2008 Florida School Garden Competition
ENTRY FORM

School  C W Norton Elementary

Teacher(s) & Grade(s) involved in garden program
Celia Phipps or Lisa Jacobs
2nd, 3rd, 4th & 5th grade enrichment students

Contact Person  Celia Phipps or Lisa Jacobs

Email address  phippsca@gmsbacs.edu

Time contact person can be reached  Between 10:30 - 12:00

Phone  (352) 955 - 6765  Fax  (352) 955 - 7126

Address (please include city and zip code)  C W Norton Elementary
2200 NW 45th Ave.
Gainesville, FL 32605

CATEGORY (Please mark only one)

_____ SINGLE CLASS GARDEN (Garden used by one class only)
Number of students in class __________

_____ MULTIPLE CLASS GARDEN (Garden used by more than one class or grade,
but not by the entire school)
Number of students involved in the garden __________

_____ ENTIRE SCHOOL GARDEN (Garden that is used by all grade levels at the
school)
Number of students involved in the garden __________

TYPE of school garden that you use with your students. (Please mark only one)

_____ Vegetable

_____ Flower

_____ Combination vegetable/flower

_____ Other, please specify  vegetable/flower & hydroponic greenhouse
1. Please indicate the number of hours a week, on average, your students spend in the garden. __9__ hrs/week (all classes continued)

2. Please mark all the activities that your students participate in prior to gardening.
   - Planning the garden
   - Preparing the garden
   - Designing the garden
   - Choosing plants
   - Other, weed, water, fertilize, deadhead & harvest
   - prepare, produce for selling vegetables.

3. Please mark all the activities that your students participate in while in the garden.
   - Planting
   - Observing
   - Recording
   - Playing
   - Experimenting
   - Sitting
   - Weeding
   - Harvesting
   - Fertilizing

4. Please indicate the percentage of time, on average, that you used the garden as an instructional tool in your classroom. Grade __2 - 3__ = 50%
   - 1st grade __25 - 80%

5. Please mark the subject area(s) into which you have incorporated school gardening. Check all that apply.
   - Math
   - Science
   - History
   - Health/Nutrition
   - Music
   - Physical Ed.
   - Ethics (responsibility and nurturing)
   - Other, please specify

6. Please indicate the number of years that a school garden has been part of your curriculum. __5 - 6 yr(s)__. 

7. Please indicate the types of volunteers that have helped you and your students with the garden.
   - Master Gardeners
   - University students
   - High school students
   - Senior citizens
   - Garden club members
   - Older students at your school
   - Parents
   - 4-H members
   - FFA
   - Other, please specify
8. Please indicate the source(s) of information used to assist in the incorporation of school gardening into your school's curriculum. Check all that apply.

- County Extension service
- Teacher in-service training
- Personal knowledge
- Educational journals/publications
- National Gardening Association's Growlab/Growing ideas newsletter
- Other, please specify

for the greenhouse was from this source

**FL Farm Bureau - grants for outside gardens & greenhouse**

9. Please indicate the types of educational material(s) used in the classroom to support the use of school gardening in the curriculum.

- Library books
- Internet
- Filmstrips
- Textbooks
- Trade books
- Newspapers
- Computer software
- Videos
- Personal books
- Experiments
- Gardening magazines and catalogs
- Other, please specify

***Please read and sign below***

By submitting the same you acknowledge and agree that the University of Florida (and Walt Disney World Co.) may reproduce the same, and all materials may be displayed (in part or in whole) at the 2008 Epcot® International Flower and Garden Festival and for other promotional materials. Such presentation materials (and School Garden packets) will NOT be returned to you (they will become the property of the University of Florida and Walt Disney World Co.) Finally, you acknowledge and agree that should your school be selected as a winner under the competition, then to the extent any of the photographs or materials submitted contain the names of likeness of students, teachers and/or others, you will be required to have adult individuals sign (and the parents/guardians of such students) sign consent/release forms provided by us so that we can display those photographs or materials concerning your winning garden. Such requirement would be a condition of your accepting the award.

I have read and understand the above.

[Signature] 3/11/08

3/11/08
Description of the school garden and hydroponic greenhouse

Educational Relevance – 25 pts.

Enrichment teachers, Celia Phipps and Lisa Jacobs wanted to give students a creative, fun and exciting hands-on project that would integrate both math/science skills and develop higher level thinking skills. We were looking for an interesting way to present and work on FCAT concepts. Our gardening project involves approximately 100 students in grades 1-5 at C.W. Norton Elementary School. We have begun to recruit younger and older siblings of our students. Many afternoons you will find students staying after school to work in the greenhouse and outside gardens.

In 2003 grants were written to build and establish a hydroponic greenhouse and outside garden. The greenhouse is the only one of its kind at an elementary school in Gainesville, Florida. The idea of raised garden beds became interesting to us because we felt we would have better control of the garden soil and could better manage pest problems. This school year (2007-2008), we have begun a new theory of gardening. It is called Square Foot Gardening and the idea came from Mel Bartholomew’s book. We decided to try this new technique, as it would help us to enjoy a weed-free garden and produce a continuous harvest. It also provides each student with a sense of ownership and promotes cooperation and teamwork.

Resources used to facilitate garden learning are: Square Foot Gardening by Mel Bartholomew, and we employ hydroponic gardening techniques in the greenhouse that we have learned through IFAS extension agent Bob Hochmuth. We regularly attend Mr. Hochmuth’s workshops. Another resource is Tim Carpenter, owner of Verti-Gro Systems. Mr. Carpenter’s company specializes in building hydroponic greenhouses and he serves as a resource for his customers. We also use internet sources for information, personal gardening experience and help and suggestions from our parents and students.

Sunshine State Standards are addressed in both math and science.

Science
The Nature of Matter

SC.A.1.2.5. Materials made by chemically combining two or more substance may have properties that differ from the original materials.

The Nature of Matter (cont.)

SC.A.1.2.2 The student knows that common materials can be changed from one state to another by heating and cooling.

Energy

SC.B.1.2.1 The student knows how to trace the flow of energy in a system.
SC.B.1.2.2 The student recognizes various form of energy (e.g., heat, light, and electricity).
SC.B.12.3 The student knows that most things that emit light also emit heat.
SC.B.1.2.6 The student knows ways that heat can move from one object to another.
SC.B.2.2.1 The student knows that some source of energy is needed for organisms to stay alive and grown.

Force and Motion

SC.C.2.2.1 The student recognizes that forces of gravity, magnetism and electricity operate simple machines.

Processes that Shape the Earth

SC.D.1.2.3 The student knows that the water cycle influenced by temperature, pressure, and the topography of the land.
SC.D.2.2.1 The student knows that using, recycling, and reducing the use of natural resources improves and protect the quality of life.

Processes of Life

SC.F.1.2.2 The student knows how all animals depend on plants.
SC.F.1.2.3 The student knows that living things are different but share similar structures.
SC.F.1.2.4 The student knows that similar cells form different kinds of structures.

How Living Things Interact with Their Environment

SC.G.1.2.4 The student knows that some organisms decompose dead plants and animals into simple minerals and nutrients for use by living things and thereby recycle matter.
SC.G.1.2.5 The student know that animals eat plants or other animals to acquire the energy the need for survival.
SC.G.1.2.6 The student knows that organism are growing, dying and decaying and that new organisms are being produced from the materials of dead organisms.
SC.G.1.2.1 The student knows ways that plants, animals, and protests interact.
SC.G.1.2.3. The student knows that green plants use carbon dioxide, water, and sunlight energy to turn minerals and nutrients into food for growth, maintenance, and reproduction.

The Nature of Science

SC.1.2.1 The student knows that it is important to keep accurate records and descriptions to provide information and clues on causes of discrepancies in repeated experiments.
SC.H.1.2.2 The student knows that a successful method to explore the natural world is to observe and record, and then analyze and communicate the results.
SC.H.1.2.3 The student knows that to work collaboratively, all team members should be free to reach, explain, and justify their own individual conclusions.
SC.H.1.2.4 The student knows that to compare and contrast observations and results is an essential skill in science.

Math

MA.A.1.2.1.5.1 reads, writes, and identifies whole numbers, fractions, and mixed numbers.
MA.A.3.2.2.5.1 solves real-world problems in involving addition, subtraction, multiplication, and division of whole numbers, and addition, subtraction, and multiplication of decimals, fractions and mixed numbers using an appropriate method.
MA.E.1.2.1.5.3 uses statistical data to predict trends.
MA.E1.2.1.5.6 analyzes and explains orally or in writing the implications of graphed data.
MA.A.4.1.1.5.1 chooses, describes, and explains estimation strategies used to determine the reasonableness of solutions to real world problems.
MA.A.5.2.1.5.6 identifies and applies rules of divisibility for 2,3,4,5,6,9 and 10.
MA.C.3.2.1.5.2 applies the concepts of area, perimeter, and volume to solve real-world and mathematical problems using student-developed formulas.
MA.B.1.2.2.5.1 solves real-world problems involving measurement of the following: length, weight or mass, temperature,(comparing temperature changes within the same scale using either a Fahrenheit or a Celsius thermometer), angles (acute, obtuse, straight).
MA.B.2.2.1.5.3 uses multiplication and division to convert units of measure within the customary or metric system.
MA.B.1.2.2.5.3 uses schedules, calendars, and elapsed time to solve real-world problems.

Level of Involvement – 40 pts.

The garden promotes leadership and teamwork among students through the various academic activities the project lends itself to. Our math lessons include units on measurement, area, perimeter and volume. We also conduct science investigations using the scientific method, making predictions, then summarizing and making conclusions. Not only, do the projects promote student leadership, but also give students a great sense of personal satisfaction. Many have stated, “I can’t believe we were
involved in the total process of seeding, witnessing the growth of plants, harvesting and selling our produce.” All funds that are collected from sales are used to continue and maintain our garden projects.

At this time we are planning to contact Christine Zamora who is involved in agriculture at the University of Florida to use as a resource, and to help us with our garden projects. An educational sorority, Alpha Delta Kappa met and visited our hydroponic greenhouse along with a local florist who presented a program on flower arranging.

In the past, we hosted a board of directors meeting for Florida Ag In The Classroom. We plan to include Master Gardeners as resource people and we plan to invite the Alachua County Farm Bureau Board of Directors to visit our gardens this spring. We received a grant from this organization this past fall.

We have very strong school and community support for our programs, by the administration, teachers, students and parents. Parents have been very supportive and purchase most of our produce. They have made monetary donations to our program as well as volunteer hours. We received a generous donation from the Mazza Family in memory of a family member.

Garden Quality – 35 points

Celia Phipps and Cecile James who was a former Norton enrichment teacher designed the garden and greenhouse, as well as parents involved in landscaping professions. Currently it continues to be maintained by enrichment teachers, Celia Phipps and Lisa Jacobs and most importantly Norton’s enrichment students in grades 1-5.

The qualities that make this garden unique are the raised beds, trellis idea and using the Square Foot Gardening method. The qualities that make the greenhouse unique are the facts that it is hydroponic and the only one of its kind in Alachua County Elementary Schools.

The garden is cared for and maintained by students as a continuous project during the school year. All work is done after students have completed academic and classroom work. In the outside gardens students prepare and add new soil each year. Some seeds are germinated in grow labs in the classroom, and then seedlings are transplanted to garden beds. Some seasonal vegetable plants are purchased from garden centers and planted into the beds.

Plants are selected according to seasons and we try to adhere to companion planting strategies and use very few chemical pesticides. We like to use “lady bugs” for aphid control in both the outside garden and the greenhouse. In the hydroponic greenhouse we sow seeds in a special mixture of coconut fiber and perlite. This is a tedious process and students actually use tweezers to place tiny seeds in the medium and seed flats. (e.g. parsley, basil, thyme seeds.) We moisten sown seeds with spray bottles.
and float the trays in water until germination occurs. We then begin to alternate days to float these seed trays, as we want to encourage strong root growth in our seedlings. As these seedlings develop, students fertilize using special liquid mixes they have prepared. When the seedlings are ready, they are transplanted into the prepared styrofoam containers. Enrichment teachers and students on a consistent basis monitor our projects even during school holidays and vacations.

Our environmental focus for both the outside gardens and hydroponic greenhouse is our use of organic or natural plant foods, organic or natural (lady bugs) means of pest control and our concentrated efforts to minimize our use of water, especially during the warmer months. One of our future projects will be to put in a drip control system in the outside gardens. Our greenhouse system is on a timed watering and fertilization schedule. Plants are watered and fertilized 4 times a day in 3-minute increments.

This has been a very exciting and satisfying project for the enrichment teachers, students and parents here at C.W. Norton Elementary School. We are proud of it and feel that we are helping young people to become life long gardeners, protectors of our environment and young entrepreneurs.
Green classroom

Norton Elementary fourth-grader Linda Pham calculates the volume of a container in the hydroponic greenhouse. Students take weekly measurements and keep a log. In the background is enrichment teacher Celia Phipps and student Skylar Swanson.

Innovative science and math lessons are both tasty and self-supporting

By MARINA BLOMBERG
Sun staff writer

OK. Here's the trick: Teach the nature of matter, algebraic thinking, "kitchen chemistry," spatial geometry, data analysis and probability to a bunch of 10-year-olds. Make sure they are gifted but need a touch more motivation. Manage to accomplish this with little money.

And then get them to eat their classroom work. Or, at the very least, sell it.

This is what Celia Phipps and Bunny James have pulled off at Norton Elementary School, and from a visitor's perspective, there is no trick to it at all other than giving the kids a creative, fun and exciting hands-on project that effectively teaches science and math and economics. It's every educator's dream.

After two years of writing grants and soliciting donations of goods, services and expertise, the two

First-grader Wenli Zhao and fourth-grader Skylar Swanson record observations and conduct math calculations on the Tahiti Mix snapdragons growing in the greenhouse.
NORTON: Lessons learned in greenhouse will help FCAT scores

Continued from 1F

Enrichment teachers’ hydroponic greenhouse project is off and running. In fact, it’s running so spectacularly that the first harvest of bunches of lettuce, greens and herbs will begin Friday, 39 days after the first seeds were planted.

The excitement of the kids in the greenhouse is palpable. They eagerly check out “their” plants, and measure the stems. They make drawings and describe the structure of the leaf. They compare these notes with last week’s measurements. They calculate the volume of the planters (hint: they hold 1.25 gallons of soil). A few take pride in measuring and mixing the fertilizer, while others, partnered with second-graders, show off their new-found knowledge.

While the kids think it’s fun, the teachers know they are really absorbing the technology for research, marketing and advertisement of Florida agricultural products. That’s a weighty goal, but one that will satisfy Sunshine State Standards and prepare the children for that all-important FCAT testing, which assesses how well schools teach the basics.

Find funding was slow at first

Phipps and James started writing grants in 2000. They were turned down on their first attempt, but Phipps’ “ill dream” was resurrected when grant approval came through in October 2001.

Two Florida Ag in the Classroom grants provided $4,500 and $4,000 to purchase the greenhouse and equipment. Grants from the Alachua County Farm Bureau ($750 for consumables supplies), the Gainesville Chamber of Commerce ($250 for heaters) and parent donations (more than $850) came in. Additional donations were contributed in honor of family of Richard Robert Maza, a bicyclist who was killed by a drunk driver in 2001 and who had children at Norton.

Invaluable assistance, advice and plants came from Bob Hochmuth, Suwannee County Extension agent for the University of Florida’s Institute of Food and Agricultural Sciences, and indisputably the state’s expert on hydroponics.

Phipps had learned about the Verti-Gro greenhouse system from a friend, and visited a Marion County greenhouse using the technology. She deemed it “perfect” for the school project.

Ground-breaking for the 15-by-30-foot greenhouse was last March but it was not completed until some time in the summer. It is made of aluminum framework covered with heavy-duty clear plastic and has a poured concrete floor. The area is fenced for security, and two concrete “teaching tables” (pallet benches) are set up, complete with umbrellas when the sun gets hot.

The temperature inside is controlled by thermostats which turn on heaters when it gets too cold, keeping the temperatures about 18 degrees warmer inside than out; and — in the summer — a “swamp cooler” that blows humidified air when it gets too hot. A shade cloth is also used over the roof to reduce sun-generated heat, but allows enough light to filter in for good growth.

The growing system uses expandable polypropylene stacks about 9 inches wide and 8 inches tall; they look like small square styrofoam coolers. They are stacked on top of one another, but at an angle, allowing plants to grow in each of the four corners. There are 8 stacks on each pole, which rotates to allow plants to get equal amounts of sunlight, and four rows in the greenhouse.

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The plans grow in a soil-less mixture — seeds are started in vermiculite and coconut fiber; the seedlings are then transplanted into perlite to mature — and are fed by nutrients pumped through the medium three times a day. The special liquid fertilizers — one is 15-0-0, the other is 5-10-25 — are mixed in a 55-gallon drum about every four days. PVC pipes carry the nutrients to the top plant, where it drips down and through the entire stack. A bucket at the boom collects the excess liquid, which then flows outside to a retention basin area.

"It's a clean operation and there is a less chance for disease, particularly if we keep it dry," Phipps said.

And the plants can be grown organically, James adds, saying when necessary, they will use chemical-free pest- and disease control: baking soda as a fungicide, against powdery mildew; and soap and oil as a pesticide, particularly if whitefly invades the enclosed space.

Crops grew quickly

Seeds of lettuce and small transplants of a variety of culinary herbs were planted Dec. 9. Much to everyone’s astonishment, the lettuces are ready for their first harvest this week already.

They plan on beginning their first cutting Friday, selling gallon bags of mixed greens for $3.50 to teachers, parents and students. The idea is to make the greenhouse operation self-supporting, Phipps said.

Fifth-grader Lindsay Avila stops measuring just long enough to say the schoolwork is fun, and Cody Spring says he is learning "how to handle plants." Does he like vegetables? No, not many say, but he does like lettuce, particularly the ones he is growing. Second-grader Zach Cremin is watching his Big Buddy do his classroom work, and thinks it’s neat.

Next on the growing menu will be tomatoes, squash and more herbs. "And we are creating little gourmands here," Phipps said. "They turn their noses up to ‘plain’ basil, preferring the lemon basil."
**Farm Bureau, FAITC-supported activity**

**School greenhouse educates pupils, earns income**

By G.B. Crawford
Assistant Editor

**A T A TIME when bashing public schools has become a common sport, there is much evidence to prove that the criticism is undeserved. Quietly and effectively, a substantial number of classroom teachers provide the learning environment young people need as they prepare for adulthood.**

One such teacher is Celia Phipps. A highly motivated, resourceful instructor with 22 years of experience, Phipps leads fourth- and fifth-grade gifted pupils at C.W. Norton Elementary School in Gainesville.

Under her tutelage, students have begun producing several varieties of lettuce and an assortment of herbs in a hydroponic system on the school grounds. Production is undertaken in a self-contained greenhouse that was constructed on site last fall. Students began cultivating their first crop in December.

"The whole reason for this is to offer math and science activities that will help these kids do better on their Florida Comprehensive Achievement Tests," Phipps explained. "We believe that hands-on activities with gifted kids is a good thing to do. It gives them a lot of ownership. They love this project."

The students are not just producers. They harvest their crops, then market them to a targeted community. Teachers, parents and school staff have eagerly purchased most of the items grown at the facility.

The lettuce varieties sold by the students — such as leaf, purple tip and romaine — are all experimental crops donated by researchers at the University of Florida's Institute of Food and Agricultural Sciences. The herb crop list is already extensive and includes sweet basil, oregano, watercress, parsley, cilantro and French sorrel, a sour leaf green that is similar to spinach.

When greenhouse plants become too bulky for the classroom, the students place them in containers for sale. Phipps writes out recipes for customers who want to attempt a culinary experiment with an unfamiliar plant.

"We are trying different things," she said. "Initially, we tried what we received. Next year we will see what grows the best and what is the most popular." Phipps is considering the possibility of adding potted bromelads to the inventory in the future.

In just a few months of operation, the hydroponic greenhouse project has become so successful as a business that it is now self-sustaining. Thus far, the students have made a profit of about $300. This money will be used to expand the project in future school years.

"We have a consumer math unit that is continuing through the year," Phipps said. "We keep up with our costs and our sales revenue with a program on the computer."

The design of the facility reflects state-of-the-art technology. The controlled environment, measuring 30 feet by 15 feet, is heated or cooled, as necessary, to maintain a desired temperature range of 75 to 85 degrees. A self-contained circulation system delivers water and nutrients to the plants with almost no waste.

At first, dependent upon donated seedlings, the students now grow their own. The growing plants are monitored by machines and by their human caretakers throughout the cultivation period.

In short, from the sensors to the plant medium to the pump units, the facility is every bit the equal of the best commercial greenhouses in the state.

Such an apparatus is not cheaply built. Four years of planning and grant-writing preceded the construction of the greenhouse. Phipps and Cecile James, a colleague who also teaches gifted students (first through third grades), have developed the project since its inception. They have both solicited donations and grants from various sources.

Among various outside financial contributions, grants from Florida Agriculture in the Classroom (FAITC) and Alachua County Farm Bureau, as well as Florida Farm Bureau Mini-Grants, have been instrumental in helping to establish the enterprise.

"Florida Ag in the Classroom and Farm Bureau have been very generous," Phipps noted. FAITC grants have totaled $12,500 so far. The county Farm Bureau has contributed $500 annually since 1998.

Both teachers have employed the FAITC curriculum guide — "Food, Land and People" — within the greenhouse project. "The neat thing about this guide is that everything is written so that it matches the (state) standards," Phipps observed. "You can integrate science, math, language arts and reading into your classroom activities."

Students give every indication of enjoying an agricultural project that offers instruction in standard curriculum subjects.

Katie Gustafson said the greenhouse "is really cool. You can actually see plants starting to grow. You learn all about the plants and how the greenhouse works."

Leslie Hefington agreed. "I like learning about the plants," she explained. "We get to come to the greenhouse instead of working out of a textbook."

Andrew Atwood likes marketing. "We harvest the plants, then we put them in half-pound or one-pound bags and return.

**Continued on Page 23**

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**The hydroponic greenhouse project, led by teachers Celia Phipps and Cecile James, is a sophisticated agricultural operation that has become a self-sustaining business.**

**Gifted students Leslie Hefington, left, Andrew Atwood and Katie Gustafson, regularly work in the greenhouse under the tutelage of their teacher, Celia Phipps.**

**Fifth grade students assemble around a table at the "outdoor classroom" next to the hydroponic greenhouse. Concrete tables provide a setting for instructing groups of pupils before they enter the facility.**
Greenhouse

Continued from Page 3

At appointed times, the fourth- and fifth-graders bring pre-kindergarten students over from their classrooms to join in the activity. All of the young people are involved in growing the plants.

Phipps emphasized that the gifted students who participate in such activities will gain more than just an interesting diversion at school.

“A lot of enrichment students are not always motivated,” she explained. “We know that giving them content in the classroom is important. But if you can apply the information in certain outdoor activities, children learn faster and better. It stays with them.

“We believe it gives them a lot of skills they would not otherwise have,” Phipps continued. “They have a sense of ownership and teamwork and they learn to work with other people.”

frigerate them for sale,” he said. “It’s all good.”

Phipps pointed out that Principal Diana Lagotic has endorsed the project from the beginning and helped it succeed. “She thought it was a great idea,” Phipps said. “Without that, we could never have gotten it done.”

Lagotic said the Norton project has created the first hydroponic greenhouse in the Alachua County school system. The project also offered the opportunity to apply learning derived from the classroom.

“The idea of having hands-on experiences that relate to the real world is something we are constantly looking at,” Lagotic said.

Such experiences will last. “The whole idea is to recognize that agriculture has a significant role to play in all of our lives. I think this will help when these children are adults.”

Phipps said her students also participate in an outdoor garden project that is situated next to her classroom. There, on raised beds, her charges grow tomatoes, eggplant, radishes and Swiss chard.

Dateline Florida

Lots of lettuce

Fifth-grader Shao Han, 11, harvests hydroponically grown lettuce at Norton Elementary School on Thursday as part of a program with the University of Florida’s Institute of Food and Agricultural Sciences.