TrashMasters!™

Team Up to Clean Up

High School Division
Bronx Borough
& Citywide Winner

Cardinal Spellman High School

2013 GOLDEN APPLE AWARDS

This certificate is awarded with the sincere appreciation and esteem
of a grateful Department and City in recognition of your school's efforts to help make New York City shine.

City of New York
Department of Sanitation
Bureau of Waste Prevention, Reuse and Recycling
nyc.gov/wasteless

NYC
recycle more, waste less!

NYC Compost Project

GOLDEN SHOVEL

Bronx Borough

Master School Composter

Cardinal Spellman
High School

2013 GOLDEN APPLE AWARDS

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Created and funded since 1993 by the Bureau of Waste Prevention, Reuse and Recycling, **NYC Compost Project** provides compost outreach and education to NYC residents, community groups, and landscapers in all five boroughs.

2013 Golden Apple Awards
Contest Entry Judging Info

(This sheet prepared for judges' use by DSNY BWPRR)

ID Info: 13005

School: Cardinal Spellman High School
Grade Division HS
Borough: BX

☐ **Golden Shovel Award contestant**
(for borough Master School Composter)

School Population: total # 1470

2013 Project Entries received for:

	Core Group:	Total Participating:
☐ **TrashMasters! Super Recyclers**		

Received:

☐ **TrashMasters! Reduce & Reuse Challenge**		

Received:

☑ **TrashMasters! Team Up to Clean Up**	150	450

United We Compost!

Received: 4/30/2013

Students successfully composted using different methods. Organic waste from the school cafeteria was recycled using fermentation ("bokashi" method). Students conducted an outdoor clean-up of the community garden, and placed organic waste in traditional compost bins. Students also tried vermicomposting with homemade worm bins. Compost will be used to enrich the soil in the school gardens. Three gardens were set up and maintained in the reflective and community areas, with vertical garden structures for growing herbs and native plants indigenous to New York City. The community garden is for vegetables with a living wall on the fence.

Prior Year Entries:
12:TU-hon;13:TU-C, GS-X-W

Current Prizes
13:TU-C,GS-X

School Contact Information:

Phone: 718-881-8000 x201
Address: 1 Cardinal Spellman Pl
Bronx 10466

Block&Lot: 2049050265
DOE Location: RCA
DOE Bldg: RCA

REQUIRED for Super Recyclers only:

Custodian: Frank Ortiz

Contest Coordinator: Rita Pilerio, Biology

Principal: Daniel O'Keefe

Sustainability Coord:

Info Confirmed: 5/15/2013

Printed: 6/26/2013

CARDINAL SPELLMAN HIGH SCHOOL

ONE CARDINAL SPELLMAN PLACE, BRONX, N.Y. 10466-5897 • (718) 881-8000 FAX: (718) 515-6615

SCHOOL INFO

- **School Number: 321100145436**
- **Official School Name:** Cardinal Spellman High School
- **Address:**
  1 Cardinal Spellman Place
  Bronx, NY 10466
  Phone: 718-881-8000, Fax: 718-515-6615
- **Principal:**
  Daniel O'Keefe
  dokeefe@cardinalspellman.org
  718-881-8000 ext. 201
- **Contest coordinator:**
  Rita Piliero, Science teacher
  rpiliero@cardinalspellman.org
  718-881-8000 ext. 269
- **School description:**
  Cardinal Spellman High School has approximately 1,400 students with diverse cultural and academic backgrounds. Cardinal Spellman High School's mission is to promote academic excellence; to serve young men and women through a rigorous program of learning which emphasizes personal Christian development as exemplified in the life and ministry of Jesus; to stimulate innate creativity and quest for knowledge; to develop emotional maturity; and to foster a concern for and commitment to the Church, community, nation, and world.

- **CONTEST ENTRY INFO:**
  - **Borough: Bronx**
  - **Grade Division: High School**
  - **Contest Entry Title: United We Compost!**
  - **Contest Entry Summary:**

    Organic waste normally disposed from the cafeteria at Cardinal Spellman was recycled using fermentation ("bokashi" method). The project included outdoor clean-up of the community garden. The organic refuse from the garden was placed into traditional compost bins. Another method of composting performed was vermicompost, which involves the recycling of food waste through decomposing activities of worms using homemade worm bins. The main purpose of such various composting methods is to recycle nutrients back to the soil by incorporating compost into the garden. In the future, the use of nutrient-rich soil will make gardening of flowers and vegetables easier. After soil enrichment, 3 gardens were set up and maintained in the reflective and community areas. The reflective garden areas will contain vertical garden structures for growth of herbs as well as native plants indigenous to New York City. The community garden will contain vegetables and a living wall on the fence. Major projects of the students include collection of various organic materials, clean-up, set-up and maintenance of the community and reflective gardens, and making various types of compost.

- **STUDENT INVOLVEMENT**
  - Student Participation: Core Group #: 150
  - Student Participation: Total #: 450
  - School Population: Total #: 1,470

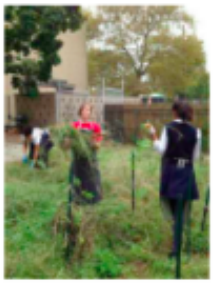
CLEANUP AND GARDENING PROJECTS

IMPLEMENTATION

- **Why this?** We, as a science community, noticed that there was a large quantity of organic waste from the cafeteria resulting from food preparation being thrown in the trash and ultimately placed into landfills. We felt that this was not in accordance with the principles of sound ecological practices. The most constructive manner to change this wasteful situation is by educating the students on how to compost in several comprehensive manners.

- **What did you do?**

    - Students cleared the community vegetable garden in the autumn of 2012. They took dried plant matter and placed them into traditional compost bins. This activity was intended to create compost for the spring 2013 garden.



- Students built structures that housed worms collected from the Lower East Side Ecology Center. These worms were given organic materials collected by students from the cafeteria, which in turn created nutrient-rich soil, known as vermicompost. The byproducts of the worm bins will be added to the soil in the community and reflective gardens. Prior to creating the worm bins, teachers attended a worm bin workshop at the Botanical Gardens located in the Bronx.

- Students were introduced to the fermentation of food waste for composting, called the bokashi method. Shig Matsukawa from the El Sol Brilliante Community Garden on the Lower East Side, who is proficient in the practice, demonstrated during a student-teacher workshop the essential components of the bokashi method. Students and teachers learned how to create fermentation starter from wheat bran, organic molasses and EM·1, which is a combination of various microorganisms involved in fermentation. The mixture took two weeks to ferment in sealed 5-gallon tubs before being added to the organic waste.

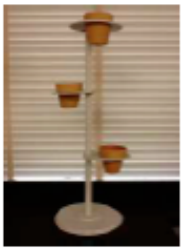
- After two weeks of fermentation, the fermentation starter was taken out of the sealed tubs and left to air-dry for two more weeks. Students then bagged and stored the fermentation starter. Recycling of food waste begins with multiple alternating layers of organic waste and fermentation starter until the tubs are full, sealing the containers tightly, and storing the containers at room temperature for two weeks until the completion of the fermentation process. After two or more weeks, the fermented waste is buried in trenches dug by the students in the community garden area. About 80 pounds of wheat bran were used to create the fermentation starter, and sufficient amounts were created to recycle waste lasting for one year. The tubs are being used daily to collect organic waste from the cafeteria. At first, we were skeptical about composting and worried that vermin and other animals would be attracted to the odors. Surprisingly, after a dry run of waste burial, no animal was attracted. After a month's time, all nutrients were recycled and became rich soil. Students also used activated EM·1 solution (EM·1, water, molasses, wheat bran) to sprinkle over the trenches to speed up the fermentation process in the ground. The fermented waste was mixed and mashed with browns (e.g., dried leaves, paper) and greens (e.g., grass clippings). Students also layered planting pots with fermented waste topped with soil to be used in vertical structures designed by biology and physics students. These structures will be used in the reflective garden area for herbs. During this entire process that began in November, and continues to date, we have recycled approximately 600 pounds of waste and coffee grinds, byproducts of food preparation that would otherwise be thrown in the trash and placed into landfills.

After a month's time, this is what remained from one 5-gallon container of 22 pounds of waste.

- Students cleared one of the reflective areas to make room for planting of native species. The native species were planted for growth in the spring. Each native species was labeled with the common name and scientific name. Students used social media to update each other on the progress of the native garden. This allowed for them to take pictures and let the other classes know of the progress we have made in the project.

- 155 students were given germination kits created by biology students. These kits included pots, made from newspapers, seed packets of herbs, vegetables, or flowers, organically enriched soil from the bokashi process, and data tables to document “time of germination” and “early plant growth.” In May, students will bring in their young seedlings, which will be planted in the community garden or in the vertical structures.

- Physics students designed homemade vertical structures. They used household items such as rebar from construction projects, chains, ropes, clothes hangers, and used planting pots. Natural resources such as tree branches were also used in the construction of these vertical structures. These structures will contain the herbs to be placed into the reflective garden.



- Earth Science students will be attempting to grow waxy beans in different types and mixtures of soil, which have been altered by the Living Environment classes. Students were given a prompt that if they were advising a committee of agriculturalists in Sub-Saharan Africa, where there is predominantly sandy soil, to grow plants most efficiently, how would they alter the soil, in a cost effective manner, to promote the quickest germination and the highest yield of waxy beans? The students, through scientific literature research, will determine what makes waxy beans grow most efficiently and then create a way to mix the sandy soil with more clay and nutrient-rich soil. To aid them, students will use nutrient-rich soil (from the EM·1 soil), vermicompost, and local natural soil from the Bronx, New York area, which has a high percentage of clay, and other fertilized soil from our compost pile. The varieties of soil were made from remnants of matter that has been recycled. The whole process will be limited to three weeks of gathering data in which the students will plant their seeds, care for them and then determine if their "soil" was sufficient for plant growth. Plant growth will be charted to determine which soil mixture will produce the greatest yield. Students will complete a laboratory report detailing their results.

- **Project planning.** Our objective was to limit waste being put into landfills, and to use that waste to benefit our community gardens. In the process, we wanted to raise social awareness of sound ecological principles. Winning the honorable mention Golden Apple Award last year gave us the confidence to expand our horizons on the ecological front. Six teachers of different science disciplines collaborated to undertake this massive project, transforming classroom lessons into practical experiences. We have raised community-wide awareness, even with students not involved in the project. The entire Spellman community is now aware of both traditional and alternative recycling techniques. It was necessary for food waste to be collected daily and stored in a common area. Fermentation starter was given to a weekly accumulation of the collected waste and sealed for one month in 5-gallon tubs. At the end of the month, the fermented food waste was buried underground. This process is ongoing, and planning was performed monthly. For each component of the project (e.g., collection of food waste, administration of fermentation starter), a log of schedule was created to maintain consistency and effectiveness of the overall project. Spreadsheets and garden maps were used as instructional guidelines. Students will be given time sheets to log their hours of community service by performing upkeep of the gardens. Students will be responsible for creating inquiry-based laboratory reports, which will be due on the final day of classes. Soil samples were taken from the community gardens for testing to verify that the soil is suitable for planting.

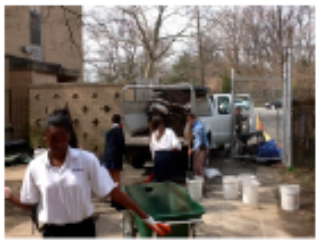
All containers required documentation detailing start and end date.

A mesh wired fence was retrieved from refuse and will be repurposed for the living wall.

- **Student involvement.** Students were involved in every aspect of the project, including collection of waste, creating fermentation starter, testing soil, germinating seeds, designing structures, clearing space, digging trenches, planting, burial of fermented material, and upkeep of the gardens.

- **Promotion.** A showcase was created to display our Golden Apple Award and to post pictures of our students working in the garden. The school community and school visitors view this showcase. Classes involved with the bokashi method have an Instagram account (@CSHS_bokashi2016) to post project progress. Classes whose project involves the restoration of a native garden have an Instagram account (@NativeGardenCS). On the Science Department page of Cardinal Spellman High School's website, journals have been created to highlight all the experiences throughout the year. (http://www.cardinalspellman.org/apps/pages/index.jsp?uREC_ID=53878&type=d&termREC_ID=&pREC_ID=388101). *The Pilot*, the school newspaper, also highlighted the various projects in its publication.

- **Collaboration.** The following organizations have played an integral role:
  - Million Trees Giveaway donated two plum trees.
  - New York Botanical Garden (NYBG) Bronx Green-Up donated compost.
  - Better Gro Garden Center donated landscaping materials.
  - Joanna Andreesen is a parent volunteer. She has a certification in permaculture and is certified in the Grow More Vegetable Series by the NYBG.
  - Shig Matsukawa is proficient in the bokashi method. He has made a booklet called "How to Recycle All Food Waste by Fermentation" (http://www.recyclefoodwaste.org/files/FFW_booklet_2sidedFold.pdf) and has written an article entitled "Microorganisms and the Environment" (2011) which can be found on the Environmental Education Advisory Council (EEAC) of New York City website (http://www.eeac-nyc.org/news_detail.asp?id=22).
  - NYC Department of Sanitation
  - We are purchasing 40 plants from Grow NYC at discounted prices on May 11, 2013. Plants will be picked up and dropped off by a teacher representative of Cardinal Spellman High School.
  - The Home Depot has expressed interest in bringing volunteers and supplying materials to build raised beds in the community garden.



- **Educational components.**
    - *Standard 1:* Students will use mathematical analysis, scientific inquiry, and engineering design as appropriate, to pose questions, seek answers, and develop solutions.
    - *Standard 2:* Students will access, generate, process, and transfer information using appropriate technologies.
    - *Standard 4:* Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.
    - *Standard 5:* Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs.
    - *Standard 6:* Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning.
    - *Standard 7:* Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.
    - *Concept Map 1*: Integration of different science curricula.
    - *Concept Map 2*: Interdisciplinary Integration

Concept Map 1

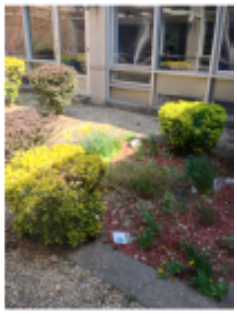
Concept Map 2

PROJECT ANALYSIS

- **What worked?** The bokashi method was surprisingly successful in transforming over 600 pounds of garbage (and growing) into nutrient-rich compost. Native garden species sprouted in the early spring. Worms have created nutrient-rich vermicompost.

Vermicompost created by worms.

Remnants of buried recycled waste.



Native garden plants

  - Students have planted seeds, and many of the seeds have germinated for the germination project. Data on growth are being collected. Students will bring seedlings in mid-May.

- **What didn't work?**
  - Some worm bins were unsuccessful in producing fertile or nutrient rich vermicompost due to an imbalance of browns and greens. This problem has been rectified and new worm bins will be constructed.
  - Seeds did not germinate for those that were sent home, possibly due to neglect.
  - Due to weather conditions in the late winter and early spring, planting has been delayed from late April to mid-May.
  - Construction of self-watering featured structures was not successful.

- **Applicability to other schools.** This project has many components requiring cooperation among staff, faculty, and administration. Teachers working on this project have a good working rapport, so they were able to work successfully and overcome any glitches or obstacles that presented themselves. Due to high academic content demands of the science courses, it was difficult to allocate time to the project. We managed our time effectively; had we not, we would not have been able to finish our curriculum and simultaneously finish the project. We suggest organization, communication, and patience in carrying out the successes of such a demanding and time-consuming endeavor.

- **Measuring success.** Measuring success is visually evident. Seeds are germinating. Native plants have already started to grow. Worms produced vermicompost. Students were able to see the transformation of organic waste into compost soil through the bokashi method. Recording data has been done on plant growth, seedling growth, and amount of recycled and buried material. Students will submit inquiry-based laboratory reports, which will assess qualitative and quantitative data. Students are able to physically distinguish the difference they have made in the gardens.

- **Comments.** Winning the honorable mention last year gave us a chance to further expand our endeavors in promoting sound ecological principles. We were able to incorporate our projects with the whole school community. Students, faculty, and staff are now more aware of various methods of recycling and composting. Last year's award helped in paying for some of the materials we needed to enhance our projects.

- **Future plans.** This summer, Cardinal Spellman High School is hosting a junior high school program for English, Math, and Science. The science program will include maintenance such as weeding as well as harvesting. The plan is for students to create a farmers' market and donate money to help eradicate world hunger. This program is still in its initial phase, and we are hopeful that it will grow into fruition. The future of this project also depends on funding. We are in desperate need of a compost tumbler for traditional composting and other resources to be successful. This year, we were very fortunate with having many organizations assisting us to keep our project ongoing. Unfortunately, after writing many grants, we were denied funds. Click the following link detailing our attempts at grant funding:

  - http://www.cardinalspellman.org/apps/pages/index.jsp?uREC_ID=53878&type=d&termREC_ID=&pREC_ID=388101
    - Week of 12-03-2012
    - Week of 12-10-2012
    - Week of 12-31-2012
    - Week of 01-07-2012
    - Week of 01-21-2012
    - Week of 03-11-2012