

# Cultural Plant Propagation Center: Things to Consider

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## Is a Greenhouse Necessary? \_\_\_\_\_

There are many career opportunities in horticulture, plant science, and other agricultural disciplines. Horticulture is one of the fastest growing segments of agriculture. Students that gain experience in greenhouse techniques have an advantage when applying for a job.

## Integrate the Greenhouse With Program Activities \_\_\_\_\_

Who will use the facilities? This use could include classes in botany, plant science, agri-science, environment, evening programs for farmers and gardeners, and production of plants for landscaping school grounds.

## What Is Typically Taught in Greenhouse Classes? \_\_\_\_\_

Typical classes can include seed germination, plant propagation, planting and watering techniques, plant identification, greenhouse management, growing media selection, temperature control, and effect of water quality on plant growth.

## Integrate the Greenhouse With the School Building \_\_\_\_\_

The best location is an east-west orientation on the south side of the school. An attached greenhouse allows access to the school without going out into the weather. It may also provide convenient work space and storage.

A free-standing greenhouse usually gives more flexibility in orientation and size, and allows space for gardens or a shadehouse and room for expansion. However, utilities are usually more difficult to provide.

## Design for Flexibility \_\_\_\_\_

Programs, the type of plants grown, and the number of students using the greenhouse change from year to year. Benches should be portable. The heating and cooling system should be out of the way. For a school greenhouse, a paved floor allows access to all parts of the greenhouse and accommodates students with disabilities. For a production greenhouse, a central paved aisle with weed barrier and stone under the benches is less expensive and allows drainage. Design for different environments for different crops.

## Who Will Manage the Greenhouse? \_\_\_\_\_

Plants need attention several times a day, 7 days a week. This means that someone will have to come in on weekends and holidays. One person should be given the responsibility for overseeing the operation, making decisions on space allocation and environmental requirements. A parent committee, greenhouse club, or garden club can be formed to assist in watering the plants and doing other chores.

## How Large Should the Greenhouse Be? \_\_\_\_\_

The size of the greenhouse will depend on the number of students and the amount of class time spent in the greenhouse. Generally, a 24 by 48 ft (7 by 14 m) greenhouse will provide work area and bench space for 20 to 25 students. Storage space for growing media, containers, and equipment can be provided with a utility shed.

## Create Additional Growing Space \_\_\_\_\_

A shadehouse, high tunnel, or cold frames can be added to create low cost growing space to supplement the greenhouse. When planning the greenhouse, leave space for expansion, auxiliary structures, and outdoor growing beds.

## What Is the Cost of Building a Greenhouse? \_\_\_\_\_

Costs vary with the style of greenhouse, the glazing materials, type of foundation, amount of environment control, site preparation required, connections to utilities, and who does the construction. A film plastic covered hoop house may cost as little as U.S. \$15/ft<sup>2</sup> (U.S. \$167/m<sup>2</sup>), whereas a steel-frame greenhouse covered with tempered glass and having electronic controls may run as high as U.S. \$50/ft<sup>2</sup> (U.S. \$555/m<sup>2</sup>). Using local labor may lower the cost somewhat.

## What Are the Operating Costs? \_\_\_\_\_

The main cost is for heat, and it varies with the greenhouse size, glazing, and climate. Assuming a 24 by 48 ft (7 by 14 m) double glazed greenhouse, 60 °F (16 °C) night temperature, and fuel costs (propane at U.S. \$2.00/gal [U.S. \$0.50/l]; natural gas at U.S. \$1.15/therm; and fuel oil at U.S. \$1.50/gal [U.S. \$0.40/l]), winter heating costs will be approximately: (1) natural gas and fuel oil at U.S. \$3,000 in the

northern tier and U.S. \$2,000 in the mid-tier of States; (2) propane at U.S. \$5,000 in the northern tier and U.S. \$3,500 in the mid-tier of States.

Costs in addition to heat include: (1) approximately U.S. \$400 for equipment maintenance; (2) from U.S. \$200 to U.S. \$300/year for electricity, excluding any supplemental plant lighting; and (3) approximately U.S. \$600 for growing supplies (mix, containers, seeds, fertilizer, and so on).

For school greenhouses, some funds can be raised by selling plants. Other sources might be raffles, scratch tickets, book subscription sales, and so on.

## What Are Typical Glazing Materials? \_\_\_\_\_

For school greenhouses, the standard material is structured sheet polycarbonate, as it is strong, lightweight, flame retardant, and has good insulation and light transmission. For production greenhouses, double layer, 6-mil, greenhouse grade polyethylene film, if inflated, will provide 4 years of service before it has to be replaced. Always use clear material to get maximum light transmission.

## Keep Environment Control System Simple \_\_\_\_\_

Good temperature control is necessary for good plant growth. Hot air systems are the least expensive and can be mounted above or below the benches. Boiler systems, though more expensive, are a better choice for larger greenhouses if more uniform temperatures and root zone heating are desired.

Fan cooling systems give the best summer control of temperature. They can be operated in stages, with the final stage being evaporative cooling. Natural ventilation systems (vents or roll-up sides) work well when someone is available most of the time to make adjustments.

## How Much Water Is Needed? \_\_\_\_\_

A considerable amount of water is needed for plants and cleanup, and well or municipal water is best. Water consumption will be approximately 0.4 gal/ft<sup>2</sup> (42 l/m<sup>2</sup>) of greenhouse space. For a 24 by 48 ft (7 by 14 m) greenhouse, this will be about 500 gal/day (1,900 l/day) during summer.

## Is Security Necessary? \_\_\_\_\_

Protection of the greenhouse is necessary, especially in school situations. Whether a fence is needed or not will depend on location, glazing material, and the proximity of other people in the area. An alarm system is necessary for emergency conditions and can be fitted with a motion detector.

## List of Participants

