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# Building a greenhouse

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*A greenhouse should have efficient light transmission, adequate height, enough strength to carry the wind load and sufficient air volume and ventilation to avoid temperature extremes.*

## GETTING STARTED

A large range of greenhouses is available commercially 'off-the-shelf' and most greenhouse manufacturers will build to your requirements.

The type of structure you select will depend on what you are trying to achieve. Do you need a warm, sheltered polyhouse for propagation, or an efficient, labour saving vegetable production facility which is affordable? It is important to identify exactly what you plan to use the greenhouse for, before making decisions about designs and costs.

Many people in the first instance prefer to build their own (it can be cheaper) and later upgrade to more sophisticated designs. However, it is often easier to build new greenhouses than to adapt existing structures to new technology.

When making an investment in protected cropping, do your sums, plan your business and consider the economies of different sized operations. Larger greenhouses can be more efficient and profitable per dollar spent.

## QUESTIONS TO THINK ABOUT

What crops are you intending to grow?

- What volume of production are you aiming for?
- Are you going to use hydroponics?
- What is your source of water? Is it good quality?
- What is your expected return?
- How much can you afford to invest in a structure?
- Will you need heating and/or complete environmental control?
- Should you consider insect-proof screening? If so, what will you need to do to ensure adequate ventilation?
- What equipment or machinery (for planting, harvesting and spraying) will you be using in the greenhouse?
- Will you need to automate the environmental control functions?

## THE SITE

A northerly aspect will provide the most sunlight in winter. Buildings and large trees, particularly evergreens (such as conifers) will limit the available sunlight in winter if they are too close. So, when choosing a site the surroundings need to be considered. A north-south orientation will tend to give more uniform conditions as it will reduce the shading in the greenhouse caused by the framework.

A brief hail storm, in a few short minutes, can tear plastic and break glass. Check the history of hailstorms in the area. A structure can be sheltered from hail with chicken wire or shade cloth suspended above it. The best protection for polyhouses is to ensure the plastic is tight. Ageing plastic is more prone to tear and rip. Double skin polyhouses have an advantage in that they tend to create a cushion effect that makes hail bounce off more readily.

In windy areas plastic must be securely fastened to prevent flapping otherwise the cover can be ruined in a matter of minutes.

## HEIGHT

A higher roof creates a larger volume of air and a more stable environment which is better for the crop. The downside is the higher cost of more materials, increased heating and the need for more

structural framework to cope with the wind resistance produced by the higher walls.

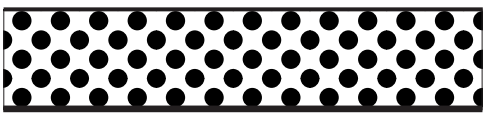
Aim for walls of at least 3.5–4 m high. The trend overseas is to use even higher walls.

## FACTORS TO CONSIDER

Adequate ventilation is probably the key factor. Not only is air movement important for disease control, but temperature extremes in a greenhouse should be avoided. A uniform, stable environment is achieved through effective ventilation (adequate air exchange and circulation) and minimal temperature variations.

Ineffective drainage can lead to disease problems in the crop and even affect personal safety when working in the greenhouse. Hot and cold spots, damp areas and condensation drips can limit the production capacity of a structure, damage a crop and make the greenhouse an unpleasant place in which to work.

Two other considerations are hygiene and access. If you are not producing in-ground crops then the floor should be covered to keep it clean. Concrete is the best material but is expensive. A cheaper alternative is blue metal. One of the best systems is to use plastic sheeting (small slope) covered with gravel. The plastic prevents waste water from entering the groundwater and enables easy collection for disposal or recycling. Weed matting over the top of the gravel produces a good surface for equipment such as trolleys and can be easily kept clean.




Some greenhouses have white plastic over the floor to increase the amount of reflected light.

Access is important. Too often when greenhouses are built it is found that the trolley is too big for the entrance or the roof is too low for the tractor. These oversights can be inconvenient and expensive, so check the equipment you plan to use and design accordingly.

## PLANT SUPPORT

Often, an overlooked detail in building greenhouses is the weight of the crop which the structure is to support. A tomato crop in an average 370 $m^2$ greenhouse could add a 22 tonne load to the framework if each plant carried 20 kg of fruit!

## MATERIALS

Metals such as steel and aluminium are superior materials for greenhouse frames. They are relatively strong and do not shade the crop to any great extent. Steel is relatively low cost, durable and easy to work with. It is popular for polythene tunnel greenhouses but should be galvanised to provide corrosion protection. Aluminium is a good framing material.

Another option is timber. Timber is cheap and easy to use but it can harbour disease organisms. Warping or sagging beams can also cause a lot of problems over time. Black polythene pipe such as 38 mm (1.5") or 50 mm (2") can be staked at the ground to create a relatively inexpensive loop framework for a polyhouse.

Glass is the ideal covering material in terms of physical characteristics but it is initially more expensive than other claddings. While glass may be the better choice for some, others would do better to use plastic materials.

Polythene is the primary alternative to glass for many growers. There are a range of products available starting from around $1/$m^2$. Strips of plastic, foam or tape should be used as a liner between the structure and the polythene to prevent damage from heat and abrasion.

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