Locating the Greenhouse

Michael A. Schnelle
Assistant Professor
Extension Ornamentals/Floriculture Specialist

John M. Dole
Assistant Professor
Floriculture

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Determining the site of a greenhouse operation involves numerous considerations before actual construction of the facility. Although this fact sheet is intended to guide the entrepreneur in selecting the site, it also can be used as a checklist when buying an existing operation. Before starting, it is important to have an idea of the type of plants you want to raise and sell and a decision as to whether you wish to be retail or wholesale. The following are major factors that should be investigated before greenhouse plans go beyond paper.

Light

Availability of sunlight is a major factor in deciding where to build the greenhouse. Do not base your decision on the present season, but rather on the short days of winter. Plan to choose the area with maximum light availability. This will allow the grower to minimize or eliminate the use of artificial or supplemental light, depending upon the crops grown. Of course, shading may be necessary during a portion of the growing season for heat and light reduction.

Search for an area that is free of any potential shading from nearby structures or trees. A rule of thumb to follow is to avoid construction any nearer than 2.5 times the height of the nearby object. Removal of the shading object may be a more feasible alternative. This will apply to eastern, western, and southern exposures.

Place the greenhouse with the ridge in a north to south orientation to reduce interior shading from the structure itself on the plants.

Land

The site should be naturally level. This will decrease initial grading costs. If possible, the land should also be large enough to accommodate expansion without excessive grading.

The ideal tract of land has a slight slope, up to five percent, which provides for proper air circulation and excess water run-off. If the soil has a high clay content, a greater slope may be needed. Otherwise, considerable expenses may be incurred to provide an elaborate drainage system. Determine if frost pockets exist in low lying areas and if flooding has occurred on the site. Low lying areas or valleys can sometimes exaggerate the effects of cold and hot air flow.

Soil is an important factor to consider. Ideally, a sandy or silt loam soil with high fertility and good drainage is recommended for container production. Soil is seldom used alone as a container media, but rather in a mix with soil-less amendments. In fact, many businesses grow plants with entirely soil-less mixes.

Proper soil drainage is vital for growing plants in ground beds. Without proper drainage a number of problems will develop that may be insurmountable to the beginning grower. High salts and insufficient soil aeration are a couple of the obstacles that may be encountered.

A media pH ranging from 5.5 to 6.5 is acceptable for the production of most greenhouse stock. The pH can be lowered by adding elemental sulfur or aluminum sulfate. However, raising the pH is more feasible and can be accomplished by adding dolomitic limestone. This is commonly used to correct soil-less mixes that are excessively acidic. Correct soil pH provides for maximum plant utilization of the soil's nutrients. The Department of Agronomy at Oklahoma State University will test soil pH and nutrient status at a reasonable cost.

Water

Sufficient clean water is critical regardless of the crops to be grown. All water sources to be used in production must be tested with a solubridge to determine soluble salt content. Research indicates that container grown plants may be watered with nearly 1400 parts per million (ppm) of dissolved salts. However, seedlings and transplants normally tolerate water with salt concentrations of 200 ppm or less. When electrical conductivity is checked in micromhos per cubic centimeter (mho/cm), up to 200 mho/cm is tolerable by many species.

Water pH must be known prior to irrigation of crops. Injection of phosphoric acid into the irrigation lines will help lower excessively high water pH. Acid type fertilizers can be used to help lower the pH in alkaline soils.

Total soluble salts, pH, calcium, carbonate, magnesium, and sodium levels should be determined prior to growing greenhouse stock. The Department of Agronomy at Oklahoma State University tests suitability of irrigation water at a nominal cost. Contact your local OSU County Extension Office for help in submitting a sample for testing.

Municipal water is generally acceptable but expensive in large production areas. Although chlorinated water is rarely harmful to plants, short of certain hydroponic systems, even 0.5 ppm fluorine may reduce salability of sensitive crops. Softened water is not appropriate for irrigation purposes.

Determine the pressure, pipe size, and flow rate of the water source. When city water cannot be used or is not desirable, determine if a suitable well can be drilled. Also, look elsewhere for water sources such as streams, lakes, etc. Be certain that this water is a reliable source and will not be diverted any time in the future from your usage. Securing a water source can be accomplished by contacting the organization below:

Oklahoma Water Resource Board
Stream/Ground Water Division
1000 N.E. 10th Street
Oklahoma City, Oklahoma 73152
(405) 271-2555

An abundant source of water becomes particularly critical during the summer. A major time commitment in frequent watering will be necessary, often more than once a day in Oklahoma's hot weather. Up to 1/3 gallon of water per square foot per day may be needed in potted plant production. Automated irrigation systems will be necessary in larger ranges to reduce excessive labor costs. During hot weather, greenhouse plants may perish or be severely injured if even one irrigation is missed. Ideally, a backup system for irrigation should be planned. The water supply needed to cool the greenhouse in the summer must also be considered.

Air

Air pollutants such as sulfur dioxide, fluorides, and ozone have been shown to be detrimental to plant growth. Site selection around industrial areas and areas of high vehicle passage could be a problem. However, in most areas of Oklahoma, air quality is not a limiting factor in plant growth.

Utilities

Electricity

It is wise to anticipate electrical needs for the future and provide sufficient capacity for full electric utilization. Currently, electricity is not competitive with natural gas in Oklahoma and is therefore not feasible as a heating source. However, check with the local electric company to get a commercial rate and determine if there are declining block rates for exceeding a particular energy amount in a given time period. Electricity will be needed at the very least for ventilation purposes at 4 to 6 kilowatts for a 1/4 acre range.

Natural Gas

Natural gas is clean and relatively inexpensive. Also, gas heating systems are generally less expensive to purchase. The cost of the energy source will be a major factor in determining the location and size of these structures. New growers can reduce heating costs by choosing crops which can be grown during warm times of the year and by avoiding crops with high temperature requirements.

Auxiliary Power/Alarm System

An emergency energy source is important to consider for a commercial operation for electrical support of heating and ventilation equipment. In addition, an alarm system is imperative to warn the operator/caretaker of impending freeze damage. Many tender plants grown in Oklahoma greenhouses are damaged by temperatures well above freezing.

Transportation and Parking

Locating the greenhouse near a major road will help facilitate the movement of plants to and from the site. In planning a retail operation, include ample parking for customers and employees. Provide 18 feet for head-in parking spaces and 30 feet clearance for back-out and turning. Any curves or turns should have an 18 to 20 foot inside radius. Check for local ordinances which dictate regulations on exits, entrances, and minimum car stall space. Plan for the greatest exposure possible when retailing to the public.

Wholesale greenhouses must consider access for their buyers. Major roadways are desirable for truck and postal arrangements and close proximity to a major airport may be desirable.

Labor

Be certain that an adequate labor pool is available for your operation. Operating a greenhouse range in a remote area, even for a wholesale operation, may not be the ideal situation. Consider times of peak labor needs such as during the spring and before holidays.

Greenhouse Expansion

A common oversight in greenhouse construction plans is the possibility of future expansion. By planning for a larger operation in years to come, the need for relocation may be avoided. Most greenhouse ranges will double in size within a few years and even greater expansion should be anticipated.

Greenhouse Layout and Design

Below is one example for designing the greenhouse and associated areas (Figure 1).

Additional Reading

Mastalerz, John W. The Greenhouse Environment. John Wiley and Sons, 1977.

Nelson, Kennard S. Greenhouse Management for Flower and Plant Production. The Interstate Printers and Publishers, Inc., Danville, Illinois, 1980.

Nelson, Paul V. Greenhouse Operation and Management. Reston Publishing Company, Inc., 3rd ed., 1985.

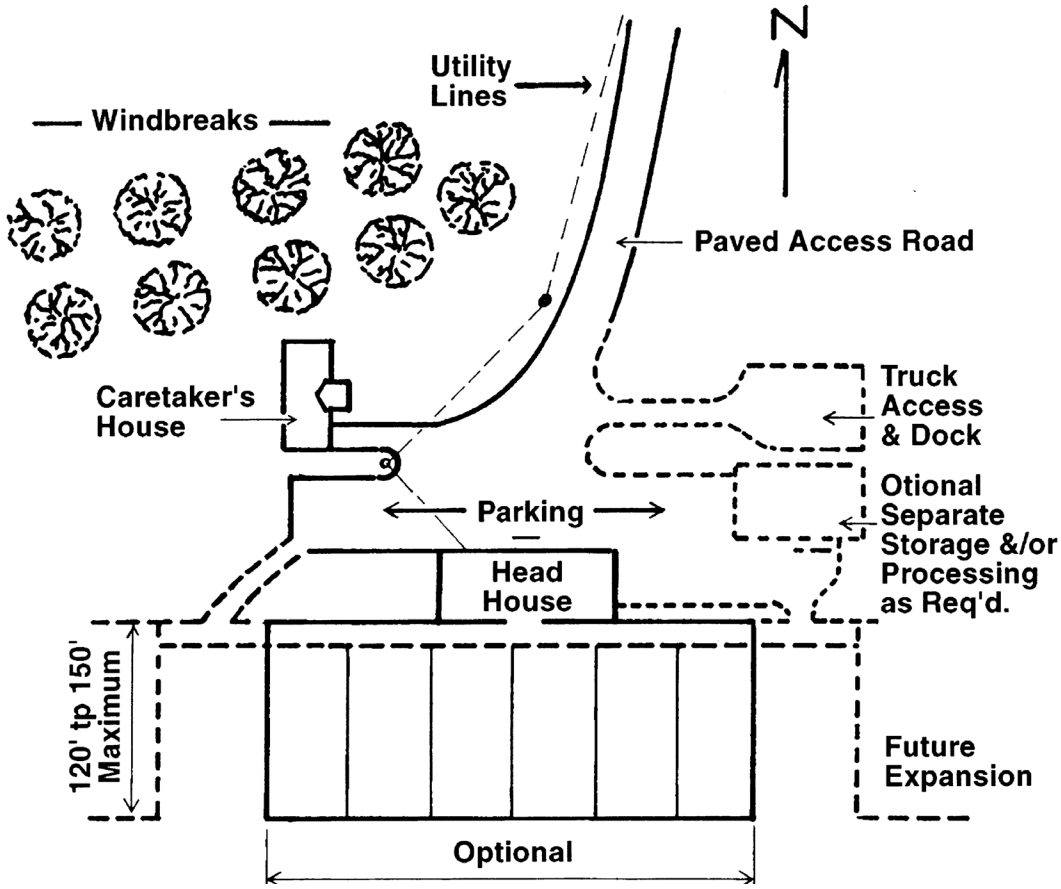

Figure 1. An example for designing the greenhouse and associated areas. Typically, greenhouses are on a level, but well drained, southerly exposed site.

Industry Trade Magazines

GrowerTalks
P.O. Box 532
1 North River Lane
Suite 206
Geneva, IL 60134

Greenhouse Grower
37733 Euclid Avenue
Willouby, Ohio 44094

Greenhouse Manager
Branch-Smith Publishing
120 St. Louis Avenue
Fort Worth, TX 76104

Organizations

OK Greenhouse Growers Association
400 N. Portland
Oklahoma City, OK 73107

Professional Plant Growers Association
Box 27517
Lansing, Michigan 48909

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