

Maximizing Gardening Experience in Schools with High Tunnels

In recent years, the use of high tunnels (unheated greenhouse structures covered by a single layer of clear polyethylene plastic) to extend the crop growing season by about a month at both ends has become an important part of vegetable, berry and flower production in New York State. Although widely used by growers, this production technique has not been recognized as relevant to school-based agricultural education (SBAE), or even elementary-level education that involves agriculture. Yet in New York State the academic or programmatic calendar for schools does not mesh well with the growing season, and as a result, educators fail to maximize the potential for garden-based learning. They have therefore become increasingly interested in practices that extend the season without the increased cost, expertise and maintenance associated with greenhouse production. We believe that high tunnels could be a desirable technology for educational institutions with the desire to implement and expand on local garden production, and could concurrently provide many desirable educational outcomes.

A federally-funded project is providing a high tunnel to each of three rural and three urban schools in New York State, beginning in the fall of 2010. For schools that hope to participate in this program, here is some information about high tunnels, and how they might be used in a school context.

GRANT RECIPIENTS RECEIVE:

- High Tunnel
 - Including site consultation, delivery and construction of the structure
 - \$1,500 to purchase garden materials and equipment
- Program Support from Cornell University
 - The Horticulture Department will provide guidance in setting up the high tunnel, choosing appropriate sites, crops, etc.
 - New York Agriculture in the Classroom will provide support and guidance in locating appropriate educational materials.

GRANT RECIPIENTS AGREE TO:

- Learn and comply with school safety regulations regarding chemicals and pesticides
- Prominently display the *Cornell High Tunnel Project* signs provided to all Project Directors
- Participate in interviews, focus groups and surveys during each grant year (up to 3 years).
- Submit teacher developed educational materials that incorporate the high tunnel.
- Maintain and use the high tunnel garden for the duration of the grant (up to 3 years)
- Provide Cornell with quarterly email updates.
- Serve as a reviewer for lesson plans and teacher guides developed through the grant.
- Upon completion of the grant (fall 2013) the project director will notify Cornell if they no longer want the High Tunnel. Cornell will work to find a new location for the structure.

THE HIGH TUNNEL

The structure that will be supplied to participating schools is manufactured by Mr. Howard Hoover, a vegetable grower near Penn Yan, NY, who has been a pioneer in growing vegetables in high tunnels for many years. The high tunnel is 20 ft. wide, 48 ft. long, and stands about 12 feet tall.

Walls and roof are made from square steel, with access to the interior through doors in the end walls. The structure is covered by clear, heavy polyethylene, the same as used as covering materials for greenhouses. For ventilation, the plastic covering the sides can be rolled up manually, and there may be vents installed in the end walls to further improve air flow.

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Plants can be grown in the ground in the high tunnel, or in raised beds edged by lumber or other materials. Raised bed culture provides the option of growing in a medium that is different from the soil native to the location of the tunnel, and thus to avoid soil-related problems of drainage, soil acidity and possible harmful residues (lead paint, toxic materials, etc.).

High tunnels rely on natural ventilation, and are normally not heated. Thus it is not necessary to locate the structure near a source of electricity. Since the plastic roof keeps off the rain, some provision must be made to supply water for plant needs. Most commonly, high tunnels are irrigated with trickle tubes that distribute the water to the base of the plants. The water is generally supplied through municipal water systems.

EXTENDING THE GARDENING SEASON WITH HIGH TUNNELS

We have found that enclosing growing plants in an unheated high tunnel raises temperatures on sunny days significantly, and allows them to grow even when outdoors it would be too cold. At night, some of the accumulated heat carries over, but for best frost protection, a secondary protective layer may be needed over the plants. This allows the gardening season to be advanced by about 4 weeks in spring, and a similar length of time in the fall. Choice of cold-tolerant plants for early and late production can extend the season even more. Thus students can be growing leafy greens in spring from sowing to harvest, and enjoy harvesting tomatoes and peppers in the fall even after these crops have been killed by frost outside. Much information on crops that can be grown, from leafy greens to fruit-bearing vegetables to raspberries, strawberries and cut flowers, can be found on the Cornell High Tunnel website www.hort.cornell.edu/hightunnel/.

SITE REQUIREMENTS FOR THE SCHOOL HIGH TUNNELS

To install a high tunnel on school property as part of this project consider the following:

- An area of at least 70 ft. by 40 ft. in a mostly level site is needed.
- The structure should be situated away from buildings and trees, especially on east, south and west sides to allow enough sunlight for proper plant growth.
- The site need not be absolutely level, but steeply sloping locations should be avoided.
- Siting on the roof of buildings may be possible, but would require consultation with a structural engineer to determine how the structure can be firmly anchored, and not exceed the load bearing restrictions of the roof.
- Access to running water is necessary to provide for the water needs of the plants being grown.

If you are interested in the high tunnel grant program please contact:

New York Agriculture in the Classroom
607-255-9253
NYAITC@cornell.edu

Photos and an October 2011 article on two current High Tunnels school projects:
<http://www.news.cornell.edu/stories/Oct11/SchoolTunnels.html>