and countless chemical compounds! In the case of garden production, all composts, soil amendments, fertilizers, and pesticides (used to manage pests: insects, weeds, slugs, etc.) are or contain chemicals. The US National Organic Program (NOP) must approve chemicals for use in organic production. The NOP is part of the USDA Agricultural Marketing Service.

**Pesticides.** The EPA defines a pesticide as “any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest.” Pests can be insects, slugs, mice and other animals, unwanted plants (weeds), and fungi or other microorganisms like bacteria and viruses. Under U.S. law, a pesticide is also any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

So, what is the difference between a chemical pesticide or fertilizer labeled “organic” or “natural” and other chemicals called “synthetic” or “man-made”? The NOP defines *synthetic* as “a substance that is formulated or

manufactured by a chemical process or by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources, except that such term shall not apply to substances created by naturally occurring biological processes.”

Some physical actions act like pesticides; for example:

- using flames to burn weeds.
- using plastic to cover the ground and create heat that will kill soil-borne pests, such as nematodes.

**Organic production.** In organic production, synthetic chemicals are usually prohibited. In certified organic production, however, there are over 45 instances when synthetic chemicals are allowed “with restriction,” as approved by the NOP with input from the National Organic Standards Board (NOSB). For example, the synthetic chemical hydrogen peroxide (produced by a chemical reaction in a factory) is allowed, with restrictions, in organic production. The synthetic chemicals ferrous sulfate (iron), ozone, and sulfur dioxide also make the allowed-with-restriction list. The synthetic substances that can be used under some circumstances in organic production are listed on the “National List of Allowed and Prohibited Substances” (<http://tinyurl.com/ylcf9vw>). Otherwise, gardeners can search for NOP-compliant pesticides by looking for the Organic Materials Review Institute (OMRI) designation on the label (<http://www.omri.org>).

When choosing a pesticide, use only those labeled by EPA. Searching for the OMRI designation on a product will guarantee that the pesticide is NOP-compliant. Do not use household chemicals in school gardens, because they are not EPA-labeled for “commercial” use (as required by the Hawai'i Department of Agriculture).

**Always read and follow the pesticide label.**

## Notice: Pesticides on Hawai'i School Campuses

"Hawaii does not have any laws restricting pesticide use in or around schools and does not require schools to implement IPM. There are no posting requirements for indoor or outdoor pesticide applications near schools, nor are there any statewide laws regarding restricted spray zones near school property." Source: <http://www.epa.gov/region9/childhealth/pesticides-hawaii.html>

**However**, school applicators **MUST** follow the label on the pesticide, as "the label is the law."

**Integrated Pest Management (IPM)** is using a combination of methods, including pesticides (if necessary), to keep pest populations at or below an acceptable level. The U.S. EPA has advice on how to employ IPM on school properties:

[www.epa.gov/pesticides/ipm/schoolipm/index.html](http://www.epa.gov/pesticides/ipm/schoolipm/index.html).

### Plants as natural pest repellents

The following plant varieties are recommended to be planted as in-row or border plants to repel pests (and they are not considered poisonous to people and pests; see

*Danger: Toxic Garden Plants*):

- |               |                |                 |
|---------------|----------------|-----------------|
| • basil       | • lavender     | • rue           |
| • borage      | • marigold     | • sage          |
| • catmint     | • mint         | • santolina     |
| • chives      | • nasturtium   | • Southern-wood |
| • coriander   | • oregano      | • tansy         |
| • garlic      | • pot marigold | • thyme         |
| • horseradish | • rosemary     |                 |
| • hyssop      |                |                 |



Source: <http://gardening.about.com/od/naturalorganiccontrol/a/Companion.htm>

### Beneficial insects: attracting and cultivating "good bugs"

Not all insects in the garden are pests. In fact, many insects and other arthropods are considered "good bugs." Biological control of insect pests is an extremely important component of an ecologically balanced garden.

In Hawai'i, import of natural enemies (including ladybugs) from outside the state is highly restricted, and there is currently no commercial source of natural enemies in-state. Fortunately, many beneficial insects have naturalized here. The three most important strategies to conserve natural enemy populations are:

1. Cultivate flowering plants in and around production area.
2. Limit or avoid pesticide sprays (including organic pesticides).
3. Know who your insect friends are!

- |                     |                       |
|---------------------|-----------------------|
| • braconid wasps    | • lady beetles (bugs) |
| • encyrtid wasps    | • minute pirate bugs  |
| • hover flies       | • predatory mites     |
| • ichneumonid wasps | • pteromalid wasps    |
| • lacewings         | • trichogramma wasps  |

See the CTAHR publication titled *Integrated Pest Management* and this UH CTAHR resource on beneficial insects, including plants that attract beneficial insects: [www.ctahr.hawaii.edu/sustainag/links/production.html#pest](http://www.ctahr.hawaii.edu/sustainag/links/production.html#pest).

### Food allergies and home-made pesticides

Some books and websites suggest using items such as milk and seafood as natural pesticides. While they may seem harmless enough, a consumer with a particular food allergy might have a negative reaction when eating a sprayed product. Do not use homemade, unapproved (unless they are on the minimum-risk list below), and unlabeled (EPA label) pesticides in school gardens. See more information about food allergies at [www.foodallergy.org](http://www.foodallergy.org).

### Minimum-risk pesticides

If you need to spray something to control pests, consider organic products (<http://www.omri.org>) or these "minimum-risk pesticides":

- 2-phenethyl propionate
- castor oil (U.S.P. or equivalent)\*
- cedar oil
- cinnamon and cinnamon oil\*
- citric acid\*
- citronella and citronella oil
- cloves and clove oil\*
- corn gluten meal\*
- corn oil\*
- cottonseed oil\*
- dried blood
- eugenol
- garlic and garlic oil\*
- geraniol
- geranium oil
- lauryl sulfate
- lemongrass oil
- linseed oil
- malic acid
- mint and mint oil
- peppermint and peppermint oil\*
- potassium sorbate
- putrescent whole egg solids
- rosemary and rosemary oil\*
- sesame (includes ground sesame plant) and sesame oil\*
- sodium chloride (common salt)\*
- sodium lauryl sulfate
- soybean oil
- thyme and thyme oil\*
- white pepper
- zinc metal strips (zinc metal and impurities, only)



\* indicates exempt active ingredients that are also exempt from pesticide residue tolerance requirements.

Source: EPA Minimum Risk Pesticides  
<http://tinyurl.com/4gbfprq>

## Danger: Toxic Garden Plants

Plants have varying levels of natural toxicity. Toxicity is the degree to which something can cause harm to living things. It is important to caution students not to eat or touch unidentified plant material in the garden. Some plants on the following list are common on school grounds, and this is a good opportunity to inform students about toxic plants and plant parts. Each of the four toxicity levels has a number, in parenthesis. If a plant has an added toxicity issue, it will be followed by another number in parenthesis. Some of these plants, like taro, have their toxicity reduced/eliminated through thorough cooking.

- (1) Major toxicity:** Ingestion of these plants may cause serious illness or death. If eaten, immediately call 911.
- angel's trumpet (*Brugmansia x candida*) (4)
  - azalea (*Rhododendron* sp.)
  - be-still tree (*Thevetia peruviana*)
  - black-eyed susan (*Abrus precatorius*)
  - cassava (*Manihot esculenta*)
  - castor bean (*Ricinus communis*) (4)
  - cerbera (*Cerbera manghas*) (4)
  - cestrum (*Cestrum* sp.)
  - chinaberry (*Melia azedarach*)
  - gloriosa lily (*Gloriosa superba*)
  - Hawaiian poppy/puka kala (*Argemone glauca*) (4)
  - hydrangea (*Hydrangea macrophylla*)
  - Japanese anemone (*Anemone hupehensis*) (4)
  - jatropha (*Jatropha* sp.) (4)
  - jimsonweed (*Datura stramonium*)
  - lantana (*Lantana camara*) (4)
  - mushrooms (*Agaricales*, not all species)
  - nightshade (*Solanum* sp.)
  - oleander (*Nerium oleander*) (4)
  - pencil plant, crown of thorns, red spurge, and slipper flower (*Euphorbia* and *Pedilanthus* spp.) (4)
  - periwinkle (*Catharanthus roseus*)
  - pokeberry and coral berry (*Phytolacca* spp. and *Rivina humilis*)
  - star-of-Bethlehem (*Hippobroma longiflora*) (4)
  - tomato leaves (*Solanum lycopersicum*) (4)

**(2) Minor toxicity:** Ingestion of these plants may cause minor illnesses such as vomiting or diarrhea. If eaten, call 911.

- allamanda (*Allamanda cathartica*) (4)
- aloe (*Aloe* sp.) (4)
- amaryllis (*Hippeastrum* sp.) (4)
- candlenut (kukui) (*Aleurites moluccana*) (4)
- croton (*Codiaeum variegatum*) (4)
- cup of gold and silver cup (*Solandra* sp.)
- foxglove (*Digitalis purpurea*) (4)
- kava (*Piper methysticum*)
- plumeria (*Plumeria* sp.) (4)
- poinsettia (*Euphorbia pulcherrima*)

**(3) Oxalates:** The juice or sap of these plants contains oxalate crystals. Ingestion of these needle-like crystals can irritate the skin, mouth, tongue, and throat, resulting in throat swelling, breathing difficulties, burning pain, and stomach upset. Call 911 if any of these symptoms appear following ingestion of plants.

- anthurium (*Anthurium* sp.)
- crown flower (*Calotropis gigantea*) (4)
- dumb cane (*Dieffenbachia* sp.) (4)
- elephant ear (*Alocasia* and *Xanthosoma* sp.) (4)
- taro (*Colocasia esculenta*)
- peace lily (*Spathiphyllum* sp.)
- philodendron (*Philodendron* sp.) (4)



**(4) Dermatitis and eye injury:** Contact with the juice, sap, or thorns of these plants may cause a skin rash or irritation or eye injury. Wash the affected area of skin with soap and water as soon as possible after contact. The rash may be very serious and painful. Call 911 if symptoms appear following contact with the plants.

- aloe (*Aloe* sp.) (2)
- amaryllis (*Hippeastrum* sp.) (2)
- angel's trumpet (*Brugmansia x candida*) (1)
- castor bean (*Ricinus communis*) (1)
- cerbera (*Cerbera manghas*) (1)
- croton (*Codiaeum variegatum*) (2)
- crown flower (*Calotropis gigantea*) (3)
- dumb cane (*Dieffenbachia* sp.) (3)
- elephant ear (*Alocasia* and *Xanthosoma* sp.) (3)
- foxglove (*Digitalis purpurea*) (2)
- Japanese anemone (*Anemone hupehensis*) (1)
- jatropha (*Jatropha* sp.) (1)
- kahiki flower and silky oak (*Grevillea* sp.)
- lantana (*Lantana camara*) (1)
- mango (*Mangifera indica*)
- oleander (*Nerium oleander*) (1)
- pencil plant, crown of thorns, red spurge, and slipper flower (*Euphorbia* and *Pedilanthus* spp.) (1)
- philodendron (*Philodendron* sp.) (3)
- plumeria (*Plumeria* sp.) (2)
- star-of-Bethlehem (*Hippobroma longiflora*) (1)
- tomato leaves (*Solanum lycopersicum*) (1)

Source(s): S. Scott and C. Thomas, *Poisonous Plants of Paradise*. University of Hawai'i Press, 2000.  
Washington State Poison Control Center: [www.wapc.org/poisons/plantlist.htm](http://www.wapc.org/poisons/plantlist.htm)  
<http://hurthawaii.blogspot.com/PoisonPlantsHawaii.pdf>  
[http://hawaii.gov/hdoa/pi/pest/BROCHURE\\_TOPTENproof.pdf](http://hawaii.gov/hdoa/pi/pest/BROCHURE_TOPTENproof.pdf)  
[www.ces.ncsu.edu/depts/hort/consumer/poison/indcoa\\_e.htm](http://www.ces.ncsu.edu/depts/hort/consumer/poison/indcoa_e.htm)

- be used *only* per label instructions, under adult supervision, and with the custodian's knowledge
- be used with appropriate personal protective equipment (P.P.E.) as required by the product's label
- have a Material Safety Data Sheet (MSDS) ([www.msds.com](http://www.msds.com)), which provides information in case of a spill or other accident occurring with that particular substance
- have warning signs and/or verbal warnings used in the garden as required by the label
- be stored in a posted, locked, well-ventilated facility.
- Keep dogs and cats out. While many consider feces to be a "fertilizer," animal dung can also contain human pathogens, such as *Toxoplasmosis* in cats.
- Keep food scraps out of the garden, as they can attract rodents and other animals. Compost them first.
- Minimize the presence of birds around food crops by using nets and/or bird deterrents (rotate frequently). Bird droppings can carry as many as 60 fungal, bacterial, and viral diseases, including West Nile virus and avian flu. Bird droppings can also contaminate aquaponic tanks and sources of human drinking water.

### Garden sanitation and protection

School properties are typically abandoned at night and on the weekends. People often have access to gardens, whether you know about it or not. Enclosing the garden with a fence and posting signs to limit trespassers provides some control over the site. Members of the community may want to help, but may unknowingly introduce pests or diseases. Inform the community that it is a school garden and ask them to contact the school if they have questions or concerns. A posted list of rules for a school garden might include the following:

- No dumping. All waste, even green material, should be thoroughly composted before it enters the garden. It is best to add compost to the soil between crops, or when the plots are fallow.

### Managing rats, slugs, and snails and reducing the chance of rat lungworm

Hawai'i, like other tropical areas, has a unique pest: the rat lungworm. This microscopic nematode (shaped like a worm and invisible to the naked eye) lives in the lungs of rats, and when it is excreted it can be eaten by slugs and snails. The photo of a semi-slug on p. 7 shows how small slugs can be. People can accidentally eat a slug or snail if they do not look carefully at what they harvest or eat. The disease can make people very sick: they can even die if the rat lungworm reaches their brain. Precautions must be taken to reduce the chance of selling or consuming contaminated produce. Best practices for managing this pest include

- removing rodent, slug, and snail hiding places; trap

## Understanding Soil, Amendments, Water Quality and Safety by Laboratory Testing

When starting a new garden it is wise to conduct a few tests to determine the condition of your production environment. Knowing about your garden's condition and possible amendments to increase its productivity can lead to a more satisfying experience, keep costs down, and reduce harmful impacts to the environment.

**Soil** (tests available from CTAHR in Mānoa or Hilo [[www.ctahr.hawaii.edu/site/adsc.aspx](http://www.ctahr.hawaii.edu/site/adsc.aspx)] and private labs: see list under Water, below). Collect soil samples as advised in the CTAHR publication, *Testing Your Soil: Why and How to Take a Soil-Test Sample*, [www.ctahr.hawaii.edu/oc/freepubs/pdf/SCM-9.pdf](http://www.ctahr.hawaii.edu/oc/freepubs/pdf/SCM-9.pdf). Test for:

- pH and extractable nutrients: calcium (Ca), magnesium (Mg), phosphorous (P), and potassium (K) and pH levels of your soil so you can get site-specific advice about amendments.
- Heavy metals: find out if there are any metals at dangerous levels. This could be the case if soil was brought into the garden from off-site.

**Compost and worm castings** (compost or worm "food" with animal feces or meat should be avoided). If used, test for:

- *Salmonella* and *E. coli* 0157:H7 bacteria. Contact Hawai'i-state-approved laboratories for their costs and testing supplies (<http://hawaii.gov/health/environmental/water/sdwb/environmental/water/sdwb/index.html>).

**Water** (irrigation and produce wash). Test for the presence of:

- *E. coli* bacteria. Contact Hawai'i-state-approved laboratories for their costs and testing supplies (link above).
- Non-potable water that has a generic *E. coli* count less than 126 bacteria/100 ml can be used for irrigation as long as it does not touch the edible portion of the crop. If such non-potable water must be used, applying it through drip irrigation tubes under plastic mulch will help minimize contact.
- Rinse or wash water for produce must be potable according to State of Hawai'i regulations.

and kill them in your garden

- not harvesting or eating produce with slugs or snails, or their feces or slime, on it.

If you suspect that slugs and snails have been on your produce, consider rinsing the produce in water containing a sanitizer that has been approved for food contact by the FDA.

More information on rat lungworm is found here:

Advice for consumers:

[www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-35.pdf](http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-35.pdf)

Advice for commercial producers:

[www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-39.pdf](http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-39.pdf)



A female rat lungworm, smaller than a pinhead.



Juvenile semi-slug on a nickel; it can contain rat lungworms.

Photo: Juliano Romanzini, courtesy Carlos Graeff Teixeira

Photo: Chris Jacobson

stronger when the core temperature of a plant is more than 10 degrees warmer than the rinse water. This is because water moves from cold parts to hot parts. The best practice is to follow FDA's Current Good Manufacturing Practices (cGMP, <http://tinyurl.com/3jq6n5g>) and use only potable produce rinse water. This guidance also follows Hawai'i Administrative Rules §11-11-8 (<http://gen.doh.hawaii.gov/sites/har/admrules/default.aspx>) and recommends that food manufacturers use water from an approved source when rinsing produce. There are some commercial "sanitizers" on the market, but they may not be labeled for some of Hawai'i's crops.

### Growing fish and produce together

Many of Hawai'i's families, farms, and schools are trying a new farming method called aquaponics. It is a combination of hydroponics (plants grown in water) and aquaculture (fish farming). Having students near an open water source is something to be careful of, especially with younger ones. Many of the precautions and recommended production methods can be found in these CTAHR publications on aquaponics and hydroponics.

*On-Farm Food Safety*

[www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-38.pdf](http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-38.pdf)

*Small-Scale Lettuce Production with Hydroponics or Aquaponics*

[www.ctahr.hawaii.edu/oc/freepubs/pdf/SA-2.pdf](http://www.ctahr.hawaii.edu/oc/freepubs/pdf/SA-2.pdf)

More hydroponics publications are here:

[www.ctahr.hawaii.edu/hawaii/Vegetable.aspx](http://www.ctahr.hawaii.edu/hawaii/Vegetable.aspx)

### Which water for what use?

Plants need water to grow, but water quality can vary greatly. You need to choose the proper water for the task.

**Irrigation.** There are no national or state standards for irrigation water quality. Therefore, the produce industry has chosen the EPA Recreational Water Standard ([www.epa.gov/waterscience/criteria/recreation](http://www.epa.gov/waterscience/criteria/recreation)) as a maximum requirement. This standard says that *E. coli* in irrigation water must be fewer than 126 bacteria per 100 ml. Some Hawai'i rivers, ditches, and water catchment systems (open reservoir and roof-top) can have *E. coli* numbers in excess of this maximum, so care must be taken when using these sources in your garden. If the water is not from a city source (called "potable," or drinkable), the best practice is to use drip irrigation under plastic mulch. At least this will keep the non-potable irrigation water from touching the "edible portion of the crop" (unless it is a root crop).

**Produce rinse water.** When a crop is harvested, the cut surface of the crop can act as an entry point for pathogens, just like when we cut ourselves. Recent science tells us that produce, just like cut flowers in a vase, can absorb water through the places where it was cut for harvesting. This process is called capillary action. Thus, if the produce rinse water contains pathogens, they might be sucked into the edible portion of the crop. Capillary action is even



### What if your garden has been flooded?

Rain is the best source of water for growing plants. There are concerns, however, about the safety of flood-damaged vegetables and fruits for fresh consumption, especially those crops grown close to the ground. Flood waters can transfer fertilizers, pesticides, feces, pests and debris into your garden from farms, lawns, septic and sewer systems, parking lots, etc. If your garden has been inundated by water, follow these recommendations from the FDA for commercial crops:

- If the edible portion of a crop is exposed to flood waters, it is considered contaminated and should not be eaten. There is no practical method of sanitizing the edible portion of a vegetable or fruit that has been sitting in contaminated water. Therefore, gardeners are encouraged to reduce the risk by discarding affected crops or incorporating the crops into the soil.

... continued on page 12

- Crops in proximity to but less exposed to flooding, where the edible portion of the crop has NOT come in contact with flood waters, need to be evaluated on a case-by-case basis. Factors to consider in the evaluation include:
- What was the source of the flood waters and were there potential upstream contributors of bacterial and/or chemical contaminants?
- The type of crop and stage of growth. For example, was the edible portion of the crop still developing? How far above the ground was the lowest edible portion?
- Were conditions such that the crop may have been exposed to prolonged periods of moisture and stress that could foster fungal growth and, possibly, development of mycotoxins?

Source: EPA: <http://tinyurl.com/3o6744q>

## THE FOOD . . .

### Food safety supplies

Garden products are eaten both raw and cooked. To protect produce from non-production contamination, you will need the following supplies:

- potable (drinkable, municipal) water for hand washing and produce rinsing
- sinks: one *exclusively* for hand washing, a separate one for produce rinsing, and, if necessary, a third for washing tools and equipment.
- non-antibacterial soap in a pump-type dispenser (no bar soap)
- single-use paper towels (no cloth towels)
- covered trash can
- a well-stocked, up-to-date, first aid kit that is easily accessible by everyone at all times.

## Allow No Animals (or Uncomposted Manures) in the Production Area

There have been produce and food recalls, sicknesses, and deaths due to contamination with animal feces containing human pathogens. The pathogens have been found in raw produce and in processed foods. Keep animals and their uncomposted manures out of the garden at all times. For example, the American Public Health Association's Compendium of Methods for the Microbiological Examination of Foods says, "*E. coli* is not part of the normal microflora of fresh produce, therefore their presence can be related to the use of polluted water for irrigation or washing, presence of animal feces, unclean hands, or contaminated surfaces of harvesters and containers."

### Follow these best food-safety practices:

Animals, including pets, should be kept out of growing areas and buffer zones at all times (<http://tinyurl.com/4qfajku>). Any production animals should be humanely housed in an enclosed area down-slope from the produce production area.

This will help keep manures from getting into the garden during heavy rains.

If feces are occasionally found in the garden, use a trowel or shovel to pick them up, place them in a plastic bag, and discard them in a trash can. Alternatively, bury feces in a hole downhill and well away from the garden. Sanitize the trowel or shovel when done.

Avoiding manure will minimize risk of microbial contamination. If manure is used to amend soil in a produce production area, it must be processed according the EPA 503 practices (<http://tinyurl.com/3wqahn3>) and Hawai'i State regulations. Purchase compost from a reputable supplier. See also the CTAHR publication titled *Composted Animal Manures: Precautions and Processing*. [AWM-1]

Worm castings collected from worm bins must never be applied to the edible portion of the crop. Side-dress plants with castings or incorporate them into the soil as an amendment.

All compost piles containing manure should be located down-slope from the produce production area. No raw manure or compost leachate (water at the bottom of the pile) should run into open bodies of water (EPA Clean Water Act: <http://tinyurl.com/yhlsgyf>).

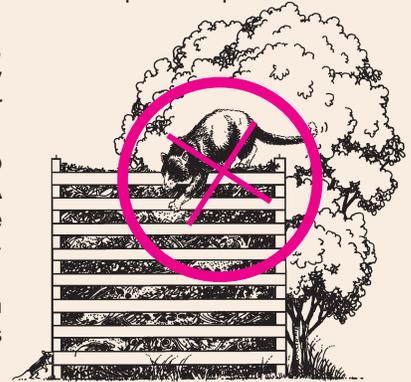
Change boots (i.e., "animal-only" or "produce-only" boots) and/or have a sanitizing boot bath if people are moving from an area with animal feces to a produce production area.

Keep birds away by using bird deterrents and changing types frequently. (The Internet has many homemade ideas.)

Bury all food discards (garbage) in a hole or in a compost pile. When raw food is exposed, it can attract dogs, cats, rodents, mongooses, birds, and other undesirable animals.

Wash hands with soap and water after being in an animal area and going back into the produce production area.

Allow *NO* raw manure or animals in a garden during the production season, especially at harvest time!



## Harvest, clean, and handle produce with food safety in mind

It is important that you not contaminate recently harvested produce. Contamination can come from unclean hands, animal feces on or in containers, from contaminated rinse water, and so forth. Follow these best practices:

- Make sure that everyone washes his or her hands with soap and water before handling or eating produce.
- If someone is ill, they should not be handling produce (harvesting, rinsing, or any preparation). Find a non-food contact project for ill students, like weeding.
- Make sure cutting tools are sharp, cleaned, and sanitized (according to manufacturer's label) before use.
- Harvest containers should be made of materials approved for food use (plastic, stainless steel, etc.).
- Harvest containers and tools should be washed with soap and water and an approved sanitizer before each use.
- Harvest containers should be kept off the ground in a clean wheelbarrow or on a tarp or pallet to avoid contaminating produce with soil and pathogens.

## Rinsing and preparing fresh produce (also known as "raw agricultural produce")

- All food contact surfaces, utensils, and equipment should be clean and sanitized (according to the manufacturers' label) before each use.
- Food served to the public (as free samples or at a group food event) must be prepared in a kitchen with a Food Establishment Permit from the Hawai'i Department of Health (<http://tinyurl.com/3sqbo6w>).
- Cut away damaged or bruised areas on fresh fruits and vegetables before preparing and/or eating. Produce that looks rotten should be discarded or composted.
- All produce should be inspected and rinsed thoroughly with clean running water before preparing, cooking, and eating. This applies to both conventionally- and organically-grown produce.
- If a produce rinse or sanitizer is used, use a clean container and follow the label instructions.
- Even if you plan to peel the produce before eating, it is still important to rinse it first.
- Soap and detergent are not approved for use on food, so do not use them to wash fruits or vegetables.
- Scrub firm produce, such as melons or potatoes, with a clean produce brush.
- Drying produce thoroughly with a clean cloth towel or paper towel may further reduce surface bacteria.

## Dude! Wash Your Hands

Here's how to do it right:

1. Wet your hands with potable running water.
2. Apply liquid or powder soap.
3. Rub your hands vigorously for at least 20 seconds. Remember to scrub all surfaces, including the backs of your hands, wrists, between your fingers and under your fingernails. (Sing the "ABC" song while washing to ensure at least 20 seconds.)
4. Rinse well.
5. Dry your hands with a clean or disposable towel or air dryer.
6. If possible, use your towel to turn off the faucet.
7. If possible, use your towel to open the door.
8. Dispose of your towel responsibly.

Note: Antibacterial soap is not more effective than regular soap for cleaning hands. Antibacterial soap does have an additional bacteria kill ingredient but may also lead to the development of more resistant bacteria. Waterless antibacterial hand gels with at least 60% alcohol can kill bacteria but are not effective for heavily soiled hands.

Source: Centers for Disease Control and Prevention  
[www.cdc.gov/handwashing](http://www.cdc.gov/handwashing)

## Proper Disposable Glove Use

Disposable gloves can be an effective safety measure if used properly. If gloves are not used properly, the chance of cross contamination is similar to bare-hand contact. The National Restaurant Association has stated in a report that they have found the key to improved food safety is proper hand washing technique. Because the 2009 FDA Food Code mandates no-bare-hand contact with ready-to-eat foods, proper glove use is essential when working with food.

Rules of proper glove use:

1. Use powder-free, non-latex gloves to reduce the chance of an allergic reaction.
2. Do not re-use gloves.
3. Gloves should be changed whenever an activity change occurs or when there is contact with face or hair.
4. Proper hand washing should be done prior to putting on new gloves, and between activity changes.

- Refrigerate all produce that is not going to be immediately consumed.
- All cut, peeled, or cooked fruits and vegetables must be eaten or refrigerated within 2 hours. Cut produce left at room temperature longer than 2 hours should be discarded in the trash or composted.

Source: [www.ctahr.hawaii.edu/NEW/foodsafety/forms/FIGHTBAC\\_saferFV.pdf](http://www.ctahr.hawaii.edu/NEW/foodsafety/forms/FIGHTBAC_saferFV.pdf)

### Is it okay to use a public school cafeteria's kitchen for garden produce?

This is a complex question! Please contact the Hawaii Department of Education's School Food Services Branch on Oahu at 808-733-8400 for more information on this matter.

### Setting up a seller display and best food handling practices

Setting up a good seller display, such as you would find in a professional farmers' market, always requires good food handling practices. Remember, people are paying for a safe, quality product. To prevent cross-contamination from the environment or people:

- Have easily accessible hand washing and toilet facilities for students, teachers, and other participants.
- Hands *must* be washed with soap before handling produce. Avoid bare-hand contact, by using gloves after washing hands. Hand sanitizer can also be made available to clean unsoiled hands than may contain contaminants.
- Use food-grade bags for any pre-packaged produce.
- Un-packaged produce needs to be displayed on clean, sanitized tables or in clean containers, preferably with a cover. Plastic or stainless steel surfaces are preferred over porous wood surfaces.
- If using tablecloths, wash them before each use.
- Loose leafy greens should be kept at 45°F or lower. Display packages chilled, or have a display sample with packages for purchase kept in a cooler or refrigerator.
- If you are providing food samples, a Hawai'i Department of Health (DOH) Temporary Food Permit is required (<http://tinyurl.com/3sqbo6w>).
- Samples of cut produce must be prepared in a DOH-certified kitchen (<http://tinyurl.com/3sqbo6w>). Cut fresh produce left at room temperature for more than 2 hours should be discarded.
- Store and display samples in a covered container to avoid environmental contaminants like dust and pests. To prevent cross-contamination, serve samples in single-use containers or have toothpicks for one-time sampling from a "dish". With sauces or dips, prevent "double-dipping" by using a squeeze bottle.
- Have a trash can handy to minimize rubbish around your display.
- Do not serve unpasteurized juice or milk.

### Wanting to provide food for the school cafeteria?

At the current time, the Hawai'i Department of Education's School Food Services Branch requires that all produce in cafeterias must:

- have a food safety line of liability; for example, through an approved produce vendor, or by means of procurement
- be available (equity) for all students participating in the meal program.

### Content for this publication is original and was adapted from the following sources and other best school-garden practices publications

UHM CTAHR's Farm Food Safety Website, which contains information for school gardens under "client services": <http://manoa.hawaii.edu/ctahr/farmfoodsafety>

University of California at Davis: *Food Safety in Your Home Vegetable Garden*  
<http://anrcatalog.ucdavis.edu/pdf/8366.pdf>

University of Connecticut: *Five Steps to Safe Fruit and Vegetable Home Gardening*  
[www.ladybug.uconn.edu/food/documents/RItraining-FiveStepstoFood.pdf](http://www.ladybug.uconn.edu/food/documents/RItraining-FiveStepstoFood.pdf)

University of Florida school garden website:  
[http://gardeningsolutions.ifas.ufl.edu/schoolgardens/hot\\_topics/garden\\_safety.shtml](http://gardeningsolutions.ifas.ufl.edu/schoolgardens/hot_topics/garden_safety.shtml)

University of New Hampshire: *Garden to Table: Five Steps to Food Safe Fruit and Vegetable Home Gardening*  
[http://gardeningsolutions.ifas.ufl.edu/schoolgardens/hot\\_topics/garden\\_safety.shtml](http://gardeningsolutions.ifas.ufl.edu/schoolgardens/hot_topics/garden_safety.shtml)

University of Maryland: *Food Safety in the School Garden* (great page!)  
[www.growit.umd.edu/Youth%20Gardening/Garden%20and%20Food%20Safety.cfm](http://www.growit.umd.edu/Youth%20Gardening/Garden%20and%20Food%20Safety.cfm)



# Critical Points about Student and Food Safety

## FOR THE STUDENTS

### Sun sense and hydration

(see “P.P.E” below)

- ✓ Provide drinking water.
- ✓ Provide sunscreen.
- ✓ Provide covered area where students can rest in the shade.
- ✓ Provide eye protection as needed; sun glasses are recommended
- ✓ Wide-brim sun hats are recommended.
- ✓ Light-colored clothes and long-sleeved work shirts are recommended.

### Safe handling of tools and supplies

- ✓ They should be age-appropriate and used under adult supervision.
- ✓ Maintain tools and store them in a locked container.
- ✓ Place them on the ground in a safe manner.

### Personal protective equipment (P.P.E.) (see “Sun sense and hydration” above)

- ✓ Provide a well-stocked first-aid kit.
- ✓ Provide eye protection as needed.
- ✓ Provide work gloves for heavy jobs.
- ✓ Covered shoes are highly recommended.
- ✓ Dust masks should be available as needed.

### Animals that bite and sting

- ✓ Be mindful of ants, bees, centipedes, scorpions, etc.
- ✓ Children who are hypersensitive to the bites or stings of bees, ants, or fleas should come to the garden with proper attire and a personal response kit.

### Other physical dangers in the garden

- ✓ Don't use treated lumber, granite or rubber tires for raised garden bed borders.
- ✓ Be mindful around compost and other dusty materials.
- ✓ Wash hands after handling compost and worm bins.
- ✓ Rid the garden of sharp objects, such as rebar or fence posts, or make sure stakes are capped.

## Good Garden Guidance

Let your words and actions always reflect your aloha for your friends and the garden.

Covered shoes are highly recommended.

Seek adult permission before applying anything to plants.

Wash your hands after eating, touching your mouth, going to the bathroom, turning compost, working in the worm bin, and before handling produce.

To protect the plants, walk around rows, not through them.

Use garden tools and equipment carefully.

Keep the garden free of dangers and trash.

Keep animals and pets out of the garden.

In case of emergency, call 911.

## IN THE GARDEN

### Fertilizers

- ✓ Use only under adult supervision.
- ✓ Use as needed to meet plants' nutritional needs.
- ✓ Use organic materials listed at [www.ORMI.org](http://www.ORMI.org).
- ✓ Follow all label precautions, as some fertilizers can be dangerous for children.
- ✓ Keep always stored in a locked container.

### Pesticides

- ✓ Avoid using if possible.
- ✓ Use only under adult supervision.
- ✓ Read and follow the label.
- ✓ Understand that children are more sensitive to pesticides than adults.
- ✓ Grow plants that naturally repel pests.
- ✓ Do not use “home-made” or experimental pesticides; rather,

use only ones approved by EPA for commercial farms and listed at [www.ORMI.org](http://www.ORMI.org).

- ✓ Always keep stored in a locked, labeled, well-ventilated storage container.

### Animals and pests

- ✓ Take active steps to keep pets, wild animals, and insect pests out of an active growing area.
- ✓ Do not leave food discards uncovered in compost piles.
- ✓ Remove rats, slugs, and snails, as they can carry the rat lungworm pathogen.
- ✓ Do not use raw manure with a growing crop.
- ✓ Livestock should be housed down-slope from garden areas to avoid run-off of fecal matter into food-growing areas.

### Garden care and maintenance

- ✓ Water garden with potable water (or use drip irrigation with non-potable water and apply water at the soil surface and never on the edible portion of the crop).
- ✓ Use science-based composting techniques that create pathogen-free finished compost.
- ✓ All manure and kitchen discards should be properly composted for at least 90 days.
- ✓ Be mindful that many plants found in Hawai'i can be toxic. Children should ask before eating.

# Best Practices for Hawai'i School Gardens

## ABOUT FOOD HANDLING

### Food safety supplies

- ✓ Use only city/county-supplied drinkable water.

#### **Provide:**

- ✓ clean sink for washing hands and produce
- ✓ non-antibacterial soap in a pump-type dispenser
- ✓ single-use towels (do not wipe hands on clothes)
- ✓ trash can with lid
- ✓ a well-stocked first-aid kit
- ✓ water to flush eyes if needed.

### Harvesting, cleaning and handling

- ✓ Wash hands (at least 20 sec.) with soap before and after harvesting or handling produce.
- ✓ Do not harvest or handle produce when sick.
- ✓ Do not harvest damaged plants, especially ones with slug/snail slime or damage, or ones with feces on them.
- ✓ Use disposable gloves properly for harvesting (or handling) (or both).
- ✓ Use clean, food-grade harvest containers to hold harvested produce.
- ✓ Make sure cutting tools are sharp, cleaned, and sanitized (according to manufacturer's label) before use.
- ✓ Harvest containers should be kept off the ground in a clean wheelbarrow, tarp or pallet, to avoid contaminating produce with soil and pathogens.
- ✓ Food contact surfaces should be non-porous and cleaned.
- ✓ Make sure knives and cutting boards are clean.

### Rinsing and preparing fresh produce

- ✓ Wash hands (at least 20 sec.) before handling produce.
- ✓ Inspect all harvested produce and discard and compost damaged products.
- ✓ All food served to the public, must be prepared in a kitchen with a Food Establishment permit from the Hawai'i Department of Health.
- ✓ Washing fruits and vegetables with soap or detergent is NOT recommended because soap is not approved for use on food.
- ✓ Scrub firm produce, such as melons or potatoes, with a clean produce brush.

- ✓ All cut, peeled, or cooked fruits and vegetables must be eaten or refrigerated within 2 hours. Cut produce left at room temperature longer than 2 hours should be discarded or composted.
- ✓ Refrigerate any other produce that is not going to be consumed immediately.

### Seller displays

- ✓ Wash hands (at least 20 sec.) with soap before handling produce.
- ✓ Use food-grade bags for any pre-packaged produce.
- ✓ Un-packaged produce needs to be displayed on clean, sanitized tables or in clean containers, preferably with a cover. Plastic or stainless steel surfaces are preferred over porous wood surfaces.
- ✓ Loose leafy greens should be kept at 45°F or lower.
- ✓ Display packages chilled, or have a display sample with packages for purchase kept in a cooler or refrigerator.
- ✓ If you are providing food samples, a Hawai'i Department of Health Temporary Food Permit is required.
- ✓ Store and display samples in a covered container to avoid environmental contaminants like dust and pests. To prevent cross-contamination, serve samples in single-use containers or have toothpicks for one-time sampling from a "dish." With sauces or dips, prevent "double-dipping" by using a squeeze bottle.
- ✓ Do not serve unpasteurized juice or milk.



### Interested in agricultural science?

If you are a student interested in exploring a degree in the agricultural sciences, in one of dozens of agriculture-related fields, then the College of Tropical Agriculture and Human Resources at the University of Hawai'i at Mānoa has a program for you! Visit us at [www.ctahr.hawaii.edu](http://www.ctahr.hawaii.edu).

These critical points summarize the contents of "Student and Food Safety: Best Practices for Hawai'i School Gardens"\* published by the College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa. The publication is available online: [www.ctahr.hawaii.edu/oc/freepubs/FST-45.pdf](http://www.ctahr.hawaii.edu/oc/freepubs/FST-45.pdf).

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**College of Tropical Agriculture  
and Human Resources**  
University of Hawai'i at Mānoa

### Hawai'i School Garden Hui Contacts

#### Hawai'i

Hawai'i Island School Garden Network  
The Kohala Center  
Nancy Redfeather, Program Director  
Phone: (808) 322-2801  
nredfeather@kohalacenter.org  
www.kohalacenter.org/HISGN/about.html

#### Maui

Maui School Garden Network  
Day: Monday–Saturday  
Time: 8 am–5 pm  
Phone: (808) 250-8323  
msgn@hawaii.rr.com  
Place: Ha'ikū, Maui  
www.maui-school-garden-network.org

#### Community Work Day Program

Day: Monday–Saturday  
Time: 8 am–5 pm  
Phone: (808) 877-2524  
m\_lane@hotmail.com  
Place: Pu'unēnē, Maui

#### South Maui School Gardens Project

Day: Monday–Saturday  
Time: 9 am–4 pm  
Phone: (808) 269-6300  
kirksurry@yahoo.com  
Place: Kīhei, Maui

#### Kaua'i

Kaua'i School Garden Network  
Tiana Kamen, Director  
Malama Kaua'i  
(808) 828-0685 ext. 12  
tiana@malamakauai.org  
www.malamakauai.org/aboutSchoolGardens.php

#### O'ahu

'AINA In Schools Program  
Kokuahawai'i Foundation  
aina@kokuahawaiifoundation.org  
www.kokuahawaiifoundation.org/aina

#### Grow Hawai'i (Hawaii Association of Independent Schools)

Phone: (808) 973.1538  
growhi@hais.org  
www.growhi.org  
Place: 1585 Kapiolani Blvd. #1212, Honolulu, HI 96814

Complete School Garden Hui listing:  
<http://www.hawaiischoolgardenhui.org>

### UHM CTAHR Master Gardener Program Contacts

#### Hawai'i (East) Master Gardener Helpline

Day: Monday, Tuesday, Friday  
Time: 9 am–noon  
Phone: (808) 981-5199  
himga@hawaii.edu  
Place: Komohana Research and Extension Complex,  
875 Komohana St., Hilo

#### Hawai'i (West) Master Gardener Helpline

Day: Thursday  
Time: 9 am–noon  
Phone: (808) 322-4892

#### Maui Master Gardener Helpline

Day: Monday, Tuesday, Thursday  
Time: 9 am–noon  
Phone: (808) 244-3242 ext. 228  
MauiMg@ctahr.hawaii.edu  
Place: Kahului Cooperative Extension Service Office,  
310 Ka'ahumanu Ave., Bldg 214

#### Kaua'i Master Gardener Helpline

Day: Monday–Friday  
Time: 1 pm–4:30 pm  
Phone: (808) 274-3471  
rebesu@hawaii.edu  
Place: Kaua'i Cooperative Extension Service Office,  
3060 Eiwa St. (State Office Bldg. Rm 210) in Līhue

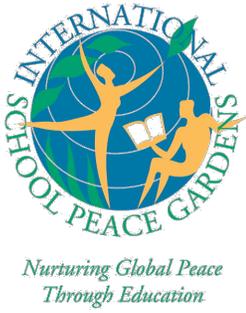
#### O'ahu Master Gardener Helpline

Day: Monday–Friday  
Time: 9 am–noon  
Phone: (808) 453.6055  
OahuMg@ctahr.hawaii.edu  
Place: Pearl City Urban Garden Center, 955  
Kamehameha Hwy.

CTAHR Master Gardener site:

[www.ctahr.hawaii.edu/site/extprograms.aspx](http://www.ctahr.hawaii.edu/site/extprograms.aspx)





PDK Hawaii School Peace Garden Community  
pdkhawaii@gmail.com or alevine@hawaii.edu



## INTERNATIONAL SCHOOL PEACE GARDENS “Next Steps” Checklist

**Step 1: Register** your involvement with the International Peace Gardens Program at [www.ihtec.org](http://www.ihtec.org). Click on the gold “Register” button. Follow the links and fill in the form (the form goes directly to IHTEC).

**Step 2: Plan your Peace Garden.** Minimally, your Garden will include 2 friendship benches and one peace or sacred tree, and a path of peace with peace signs, student sculptures, or some other way of recognizing it as a Peace Garden.

Student involvement in pre-planning. Students should be engaged throughout the process, from brainstorming to planting, through maintenance and continual development.

- Meet with Julia Morton-Marr (on-line or if possible, in-person) as a staff to discuss how to incorporate the Peace Garden as a curriculum and as a physical element in your school program.

Some ideas:

- Each child creates his/her idea of peace through: pictures, posters, dioramas that can be displayed around school on an on-going basis

Notes/Ideas: \_\_\_\_\_

- Incorporate peace values for the classroom as an integrated part of the daily routine in the classroom (e.g. *sharing* of space, materials, insights and ideas; *respect*; *harmony*; *discussion/conflict resolution*).

Notes/Ideas: \_\_\_\_\_

- Each class walk around the grounds to decide what location to select. Children each design a garden (incorporating math, science, art, etc). Each class proposes a single design to be considered as the school design.

Notes/Ideas: \_\_\_\_\_

- Brainstorm ideas with students, staff, parents, with respect to other sustainability ideas, such as solar energy, conservation of water, and transportation.

Notes/Ideas: \_\_\_\_\_

### Physical components of Peace Garden.

- 2 benches designated as “friendship benches”.

Notes about material, placement, art, etc: \_\_\_\_\_

- Plants to support local, migrating, or native species

- Important plants, vegetables, and other crops that are locally or globally significant

Plant Ideas: \_\_\_\_\_

- Local environmental and cultural resources taken into consideration.

Notes about climate, weather, student population, community: \_\_\_\_\_

### **Step 3: Select a site for your Peace Garden** or Peace Tree: \_\_\_\_\_

- Site approved by school administration and/or school board if appropriate
- Site discussed and approved/acknowledged by grounds and custodial staff
- Site appropriateness for Peace Garden or Tree discussed with local experts or otherwise researched

### **Step 4: Draw up an implementation plan for your Peace Garden**

- Create work plan (monthly or weekly) to span from now until Dedication Day and beyond
- Create a list of tasks necessary to
  - Start garden: \_\_\_\_\_
  - Maintain garden: \_\_\_\_\_
  - Grow/expand garden: \_\_\_\_\_
- Select a dedication date (such as United Nations Day (October), World Environment Day (June), Earth Day (April), or Peace Day (September)). Date Selected: \_\_\_\_\_

### **Step 5: Dedicate your Peace Garden**

- Devise a program for your dedication ceremony, including student work (art, speech, performance)
- Secure necessary tools or equipment for ceremony
- Send out invitations to parents, community, local officials/agencies, etc.
- Celebrate!

### **Step 6: Commemorate your Peace Garden**

- Create a blog on a site such as [www.blogger.com](http://www.blogger.com); send IHTEC your blog url so that we can create a link to <http://ispg.blogspot.com>.
- Create a booklet of the history of your Peace Garden. Communicate your Peace Garden news by sending it to your local paper, neighborhood schools, parents, government members, community, etc. This may help raise visibility, support, and funds for your Peace Garden.
- USE THE ISPG LOGO ON ALL YOUR DOCUMENTS AND SEND COPIES TO IHTEC.