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The Hartley Owner's Guide to
Greenhouse Gardening



A greenhouse can help your gardening dreams become a practical reality



Sharing the best in Gardening

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The Hartley Owner's Guide to Greenhouse Gardening

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*'A greenhouse brings
a new dimension
to your garden'*



PART ONE

Introduction

WHEN WE MOVED to our new home, I had to wait nearly six years for a new greenhouse. Previously, we had lived in a well equipped garden where I took such things as eating fresh grapes or tangy, ripe tomatoes for granted. As well as providing crops, my old greenhouse was essential for propagation of seeds and cuttings, over-wintering tender stock and providing a constant source of houseplants. Indeed, that greenhouse was as necessary for successful gardening as a spade or trowel, and I couldn't have done without it.

When we moved house, I had to make do with windowsills and makeshift cold-frames. My precious plants were at the mercy of the British climate and almost every gardening activity was limited by the lack of essential facilities.

Then, one August day, the truck arrived with the new greenhouse. Within the week, it was not only fully built, but also partially stocked. Even before water and electricity were connected, I rigged up a makeshift propagator and rooted my first cuttings. Two months later, I harvested fresh pak choi greens from the new greenhouse beds.

A greenhouse brings an entire new dimension to any garden. Glass enables you to overwinter delicate plants, to raise your own seedlings, to produce delicious food items – from tomatoes or chillies to grapes and melons – and to create colourful floral displays. And if the greenhouse is well designed and soundly constructed, it becomes a handsome focal point, not merely producing fine plants for your garden but also an object of beauty and pride in its own right.

A greenhouse can make your gardening dreams a practical reality and will continue to give you pleasure year after year

GETTING STARTED



Which type to choose

Properly sited, a greenhouse can combine being a visual asset and an environment in which to grow top-quality plants

A **GREENHOUSE** represents a major investment in the development of your garden, not just from the practical standpoint of being able to grow the plants that you always dreamed of, but also in terms of the effect it will have on the design and appearance of your garden. There is so much to think about and this Hartley guide will help you to decide what is right for you.

Deciding on size and style.

The golden rule, when planning for a greenhouse, is to work out what size you think you will need for all your expected gardening activities, and then double it! Once you have discovered just how much a greenhouse can do, your horticultural plans are likely to become increasingly ambitious, and for that you will need space. No greenhouse ever seems big enough once you start using it, so, right from the start, cut yourself some slack.

Remember though, that the larger the structure, the more expensive it will be to heat. Watering and plant care will take longer each day, and even if you are happy with that, it may be more burdensome for anyone expected to look after the plants when you go away. Greenhouses, even little ones, benefit from daily check-ups, even in midwinter, and will need more frequent visits during spring, summer and autumn.

You will probably want to match the style of your greenhouse, not only to its intended use, but also to its setting in your garden. For food production in a kitchen garden – or if the greenhouse is for purely functional purposes, there is no need to spend extra cash on fancy styles. But if the structure is to sit – as most do – at the heart of a cherished garden, the extra investment in a beautiful one is so worthwhile.

Personally, I selected the ‘Wisley’ design because it combines practicality with appearance. The ‘Dutch’ style roof makes a wide spread, maximising the warming effect of the sun and makes the interior feel roomy. I particularly like the coloured coating on the metal parts of the structure – a soft beige-cream on my greenhouse – because it is gentler on the eye than stark white.

Essential features:

- **Services.** Mains water and electricity are not absolutely essential, but life with your greenhouse will be far more difficult without them. You’ll benefit from lighting, with a switch near the door, and power points for heaters and propagators. Exterior grade fittings are advisable throughout, as greenhouses can be damp places. Even if you decide not to heat your structure in winter, soil-warming facilities are almost essential for propagating and protecting cuttings or young plants in winter.
- Your greenhouse will use a great deal of water, so if a supply is not available on tap you’ll be carrying a great many heavy watering cans, day after day. Clean, sterile water is needed for plant hygiene, particularly with young seedlings – another sound reason for installing a tap!
- **Ventilation.** The biggest cause of disease, particularly in winter, is poor ventilation. Air must circulate freely within the structure to discourage



The Victorian Planthouse sits on a single-skin brick base and its historic line is perfect where a period style is required



The fully glazed Tradition 8 range combines tradition with utilitarian style and is ideal for growing salad crops in beds and borders



Stylish, modern: the new Hartley Vista range



Rustic stone walls and solid benches give a rugged finish, ideal for alpinists (left). Make the greenhouse a key feature in your garden (right)

growth of fungal organisms and to moderate high temperatures in summer. Standard specifications of many prefabricated greenhouses and conservatories lack even the minimal ventilation needed for optimum plant health. If you increase the number of roof vents usually offered with a ready-made greenhouse, the cost will rise but will be worth every penny.

- Conditions within a greenhouse change remarkably quickly. A few moments of sun can boost temperatures rapidly, even on a cold, clear winter's day, and that puts strain on the plants unless vents can be opened and closed quickly to adjust to ambient conditions. Automatic roof vents are therefore almost essential. They will help to reduce temperature extremes without the need for constant attention from you.
- With more than 75 years of greenhouse construction behind them, Hartley understand the importance of adequate roof vents. On my Wisley 8, for example, I have four roof vents for a building roughly 20ft by 8ft. I also use

a powerful electric fan heater that circulates air all the time, even in summer, when it is not providing heat. That ensures air movement and prevents areas of stagnant air forming where fungal diseases can flourish.

- **Air space.** Greenhouses build up heat quickly in sun because the rays penetrate the glass, release energy as they strike solid objects and the resulting heat is then trapped. (This is similar to the 'greenhouse effect', which is causing global warming.) As the sun fades, in a non-insulated structure, heat is also lost quickly. This oscillating effect is cushioned by having a large air space. When choosing your greenhouse, therefore, go for the tallest affordable model, to maximise that stabilising effect on heat and cold.
- **Doors.** Doors serve as ventilators during warm weather. You may only need a single door on your building, but it is always worth considering a second one, so they can be left open for extra

air during hot summer weather.

Double doors provide extra width for manoeuvring wheelbarrows or moving large objects such as growing bags or other containers in and out.

- **Staging.** Whether propagating, growing on, or creating ornamental displays, you will need staging – platforms of convenient working height on which you can also manage and display potted plants. Most staging has aluminium or wooden slats, but it can be made of brick or concrete. See Chapter 2, p 13.
- **Floor space and growing beds.** For taller plants, and for growing crops such as aubergines, peppers or tomatoes, you will need free floor space. Permanent large plants such as vines, figs or big ornamentals will also need growing space with plenty of headroom. They can be planted directly in beds or grown in big containers. Most general-purpose greenhouses compromise by allocating space for both staging and free floor space.

Extending the facilities

YOUR NEW GREENHOUSE will soon become the heart of your gardening activities. As you widen the number of uses, and begin to realise the benefits of having it, you will begin to recognise the need for extending those facilities beyond the building itself. These need not be costly, or difficult to arrange, but they will add greatly to the value of your glass. You may even wish to adapt the design and layout of your garden so that the entire greenhouse area works more conveniently.

- **Ancillary glass.** Cold frames will enable you to harden-off young plants before planting them out in spring, and to accommodate plants which need only minimal protection. Frames can also provide overflow accommodation at busy times when the main greenhouse is full. Have them facing south-west or west, where possible, and avoid too exposed a spot, or excessive shade, such as that cast by a north-facing wall.
- **Standing areas.** Sited in a sheltered space, near the building, a nursery area will enable you to assemble containerised plants so that watering and management all take place on the same spot. The ground needs to be well drained, and will be easier to use if it is floored with a permeable, woven

plastic membrane, covered with shingle or grit, all contained within low-sided wooden frames.

- **Propagator.** As part of the greenhouse equipment, a propagator with electric bottom heat is almost essential (those with thermostatic settings will give better temperature control). It will assist with germinating seed, rooting cuttings and accommodating delicate young plants. By keeping vulnerable plants frost-free, it can provide limited winter protection at low cost – if no other heat is available.



Cold frames offer additional protected growing space, particularly welcome in peak season



A nursery area for growing on and caring for young plants will be a real asset



A heated propagator is indispensable when raising plants from seed or cuttings

Locating and installing



A sunny, sheltered spot that does not trap frosty air will give best results

HAVING DECIDED TO INVEST in a greenhouse, your first important task is choosing where to put it. Few of us are lucky enough to have the ideal site available, so in almost every case there will have to be compromises. However, certain factors, particularly adequate light, will be essential for success. Here are some tips for ensuring that you provide the best possible conditions:

- Plants need light, so it makes sense to site your greenhouse where it will receive as much sunshine as possible. If you align the building so that its longest sides face east and west, it will receive direct sun when it is most in need, during morning and evening, while the excesses of the midday sun will be minimised. But if your garden cannot provide the perfect spot, site it as advantageously as you can.
- Exposed sites will be cold, especially if subjected to winter winds, and heating costs will therefore rise. Sheltered spots are better, provided the light is not too restricted. East and north winds, when they blow, are usually colder than the prevailing westerlies.
- Avoiding low-lying or excessively shaded areas. Low ground is frost-prone, adding to any heating costs. It will also put plants at risk, if the greenhouse is unheated. Excessive shade causes weak, leggy growth, particularly in winter and early spring. Remember, a well-lit spot in June could be in constant shadow in December, if the sun does not rise above surrounding walls or buildings.
- If you plan to install growing beds within the greenhouse make sure the soil is fertile, easy to work and free of pathogens. On poor ground it will pay to remove the native soil while the foundations are being laid and replace it with good-quality topsoil.

Preparing the site

YOU WANT YOUR GREENHOUSE to last and to remain sound and trouble-free for many decades. For that you need an excellent quality building, but it is also essential to prepare the site correctly and meet the specifications recommended by the greenhouse manufacturer.

If you feel this is beyond you, a builder or landscape contractor will be able to do it at a reasonable cost. All you need do is hand them the specifications supplied by Hartley Botanic. If, however, you prefer to prepare the site yourself, make sure that everything has been done according to the Hartley specifications. Accuracy is essential and your foundation brick course must adhere to those precise dimensions.

- Measure out the area and check the site is level across all the corners.
- Decide whether you want the structure



The Hartley Victorian Lodge Planthouse has cold frames built into the brick base, and should be professionally constructed

to stand on a concrete raft, or to have a perimeter foundation. You will need the latter if you want interior beds for growing plants.

- Make perimeter foundations exactly as specified by Hartley, using good quality, frost-resistant bricks or engineering bricks. Avoid using facing bricks as they could deteriorate. Don't forget to leave a gap for water pipes and electric cable and, if possible, lay these before the greenhouse is built. That way, connecting up will be made easier.
- When the greenhouse is delivered, make space near the site for temporary storage of all the parts, including the glass – which is surprisingly heavy. Ask the delivery man to advise on how to arrange the components so that erection is made easy.



Whether you opt to erect the greenhouse yourself (above and below) or employ professional contractors (below left), a well-built foundation is essential



A low wall of engineering brick (above) provides a durable base for the framework



Leave a hole in the wall (left) for services such as armoured electricity cables. If planning to grow plants directly in the borders (below left) always use top-quality topsoil or sterilised loam



Hartley greenhouses can be



The Wisley 8, a Dutch-style greenhouse of proven performance over many years



The components lock together easily, making the Wisley 8 simple to self-install



The structure is light, but strong, once the side struts and end sections are in place



The main structure is now complete: the glass is slipped into place and shelves are fitted



Slatted benching is durable, allowing light through to shade-loving plants below



Spaced aluminium slats create a sturdy surface, strong enough to support heavy pots



Temperature-controlled vents keep the greenhouse atmosphere regulated (above & right).



self- or contractor-installed...



The Victorian Lodge Planthouse is designed with plenty of growing space inside and out



The brickwork can complement the nearby architecture or make its own style statement



Larger structures, especially those with brick bases, are best erected by a professional team



Once bolted together, the structure can be glazed with the 4mm toughened glass panes



The glasshouse is nearly complete, with just the porch remaining to be glazed



Saving precious rainwater is increasingly important: storage tanks can be built in



When all the construction work is complete the glass and frame are washed thoroughly



In just a few days the completed Victorian Lodge Planthouse is ready to welcome you to a whole new gardening experience...

2 GOOD HOUSEKEEPING



HOWEVER LARGE it may be, the space within your greenhouse is finite. There are so many activities you will want to begin, and so many plants you will want to grow, that it will soon become necessary to organise things. You may even have to prioritise, in order to make the best possible use of the facilities provided.

There is so much to enjoy in a well-furnished greenhouse for users of all ages

Getting the best from your greenhouse



Benches come in a range of types and uses, with slatted (left) or solid trays (middle). Shelves (right) increase the growing and display space

The growing space

How you utilise the space depends, of course, on what you will grow in your greenhouse, but most general-purpose structures will need all of the following:

Staging To grow and appreciate most greenhouse plants they need to be displayed on staging, set at around table height. Hartley staging is made of durable alloy slats secured by spacers. Pots can be stood on these, or alternatively shallow trays filled with a layer of grit or gravel can be used. If this is kept moist a more plant-friendly habitat can be maintained. Gravel trays can be used in automated watering systems, reducing the rate at which pots dry out in summer.

Shelving Shelves make more efficient use of space by occupying higher parts of your greenhouse. This is particularly useful for staging trailing and smaller plants. Shelving also improves the appearance and visual impact of the greenhouse by creating elevated displays of ornamental plants.

Potting bench & compost store

You may wish to consider setting aside an area of staging to use as a potting

bench, or to store items of equipment or compost in a waterproof locker or cupboard beneath to help keep the glasshouse tidy.

Floor standing space It is unlikely you will want to cover the whole interior with staging and will want to include a standing area for larger ornamental or crop plants or those needing to be overwintered after spending summer outdoors. Ensure the area drains freely to prevent waterlogging of pots.

Under the staging Space under the greenhouse staging can become a very



Beds can contain soil in which to grow plants directly (left) or be gravelled for pots and growing bags (right)

valuable asset. Depending on your growing systems and type of staging used it can be a shaded and relatively dry environment.

- It can be used for storing dormant bulbs and tubers, plants requiring rest periods from cultivation, or for storing chrysanthemum stools that will produce fresh cuttings at winter's end.
- Ferns, which benefit from shade, even in winter, may be happier growing under the staging than anywhere else.
- Even certain seeds – auriculas, for example, or hardy cyclamen – germinate better, down there, than in a cosy propagator. But it's important to remember that they are there, and will need attention. Out of sight can be out of mind!

Greenhouse beds If you plan to grow food crops, cut flowers or anything else in quantity, you will probably want to set up some greenhouse beds. A greenhouse built on a brick foundation, with natural soil as its floor will have the advantage of ready-made growing facilities. If the building rests on a concrete base, raised beds can be built or growing bags used for crops and plants.

- Hydroponic systems using nutrients and water are also a possibility and you can even grow crops like tomatoes on bales of moist straw, or by a system known as 'ring culture' where plants grow in bottomless containers filled with potting compost, placed on a substrate such as grit, which can then be used as

a reservoir for providing water:

- If natural soil is of good quality and fertile it will serve as a greenhouse growing medium for many years, particularly if you look after it by dressing with rotted compost to build up the organic content and refraining from over-feeding.
- If you have a mains water supply laid on, automatic irrigation systems for greenhouse beds are easy to install. They can be fitted with time clock and trickle tubes or 'leaky hose' to ensure a reliable supply of moisture, particularly if you are unable to get to your greenhouse during the warmest part of the day.



Select a heating system to suit your glasshouse and the plants you want to grow

Control of heat and temperature

ARTIFICIAL HEAT is by no means essential, but it will widen your scope. The amount of heat required will be determined by a number of factors:

- what you use your greenhouse for
- what you grow and when you grow it
- the prevailing climate
- the position and aspect of the structure.

A great deal can be achieved with an unheated or 'cold' greenhouse. Indeed, in mild areas, with extra insulation and good design, the interior can be kept almost

frost-free for much of the winter.

It is not possible to make a cold greenhouse completely safe from freezing, however. If outside temperatures fall substantially below 0°C tender plants will be at risk. As a rule of thumb, you can expect the difference between the minimum outdoor temperature and that within an average cold greenhouse to be



Automatic hydraulic ventilators help to maintain an even temperature

approximately 2°C. Thus, without double glazing or any other protection, frost-tender plants within the greenhouse should survive, just, even if the external minimum fell to -2°C. With efficient insulation, that temperature drop could be buffered by a further degree or so.

Each degree of temperature near freezing is critical for plants, but good



Thermostatically controlled electric fan heaters (left) are ideal to keep smaller houses frost-free. An insulating skin of bubble wrap (centre) or plastic sheet will significantly help reduce heat loss and fuel costs and is widely available in kit form. Louvred side vents (right) improve air flow

management will help. Keeping potted plants drier will protect roots, enhancing winter hardiness. Select plants for overwintering carefully, growing only (or grouping) those of similar temperature requirements.

Heating of some kind will be necessary, but need not be costly. Systems range from providing background warmth against frost to constant heating. Remember that each degree rise in ambient temperature carries additional cost and with global concern about carbon footprint it makes sense to use as little artificial heat as possible.

Here are some topics to bear in mind when planning your heating system:

Insulation You can reduce heat-loss by installing winter insulation over the glazed area. The most effective method is to use bubble wrap polythene, cut to size and fixed on the inside of the house, close to the glass. This is a fiddly task, since the material has to be cut to fit, and it may take more than one

person to install the insulation. Furthermore, the insulation is best removed during the warmer months to admit more light and to facilitate cleaning. Suppliers of greenhouse accessories will stock clips designed to fix the insulating material to the glazing bars. You'll need a pair of large, sharp scissors to cut the polythene to shape.

- Partial insulation is also possible. If you wish to protect plants in part of the house, but don't want the arduous task of cladding the whole interior with bubble-wrap, section off part of the structure. You can separate it from the remainder with a polythene sheet, or a bubble-wrap curtain, and put vulnerable treasures inside the enclosure. You could even heat that part more cheaply with soil-warming cable to protect vulnerable roots and shoots from getting chilled.

Heat sources Most people heat their greenhouses with electricity, paraffin

or bottled gas. You can install gas or oil-fired central heating, of course, or even a solid fuel boiler; but most gardeners will just want to plug in and switch on.

- Electricity is not cheap – nor is any source of purchased energy – but with modern heaters, and with an insulated structure, you can keep running costs to a minimum. Electric fan heaters which circulate the air are efficient, but it is worth investing in a good-quality model which is equipped with an accurate thermostat. The better heaters move a greater volume of air, improving overall ventilation, reducing air stagnation and thereby reducing risks of fungal diseases such as botrytis (grey mould), particularly in winter.
- Heaters powered by paraffin or bottled gas may be less expensive to run but are not quite as reliable, or as convenient, as electric ones. Paraffin can produce unpleasant or toxic fumes if the wicks are not correctly trimmed, and the



Fixed roller blinds will provide welcome shade for both you and your plants and help temper the damaging effects of strong sunlight



Traditional ratchet controls are an optional extra in larger models in Hartley' Botanic's Victorian range of greenhouses

heaters need to be filled and checked regularly. They are useful for background warmth, rather than for significantly lifting the temperature.

- The better gas heaters are fitted with thermostats and may provide up to 3kw of heat. With gas, in addition to the heater itself, you will need two gas bottles, preferably installed outside the greenhouse, with the gas delivery hose running under the frame. A regulator will be necessary for each bottle. You will also benefit from using an automatic switch-over device. This will begin drawing from the full cylinder when the one in current use is empty and will indicate which needs replacing.
- Remember that fittings on gas appliances are screwed anticlockwise, rather than the usual way. Remember too, that when hydrocarbons such as gas and paraffin burn they produce water vapour as well as carbon dioxide. The CO₂ is beneficial to plants by day, but

increased humidity and condensation can exacerbate fungal disease problems. Good ventilation is therefore essential with gas or paraffin heaters.

Minimal heating In a Wisley 8, six pane greenhouse, a 2.5 kilowatt electric fan heater can be set low, so that heat comes on only when the temperature falls dangerously low. You will need to take a few days to work out the ideal setting on the dial of the heater and to match this with overnight minimum temperature. To do this you will need a reliable 'max and min' thermometer placed among plants on the staging or fixed about a metre above the ground, well away from the heater.

- A night minimum of 4° or 5°C is a safe temperature to maintain if you want to be safely buffered against severe snap frosts. If you want to run your heating on a tight budget, have horticultural fleece available to spread over

vulnerable plants during excessively cold spells.

Soil-warming systems One of the most economical heating systems is simply to warm soil, either in a bed, or propagation bench. Soil-warming cable provides heat where it is most needed, at the roots, so even if top-growth is cold-damaged, the roots will survive.

- Cable is safe and easy to install and, with a thermostat, lets you control soil temperature more accurately. It is particularly useful for protecting young plants in cold times of the year. Its performance depends on the cable type, prevailing temperatures and how the system is installed, e.g. a 6m cable consumes 75 watts and correctly installed will sustain temperatures between 15°C and 25°C per square metre of covered bench. Cover plants with fleece or a canopy of translucent sheeting to retain heat.

A heated propagator
is a real asset



istock

Propagating by seed is so rewarding



Group plants to maximise available space



Grow lights boost growth in dull weather

Plant propagation

YOUR NEW GREENHOUSE will enable you to graduate from green-fingered enthusiast to professional propagator at a stroke. Stem cuttings, root cuttings, leaf cuttings and seeds will all spring to life with much more speed and ease than you are used to. Within a few weeks of starting you will wonder how you ever managed without a greenhouse in the past.

With a little extra equipment, and particularly with a heated propagator, expect to become a potential nurseryman within days!

Propagators Some particular methods of propagation are almost indispensable. When cuttings or newly sown seeds are boosted with bottom heat, germination and rooting is far quicker, damping off disease is less likely and the plants get off to a more rapid start than those relying on natural conditions. For

supplying such heat, and to ensure the best aftercare, you need a purpose-made propagator:

- The simplest propagator consists of a seed tray with a clear plastic or glass cover on top, or perhaps, nothing more than a simply constructed, polythene tent. As no artificial or bottom heat is



Sowing seeds in cells enables you to transplant them without root damage



Slower-growing seedlings can be left to grow on in trays until large enough to prick out



Cell trays are also ideal for rooting cuttings in plugs or pre-formed compost blocks

supplied, the benefits of such a structure are limited. Even so, cuttings will root more quickly in a simple propagator, and young seedlings will benefit from the extra protection.

- Small, electric propagators are much more effective. Their small size might be limiting to ambitious gardeners, however, and to avoid frustration it is worth investing in a propagating bench that is large enough to accommodate all your growing needs.
- You can kit yourself out with a sturdy alloy bench, just over a square metre in growing area, with soil warming cable, soil thermostat and high, durable cover.

What will you propagate?

Seed A greenhouse plus a heated propagator will give you much more control over growing conditions, thereby enabling you to grow even the most challenging plants from seed. You will be able to set temperatures to within the desired range; you can

allocate precisely the right amount of water and ventilation and can handle your young 'propagules' in hygienic conditions to sustain good plant health.

- You can bring the sowing dates of tender plants forward, even starting them off in the depths of winter, if you wish. Giving them an early start lets you plant mature specimens outdoors in spring and enjoy early flowers.
- Seeds that are difficult or that need special conditions for germination can be given the extra care they need if grown under glass. You can monitor their progress and once they have successfully germinated and are ready to prick out you can nurture the young plants in an ideal environment until they have matured.

Cuttings Even without a propagator, soft cuttings will always root more quickly in the warmth of a greenhouse. Providing extra bottom heat will hasten the process, reducing the chances of

new cuttings running out of nutrients before they have rooted or, even worse, rotted.

- Softwood cuttings, i.e. young shoots which are soft and vegetative rather than woody, wilt easily unless high humidity is maintained. And when cuttings wilt, the rooting process is delayed and delicate plant tissue is at risk. In a propagator, where moist air keeps them turgid and bottom heat gives them warmth, rooting is speedy.
- You can also extend the cuttings season with a heated propagator, taking the first soft cuttings in early spring and continuing, if you wish, until the end of autumn.
- Leaf cuttings of such plants as begonias or *Streptocarpus* will also grow readily in a greenhouse propagator, and in rapid time. Warmth and humidity hasten the process and will result in healthy young plants ready for potting up.



Being constantly vigilant for what needs watering is a key part of routine practice

Watering techniques

DESPITE BEING THE LAST TOPIC of this chapter, watering is the most important task in the routine daily life of your greenhouse. Watering effectively – by never allowing plants to be stressed by under-watering, or suffering root damage from over-watering – is a skill which must be learnt. You will soon know by instinct whether a plant looks happy and healthy or not, but understanding the relationship between soil moisture and plant health is sometimes surprisingly difficult to grasp.



Capillary matting is a reservoir for moisture



Water overhead in mornings or evenings



Trickle irrigation targets roots directly



Collect rainwater from your greenhouse roof

In a well-run greenhouse, potted plants should be allowed to dry to the point that they are almost – but not quite – starting to wilt, before being watered. The compost should be soaked to overflowing, but then allowed time to drain freely and quickly, leaving it moist, but never saturated for more than a few minutes.

In a mixed greenhouse plants take up water at different rates, some needing a drink almost daily, others being happy with less-frequent soakings. In winter, watering will be far less frequent than in summer. It is important not to over-water in cold weather, since that can compromise the plants' health and cause rotting. During hot spells, large thirsty plants such as tomatoes may need watering several times a day. You'll soon get to know your plants and will be quick to learn which are inclined to be thirsty and which are in danger of being kept too wet.

Automatic systems For busy people, automated watering systems will help to care for your charges while you are away. As we've seen, these can be installed relatively cheaply, and usually



Moistening paths will raise humidity

work with a time clock. They will not, however, provide the human touch. Water is supplied to all the plants at the same rate and the machinery cannot know which plants are suffering from drought stress, and which are getting wet feet and hating it.

Damping down and humidity

In summer, humidity can become too low, allowing high temperatures to become potentially dangerous. Low humidity causes plants to lose water from their systems more quickly than they can take it up through their roots. As a result they wilt and if the problem persists, they begin to develop more serious disorders.

- Humidity is easy to increase, simply by damping down the insides of the structure. Doing so will also reduce high midday temperatures. Watering the floor, spraying down the sides and particularly directing water under staging can help to bring down excessive temperatures and increase humidity. Avoid spraying directly onto plants, as wet foliage may scorch in sun.



Water individual plants with care

Water sources As well as mains water you can use collected rainwater from a water butt, or 'grey' water recycled from baths or sinks, on healthy, mature plants. However, avoid using water from dishwashers or washing machines, as it can contain bleaches or caustic materials, and never use artificially softened water as the salt it may contain will be harmful to plants.

- Seedlings and newly sown seed are far more vulnerable, particularly to a family of fungal diseases known collectively as 'damping off'. Scrupulously clean pots and trays, sterile compost and, of course, clean tap water are essential for seedlings until they have grown into substantial young plants.

Most of the practices described in this chapter will already be second-nature to experienced gardeners. For those new to greenhouse management, they are all easily learnt and simple and pleasurable to put into practice. After a while you will know whether all is well – or not – in your greenhouse the moment you open its door and look inside.

A vibrant greenhouse scene featuring a variety of potted plants. In the foreground, there are several pots containing plants with large, textured green leaves, clusters of bright yellow flowers, and a bush of pink flowers. To the right, a plant with delicate purple flowers is visible. In the background, a large black pot holds several plants with large, rounded, reddish-brown leaves. The greenhouse structure is visible in the background, with sunlight filtering through the glass panes.

*‘Nothing but the best
from your new
greenhouse’*



PART TWO

Bringing your greenhouse to life

A mixed collection of your favourite flowering and foliage plants will become a constant source of pleasure throughout the year

YOUR BRAND-NEW GREENHOUSE is now up and running. At last, you can begin to enjoy the benefits it brings and to derive pleasure and satisfaction from every minute you spend, sowing, planting, planning, picking, training and tying or just messing about under glass. From now on, rainy days or cold winter afternoons will never blight your gardening plans. And, with each year that passes, you will save a small fortune by raising your own plants.

The following pages give a broad overview of some of the specific plant groups you can grow, and gives hints on how you can derive maximum value from them and from your investment.

Ornamentals are likely to play a big role, unless you are purely engaged in food production, and as time passes you are bound to find a whole range of further uses.

If you enjoy house plants, but find that rooms and windowsills provide less than ideal growing conditions, your greenhouse will serve as an excellent rehabilitation centre for plants stressed by artificial domestic living.

Canny greenhouse owners will have a planned rotation so that the house is constantly supplied with top-quality material. Admiration and favourable comments from guests is just part of the satisfaction felt by having a greenhouse for ornamental gardening.

3 YOUR NEW DIMENSION

Deciding what you want to do

I F YOU ARE NEW to gardening you will be amazed at how many different functions a greenhouse will perform. And if it is already second nature, you will know only too well how difficult it is to do all you want without glass in your garden.

Even when the greenhouse has been built, there are so many different uses to which it can be put, that before long, you will be spoilt for choice. That is why some people, even in relatively small gardens, often end up with two, three or even several greenhouses, particularly if you specialise in growing different types of plant!

Here are some key functions:

Propagation The most rewarding way to produce plants is from seed. Packets of seed cost far less than buying mature plants and, once you have mastered the simple skills of sowing and aftercare, you can produce as many plants as you like. Plants for spring or summer display, longer term perennials or shrubs and, of course, food crops can all be started from seeds sown in a greenhouse.

Growing plants from cuttings will also be much easier in a greenhouse than outdoors. As well as simple stem cuttings,

you can also try raising leaf cuttings from such plants as begonias or Cape primroses (*Streptocarpus*), or root cuttings from a variety of perennials.

Display Most people who own a greenhouse want it to be welcoming and beautiful. You can take this further, however, to create magnificent displays of colour and interest throughout the year.

Even in a small, multi-purpose greenhouse, there's much you can do to make the interior beautiful and to



Propagating either from seed or cuttings will enable you to raise plants cheaply and develop your growing skills



Create your own colourful, artistic displays

look inviting from outside.

- Staging and shelving maximises growing space and enables you to arrange your plants to look their best. If you plan for a succession of interesting flowers and foliage, the quality of your display can be sustained for long periods, and can be made more dynamic, with changes in colours and styles.
- The service areas of a greenhouse, such as potting benches, are less pretty, but you can help to conceal them by arranging your show plants so that they dominate the view.
- A greenhouse also helps you to provide



Grow a wide range of delicious crops

top quality plants for your house. Ailing specimens or plants not at their best can be removed from indoors and revived in your greenhouse. Meanwhile, if you have plenty of replacements coming on, your house need never be lacking floral decoration.

Growing food Under glass you can grow a range of annual food crops such as tomatoes, cucumbers, aubergines and peppers, as well as more permanent plants including grape vines, kiwi fruit and figs.

Winter protection A greenhouse, with minimal artificial heat, will keep temperatures just above freezing. Plants which would perish outdoors in winter can therefore be safely sustained under glass for the next growing season.

While they are protected you can carry out seasonal tasks on them, such as pruning



Provide winter protection for tender plants

and training, re-potting, root-pruning or even propagating.

- Tender shrubs or perennials, if containerised, can be moved into the greenhouse in autumn where they can remain dormant, or rest until the following spring.
- Young plants propagated during autumn and winter can be kept in a protected environment until the danger of frost outdoors has passed.
- Tubers or roots of summer and autumn blooms such as dahlias, chrysanthemums and the taller New World salvias can be stored under greenhouse staging and propagated from in late winter.
- Summer bulbs, such as *Agapanthus*, *Hymenocallis* or the magnificent climbing lily *Gloriosa superba*, can also be parked under the staging, when dormant, for a cosy winter:



Collections of particular plant groups, such as alpines, can be both rewarding and educational

Indulging your hobby

MOST PEOPLE who want to grow particular types of plants will also need a greenhouse. In many cases these can be adapted to provide specific conditions, but with careful selection it is possible to mix and match certain plant groups, thereby broadening the scope of the growing environment. You can also use conditions created by some plants to accommodate others, e.g. ferns and other forest plants can be grown in the moist shade of larger orchids.



Many beautiful orchids are easily grown

Orchids are found in most parts of the world, from alpine zones to tropical rainforests, and so a wide number of species and hybrids are available to suit different temperature environments and ideal as a focus of a small collection.



Succulents have fascinating shapes and forms

Most cacti and succulents require dry, airy, sunny, frost-free conditions and have a remarkable range of shapes and forms. Many also have spectacular spines or hairs and produce eye-catching clusters of glorious, brightly coloured flowers.



Give protection to delicate-flowered alpiners

While most alpiners are happy outdoors, some prefer cool, dry, airy conditions. A special alpine house can help provide this environment and enable them to be grown to perfection. It also enables them to be appreciated at close quarters.



Carnivorous plants are strangely seductive

Many carnivorous plants are easily grown in a cool, frost-free greenhouse, providing you give them the damp, acid soil conditions they need. Their peculiar ways of catching food are captivating, but new hybrids are making them decorative too.



Bromeliads have highly coloured flowerheads

Requiring cool-to-warm conditions, many bromeliads have spectacular, long-lived flowerheads that erupt from the rosette of leaves, which may also be decoratively patterned. The so-called air-plants or *Tillandsia* are part of this interesting group.



Ferns are ideal for shady conditions

Ferns have a subtle charm all of their own and can form the basis of a special collection, particularly if your greenhouse is naturally shaded. Alternatively they can be grown beneath the staging or in the shade of other plants.

There are hundreds of
different passion flowers
to choose from, all with distinctive
and exotic flowers,
in all colours of the rainbow

*‘Providing colour and
beauty, indoors and out’*



4 ORNAMENTALS UNDER GLASS

WHATEVER YOUR gardening preferences, your greenhouse will broaden the scope, not only of what you can grow, but also when you can grow it. Seasons become a little less relevant since you are able to provide full frost protection, and at the start of the growing year you can steal a march on nature. Furthermore, the large number of plants that are virtually impossible to propagate outdoors will become easy to raise.

Savings will be significant too. Instead of planting your summer garden with expensive half-hardy or tender plants – probably bought in a crowded spring garden centre – you will have spent a fraction of the cost on seed and will have raised all your own stock ready for planting out.



The flowers of marmalade bush, *Streptosolen jamesonii*, fade from orange to yellow



Plants with real flower power

Primula obconica is easily raised from seed, sown in spring to flower the following year

EVERY YEAR, patio plants and floral bedding – not to mention those for window boxes and hanging baskets – are raised and sold in millions. Many are technically perennials, but even so they are routinely grown for a single season before being wastefully discarded. With a greenhouse you can cut out the middle man and take control by growing your own.

You can raise all these plants yourself and many more besides – and overwinter and readily propagate varieties you had previously considered as disposable. Their offspring can be used next season and for years to come until you tire of them and want to try new ones. The following plant groups will provide year-round interest:



Bedding and container plants

RAISING AND GROWING-ON your own bedding plants is one of the great benefits of owning your own greenhouse. It enables you to grow as much as you want, which you can then tailor to suit your own circumstances and needs. It also offers the opportunity to try out varieties both new and old which may be unavailable from local stockists, or plan creative displays of flower colour and foliage to help you transform your garden throughout the year.

Producing your own selection of bedding plants will revolutionise what you can achieve in your garden

- Bedding plants can be raised in three main ways, from seed, by cuttings and, increasingly, by growing on small plants started off in plugs of compost by mail-order suppliers.
- To raise summer bedding plants such as African marigolds, nemesias, petunias and zinnias from seed, sow in a heated propagator between late January and March, then prick them out and plant into trays divided up into cells or into individual pots when big enough to



A wealth of bedding is available to greenhouse owners, as seed, cuttings or plugs, including *Sutera* (*Bacopa*) (top left), *Bidens* (lower left), fuchsias (centre), *Nemesia* (top right) and *Anagallis* (lower right)



handle. Grow the plants on, re-potting where necessary. In late spring, they can be set out into cold frames or a sheltered spot outside to harden off for about 20 days before being planted out in the open garden, usually not before the second week of May after the danger of late frost has passed.

- For those nervous about raising their own bedding plants there is an ever-widening selection of young plants available. Deliveries of these plug-grown

plants usually arrive in April allowing you sufficient time to grow them on to maturity for summer.

- To raise many tender perennials that are used as summer bedding, such as pelargoniums, fuchsias, argyranthemums, petunia-relative *Calibrachoa* (such as Million Bells) and *Sutera* (also known as *Bacopa*), you can over-winter single 'stock' plants which will provide cuttings for bulking-up new stock next season. Cuttings are rooted in your propagator

from late winter onwards and, when kept fed and watered, will soon produce sturdy plants suitable for planting out in late May.

- Old stock plants are best discarded in favour of one or more of this year's crop to provide sufficient young, vigorous shoots from which to take cuttings to produce next year's bedding.



Greenhouse ornamentals

MOST PEOPLE like their greenhouse to look alluring and to have floral interest, particularly during the winter when the outdoor garden becomes low key. Space, you'll find, will always be limited, so make your selections with care and be ready to throw out anything which is neither contributing nor showing any potential.

Tender bedding plants such as *Solenostemon* (coleus), fuchsias and pelargoniums can be planted out in early summer and overwintered as rooted cuttings for use the following year

- For winter floral displays, and with minimal heat, you can grow cyclamen from seed – they're easier than you think – as well as greenhouse primulas such as *Primula obconica* and *P. malacoides*, old fashioned pot cinerarias (*Pericallis*) or the updated varieties called Senetti.
- Spring provides opportunities for potted, large-flowered aquilegias, *Schizanthus*, trailing violas such as the 'Friolina' series and, as the days lengthen, a vast range of summer display plants. Cape primroses (*Streptocarpus*) provide floral abundance; New Guinea impatiens make big, bold statements, you can utilise upper shelves with such trailing plants as *Columnnea* and *Achimenes* and notch up the fragrance by including heliotrope.



Exotic-looking *Achimenes* comes in a wide range of colours (left). Colourful pansies and violas can be raised from seed year-round for a wide range of uses in the garden (above)

- Foliage is, if anything, more important than flower in a greenhouse. Flame nettles, *Solenostemon* (formerly *Coleus*), are universally popular and provide sumptuous leaf colour. Their close relatives *Plectranthus* also produce superb foliage, and many flower – often in autumn or winter – as a bonus.
- For low light levels, many of the big-leaved begonias, particularly *B. rex*, come in silvery, purple, red, bronze and green hues and look superb among flowering plants.
- You can have great fun composing an ornamental bench with such a choice, and you can draw on such stocks for houseplants, gifts or swaps with friends.

Large tender perennials and shrubs.

Many of the larger plants which are non-hardy will spend their winters in your greenhouse and summers out of doors. Size and available space will always be limiting factors, particularly as many shrubs occupy big volumes but make limited ornamental contributions, during winter. Many of these – even the larger shrubs – are fast-growing and can be rooted as cuttings in early autumn for growing on through winter, albeit rather slowly.

Given reasonable weather and adequate heat, some can achieve impressive size within their first season as outdoor summer plants.

Such plants as



istock



oleanders (above), *Tibouchina urvilleana*, with its sumptuous, purple-blue flowers, and Australian mallow *Alyogyne huegelii* (left) need protection but can look unexciting all winter.

Certain *Acacia* species (mimosas,) on the other hand, can be covered with fragrant flowers in winter. Orange or lemon trees with their beautiful white blossoms will also perfume winter interiors.



Climbers with impact

A GREENHOUSE, like most small gardens, will have a greater area of vertical growing space than horizontal. The sides and roof sections therefore provide magnificent opportunities for climbing and trailing plants which can be grown for foliage, flower or fruit.

The choice is huge but it is important to plant judiciously. If you cover the whole interior with dense vegetation, light levels will be seriously reduced, making life difficult for the non-climbing plants. This is particularly important between October and April, when light is always at a premium. Large climbers can also harbour pests and diseases which may be difficult to access and treat.

You will need to install support wires so that the climbers can be trained. Specially designed fittings or clips are easy to screw into grooves in the structural parts of the building. These have a flange and eye, making wiring simple, as well as fixing supports for crops such as tomatoes, for installing insulation material in winter or for suspending shelving. Here are some suggestions for climbers to grow.

Evergreen Chilean bellflower

Lapageria rosea revels in cool, moist soil and shady, humid conditions



Love-lies-bleeding vine *Clerodendron thomsoniae* requires good light and warm conditions over winter and if pot-grown, can be used as a houseplant

Annual and herbaceous climbers

These will be temporary, providing summer display. Their cover is usually sparser than with woody plants, so they will be less light-inhibiting. Plants such as *Rhodochiton*, *Lophospermum*, *Thunbergia alata* (black-eyed Susan) and morning glories are excellent for speedy displays. They are easy to grow and good-natured to train, either directly on the house sides, or as free-standing wigwams.

- For late autumn or spring you can grow off-season annual sweet peas, sowing the seed in summer or early autumn and carefully training the plants for maximum flower. Exotic beauties such as *Gloriosa* and *Bomaria* – both climbing lilies with tuberous roots – will astound your friends, if well grown.

Woody climbers These will provide more permanent displays, with a solid presence throughout the year. Evergreens such as *Stephanotis*, *Mandevilla*, *Passiflora* and *Allamanda* will form dense cover and need careful siting. You may need to thin the growth on a regular basis to prevent them from taking over. Plant them, therefore, in accessible places, and at the north end of the building to minimise light loss.

- Fragrance is an important constituent in greenhouses or conservatories and for sheer knockout power try planting *Jasminum polyanthum* and enjoy the masses of powerfully perfumed blossom from late winter onwards.



Black-eyed Susan, *Thunbergia alata* (above) and *T. gregorii*, are attractive tender climbers



Jasmines scent the air with rich perfume



South African *Lachenalia* produce spikes of cheery, brightly coloured bells in spring

Bulbs for winter, spring and summer

FORCING FOR WINTER: one of the delights of having a greenhouse is to produce out-of-season flowers. By providing extra warmth, plants which are normally dormant during winter can be 'woken early' and will look their best several months ahead of those grown naturally outdoors. Here are some examples:

Bulbs for winter display Popular spring bulbs or corms, including tulips, narcissus, hyacinths, crocus, florists' anemones and Dutch irises can be forced into flower from midwinter onwards. Some, such as hyacinths,

are often available as 'prepared' bulbs, i.e. they have been treated to simulate an artificial winter and will therefore spring into growth as soon as planted.

- Narcissus can be planted at two levels,



A pot of tulips makes a bright show

Forcing bulbs Purchase quality bulbs in autumn and plant closely in pots using peat-free potting compost. Ten medium-sized tulip bulbs will fit into a 5in (13cm) pot (left). Bury small bulbs 1in (2.5cm) deep, larger ones, such as hyacinths, with necks protruding. Water and put in a cool, dark place outdoors, such as under a thick layer of sharp sand, to encourage rooting. Six to eight weeks later, or when shoots are 1in (2.5cm) tall, bring into the greenhouse. Keep cool, around 15°C (59°F), and roots moist to encourage flowers to form.





Narcissi can be grown to perfection indoors

in a bowl or pot, for mixed displays of blossom. Bulbs grown in borders or growing-bags for cut flowers can be planted densely to maximise the crop.

- Forcing provides an excellent out-of-season display, but exhausts the bulbs. They should be discarded after use.

Tender bulbs Non-hardy bulbs or corms such as *Hymenocallis*, *Veltheimia* and moisture-loving *Watsonia* can all be safely grown in a greenhouse. Some, such as *Hippeastrum* (amaryllis) and the startling red *Sprekelia*, will flower under protection in spring.

- Others, including *Gladiolus*, *Tigridia* and the more tender species of *Agapanthus*, can be grown on in warmth until early summer; and then planted outdoors a few weeks before they are due to flower.



Sumptuous *Salpiglossis* will provide you with a fabulous summer display from a spring sowing

Cut flowers for winter and spring

Cut displays If you have a greenhouse bed and like to grow summer food crops, a good winter use for the vacant space is to raise cut flowers.

- Specially bred strains of antirrhinums and ten-week stocks, for example, will produce superb spikes for cutting.

Freesias can be grown for display or cutting and flower naturally in late winter and thrive in a cool greenhouse. Also try polyanthus (*Primula*), *Molucella* or 'bells of Ireland' and for later in the year, *Eustoma* (prairie gentian). All these plants are easy to grow and will give impressive results.

A close-up photograph of a variety of tomatoes on a decorative plate. The tomatoes include several large, ribbed red tomatoes, several smaller round red tomatoes, and two dark purple/black tomatoes. The background is softly blurred, showing more tomatoes and a green pepper. The text is overlaid on the left side of the image.

*‘Let the greenhouse
pander to your
taste buds...’*

5 FOOD UNDER GLASS

GREENHOUSES IN BRITISH GARDENS produce a superabundance of tomatoes every summer. And what flavours! But why miss out on the vast range of other easily grown greenhouse crops? From off-season lettuces to big, ripe aubergines; from hot little chillies to heavy bunches of big, golden muscat grapes, a greenhouse can be a reliable source, not just of home-grown food, but of the choicest, tastiest and most sought-after luxuries.



Tomatoes and cucumbers – just two of the productive crops to try



Raise young vegetable plants in cell trays for ease of handling

A nursery for outdoor crops

A GREENHOUSE is also the stepping-off point for outdoor vegetable production. As well as raising tender crops including courgettes and outdoor cucumbers, you can kick-start runner beans, brassicas and even such root crops as carrots and beets. And you can use a little spare staging to ‘chit’ seed

potatoes, i.e. expose them to light and warmth to encourage their shoots to begin growth prior to planting.

Starting off hardy vegetables

If kitchen garden produce is started into growth in late winter or early spring, the first harvest will be weeks ahead of

crops raised entirely outdoors. And if you can move your little treasures outside to an area protected by cloches, they will grow at the fastest possible rate.

- Sow the seeds individually, or a few at a time, in specially designed cell trays, in good quality potting compost and thin them out to individual plants when established. If necessary, pot the young plants on into 9cm pots before planting them out. Protect newly planted crops outdoors with horticultural fleece for a week or two while they harden off.

Providing continuity in food

growing Your greenhouse will enable you to extend significantly the productive year. With strawberries, for example, if you use specially designed containers with planting pockets down their sides the plants could produce fruit in May and again in November. Meanwhile, your maincrop strawberries outside will crop from late June to early August.

- Summer broccoli, sown in January, may be in production by late June and, if you sow your first runner beans in February under glass and plant them out in May, they'll crop from late June to September. Meanwhile, bean seed sown outside in late June will crop from late August to November, until deteriorating weather brings productivity to a close.



Stock

When large enough to handle, 'prick out' seedlings of crops such as tomatoes, cucumbers and marrows into 3in (7.5cm) containers, potting on as plants grow and develop

Greenhouse vegetables

A WIDE RANGE of tender vegetables can be raised in your greenhouse. Your difficult decision will not be what to grow, but what to leave out, since space is always limited, and you'll have some hard choices to make. Remember, though, that greenhouse crops are 'high maintenance' and, even with automatic watering, will need daily attention.

Tomatoes Nothing tastes quite so delicious as a fresh-picked, home-grown tomato, especially if the variety is noted for its flavour. Supermarket tomatoes, by comparison, bred for yield and shelf life, taste bland. When selecting varieties to grow at home, go for those with the best flavour, since yield is less important.

Even with modest croppers, if you grow your plants well, you'll have a surplus each year.

- There are literally hundreds of varieties, in a surprising range of sizes, shapes, flavours and colours. Tiny 'cherry' tomatoes can be eaten whole; huge beefsteak varieties can be carved up

and fried. There are dark-fleshed, rich flavoured kinds for salads and others sweet enough to accompany dessert fruits. New varieties are produced constantly, but many gardeners also like to collect old or 'heirloom' varieties.

- Grow tomatoes from seed sown in late winter in a propagator and planted out into greenhouse beds, large pots or growing bags. Alternatively, buy young plants from a nursery or garden centre. Choice is wider if you buy seed, but young plants involve less work.
- Tomatoes need good light levels, regular watering and feeding, and should be protected from excessive heat and sunlight. They will need support, either

on canes, or from strings suspended from the roof. If grown as single stemmed cordons, side shoots must be constantly removed.

Peppers, aubergines and other related crops

Tomatoes are the most widely grown tender crop, often to the exclusion of more interesting items such as chillies or aubergines. These are no more difficult to grow and have high culinary value.

- Chillies can be grown over two or three years and if looked after will develop into attractive, colourful bushes. As summer patio plants, they are useful and beautiful, but they'll need returning

to the greenhouse for winter to be kept frost-free. Chillies are best started from seed, sown either in early spring or with heat in autumn for spring production.

- Peppers and aubergines are grown in similar conditions to tomatoes. They are slightly more prone to rot diseases, however, and fruit failing to set when temperatures differ sharply between day and night. Shading the plants may be advisable during the warmest part of summer – but that is likely to benefit other greenhouse plants as well.
- More exotic greenhouse veg includes the tangy, zesty tomatillo – essential ingredient of Mexican salsa – the closely related Cape gooseberry, sweet potatoes, choko or christophine and tamarillo.



istock



istock

Tomatoes, chillies and aubergines are related and are all easily grown. Aubergines and chillies can be placed outside in summer, but crop more productively under glass in cool, wet summers

Cucumbers Second in popularity, after tomatoes, cucumbers are a little more demanding but still not difficult to grow. Nowadays, dwarf or 'lunchbox' cucumbers are more popular for amateur growers than the big commercial plants which produce those familiar, long, dark green fruits.

- The advantage they have over supermarket specimens is less to do with flavour – since all cucumbers are relatively mild, if not tasteless – but more to do with yield. If looked after, and regularly cropped, cucumber plants will provide a succession of good fruits, even when grown in a 20cm (8in) pot.



Salads, herbs and winter crops

OUT-OF-SEASON FOOD is always a pleasant bonus in the gardening year, and with a greenhouse you will be surprised and delighted at what can be grown.

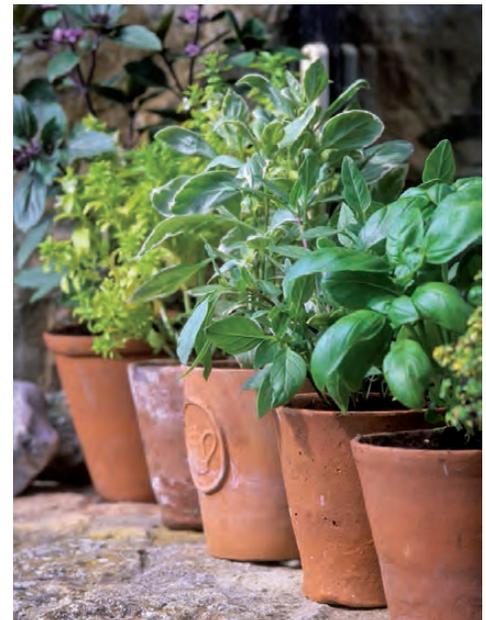
Fresh greens On greenhouse beds, after the tomato crop for example, you could grow pak choi or other Chinese greens. They mature fast and if seed is sown in cell trays in August and the crop planted out in early September you should have succulent, leaves and stems by late October.

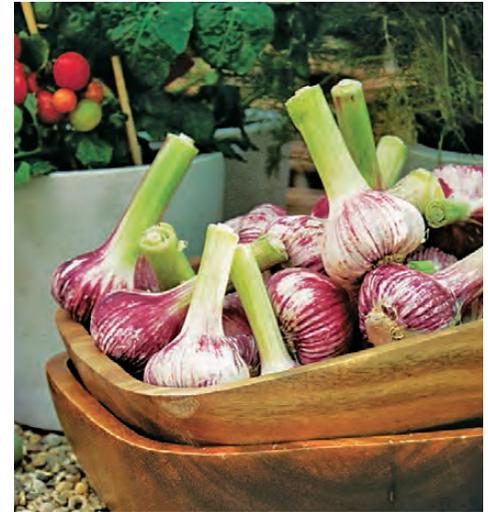
- Lettuce or rocket also grows speedily in autumn and winter, but will be less dense and more drawn up or 'leggy' than if started in spring or summer.

Salad crops such as lettuce can be grown in large pots or growing-bags if there is no border soil (left).

Basil grows more reliably and is more aromatic in a warm greenhouse (right)

If you want to improve density and crop size in winter, use Grolux lights and provide extra heat. But remember that it will result in higher energy costs and has a detrimental effect on your carbon footprint.





Other crops to try – tasty garnishes (left), succulent pak choi (centre) and piquant garlic (right)

- Most seed companies also produce mixes of 'cut and come again' salad greens. These can be harvested a little at a time, and if sown at regular intervals, will produce greenery all year round.

- Herbs** While many herbs are hardy and grown in the open garden, some herbs from subtropical regions perform more reliably in the warmer, more humid conditions of a greenhouse.
- Many others, such as sage, rosemary

and thyme can also be grown in pots in a frost-free greenhouse over winter to provide you with a continuous supply of aromatic leaves.

- Basils, of which there are more than 30 different types listed for sale in the UK, revel in warm conditions and have a range of distinctive flavours from aniseed to citrus and are used in a wide range of dishes. The additional warmth of a greenhouse will also help stimulate the production of the aromatic oils that make the taste of basil so distinctive. They are easily raised from seed or cuttings, but are easily damaged by greenfly, so treat plants as soon as these pests are seen.
- You can also experiment and raise your own lemon grass, root ginger, galangal or cardamom. All are easily grown from root divisions, which you can get from specialist greengrocers, but they will require frost-free conditions to overwinter.



Off-season new potatoes Finally, an easy crop, and fun to grow, are winter new potatoes. Between December and early February, take a large pot – minimum 25cms – fill it one quarter full of potting compost. Lay the seed potato of a variety such as 'Charlotte' or 'Rocket' on the surface and as the stems begin to grow, keep covering them with more compost until the pot is full. Support the potato plants' top-growth and, when the tubers are the size of bantam's eggs, break out the pot and harvest tasty, tender new potatoes.





Grapevines and other greenhouse fruit

IN THE DAYS of the great Victorian estates, glasshouses were used to produce all manner of off-season and exotic fruits, from figs, peaches and apricots to bunches of big, luscious grapes and even pineapples. In a small greenhouse space prohibits such extravagance, but you can grow a number of high-value fruit crops and still leave plenty of room for other plants.

Grapes The quality of grapes grown under glass in Britain is greatly superior to any harvested outdoors. Extra close attention given to your vine will reward you with superb grapes on large, well-shaped bunches.

- Ideally, the vine rootstock is planted outside, with the main stem fed through into the greenhouse. This enables the roots to quest for nutrients and water over a wider area while the remainder of the plant is cosily inside where the ripening fruit benefits from the longer, warmer growing season. But vines grown completely within a greenhouse will grow almost as well and you can even take modest crops from vines grown in large pots.

- Vines are useful for shading large greenhouses because the leaves emerge when shade is most needed, but fall when light is at a premium in the autumn. Good ventilation is essential, since vines are prone to mildew disease and need dry, fresh air to flow between their branches to prevent this. They are also much thirstier than you would

In cooler parts of the UK, grapes (above left) and nectarines (right) ripen more reliably under glass; both can be trained on wires





A Victorian favourite, peaches can be fan-trained against the wall of a lean-to glasshouse to protect early blossom from frost and help ripen fruit.

expect of a Mediterranean species and grow best in well-watered soil.

- Further study of viticulture will pay off, since pruning and training techniques can be complicated, but of all protected fruit crops the grape is the king.

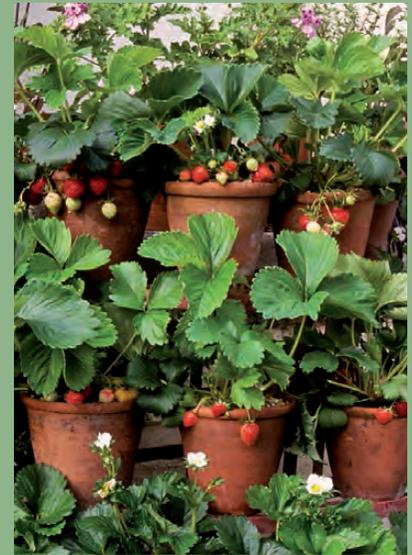
Wall fruits In lean-to greenhouses, provided their high back wall receives enough sun, fruit trees – usually fan-trained – will be amazingly productive. Peaches, nectarines, apricots and figs are the best ones to try if you have the wall area. In limited space, dwarf trees can be grown in large pots to produce more modest crops.

- In summer, such little trees can be lined up or arranged outside. Be sure to look up pruning techniques – they are too complex to go into in detail here – and to familiarise yourself with routine care procedures.

Citrus Producing your own crops of lemons, kumquats or calamondin oranges is a real possibility under glass, but the sweet-scented flowers on these evergreen trees and shrubs are reward enough. Grow lemon 'Verna', lemon/orange hybrid 'Meyer' or calamondin orange in pots, with a minimum winter temperature of 5°C.



iStock



Strawberries Strawberries are perfect for production under glass, provided you select the ideal varieties. As with tomatoes, avoid the commercially popular varieties such as 'Elsanta' that are tasteless, and go for those bred specifically for flavour, such as 'Aromel' or the old, distinctively flavoured 'Mara des Bois.'

You can grow them in pots, in growing bags, or you can suspend them in special strawberry planters so that the fruit ripens at eye-level. Strawberries also produce well and look beautiful when grown in hanging baskets.



Fruit from citrus trees, such as lemons (left), limes and calamondin oranges is possible



*‘Smooth running
will ensure best results’*

6 MAINTAINING

YOUR GREENHOUSE will do so much for you, but to make sure it lasts several decades, and to get the best possible results from all your various enterprises, it is important to maintain it as carefully as you can. Routinely look over your plants and check their health.

YOUR SUCCESS

Maintaining a healthy environment will help ensure your plants perform to their full potential

Cleaning and shading the house

STRICT HYGIENE is essential for plant health, particularly among young seedlings and unrooted cuttings which are prone to damping-off disease. In winter or during cool, humid spells of weather fungal diseases are widespread, but outbreaks are always more frequent when plant debris and weeds accumulate. A clean, tidy greenhouse is also a safer place, free of trip hazards or objects that can cause injury when carelessly located.

Sterilise the framework Pests such as red spider mites and the spores of rots such as grey mould often lurk and overwinter in cracks and crevices, such as in glazing bars or corners of staging. When growing conditions improve in spring they re-infect nearby plants.

- A thorough wash-down, using detergent, will help reduce sources of infection. To do this choose a warm, still sunny day and remove most of the plants. Also check over and individually treat any pest or disease problems.

Clean the glass Grime on glass looks unsightly, but more importantly it blocks light passing through and can harbour mould spores. Wash glass both sides with soapy water each autumn.

Tidy up plant debris Pick off any dead or damaged foliage when seen and take prompt action if you spot outbreaks of pests or diseases.



Washing your greenhouse in spring or autumn will maximise light and help control pests



Different fabrics offering degrees of shading can be installed as rollers or fixed to the frame



Shading paint is cheap, but messy to use

IN THEORY, if a greenhouse is well ventilated, with roof and side vents and multiple doors, shading would not be required, except if growing shade-loving forest plants. In reality, most greenhouses are multi-functional and modestly ventilated. On bright days temperatures can rise sharply placing plants under stress, possibly causing scorching or inhibiting pollination. Sharp swings of temperature between night and day can cause bud drop in some or early leaf fall in others. For most plants, except cacti and succulents, some form of shading during summer is required.

Paints or washes The cheapest and easiest way of creating artificial shade is to apply a special paint or wash, such as Bayer Coolglass. Although easy to apply they are semi-permanent, maintaining shade during dull weather, and need removing in autumn.

Internal blinds Although expensive, they provide shade as required, although location and use may be problematic if growing climbing plants or vines. Motorised systems with sensors enable remote control.

Shade netting A canopy of polypropylene shade netting can be erected locally for specific plants or cover the house by attaching it to the framework.



Cold frames, whether part of the greenhouse structure (left) or positioned nearby (above) offer extra space for growing or to get plants 'hardened off' – accustomed to conditions outdoors before planting them out

Expanding your growing space

THE BIGGEST PROBLEM with almost everyone's greenhouse is that ambition usually overtakes available space. Those few trays of young seedlings in February become hundreds of pots full of rapidly growing plants by April, all jostling for space. But none of them is yet tough enough to plant outdoors.

You can overcome space problems by careful planning and with ruthless selection. Regard with suspicion any plants that are not absolutely essential and if in doubt, compost them anyway. When you begin the new growing season think ahead and plan for the required expansion so that it doesn't take you by surprise. Later, if the staging still becomes too overcrowded, work up a priority list so that surplus plants can be planted out early or homes are found for them elsewhere. They'll be at risk

if moved outdoors before May, but could well get by if the weather is kind.

If you are still short of space, seriously consider extending your facilities.

Add on sections Most Hartley Botanic Greenhouses can be extended without disturbing the main structure very much. In the Wisley range, for example, you could add on a couple of extra 'panes' thereby gaining nearly 1.5m more length. The end section can be

moved down, or an extra one installed to make a two chamber building.

- Ancillary facilities** Much of the seasonal overflow from a greenhouse can cope with less comprehensive protection as it matures. Cold frames or even sheltered standing areas can therefore do much to relieve the pressure within the main house.
- Cold frames are also important for hardening off plants and crops which are due to be moved to the open garden later on. A three-week acclimatisation period in a frame will accustom them to harsher conditions.
 - Cold frames are also valuable for a variety of other uses.
 - ▶ You can raise hardy perennials, shrubs and trees from seed, sown in pans, in a frame.
 - ▶ Marginally hardy succulents, bulbs and other plants can derive a little extra winter protection, if put in



Additional greenhouses provide the opportunity to grow particular types of ornamental and food plants that require specific conditions

frames for safe keeping.

- ▶ During the growing season you can use the same frames for growing semi-protected crops such as ridge cucumbers, melons, strawberries or speedy spring and autumn salads.
- ▶ Frames are useful for propagating ripe or semi-ripe woody cuttings, taken in the autumn.
- A free-standing area that is sheltered is also valuable. Plants grouped in such a spot can be given extra attention and, if they are all together they will be easier to manage during this vulnerable period.

Consider a second greenhouse

If you still lack space or want to grow plants requiring exacting conditions you might consider a second greenhouse. One house could be heated, the other not, or one could consist of staging, the other, beds. You could establish a display house, while the other is being used to raise new plants for later use.



Grow safely

- However well-constructed and watertight, a greenhouse will inevitably have damp places. Water will run through staging and shelves to the ground below during routine watering; condensation will drip from overhead panes and in a greenhouse with beds, the soil will be constantly damp. All electrical appliances must, therefore, be correctly protected with earth trip mechanisms and all plugs or joins should be fully protected.
- Electrical fittings such as switches and sockets must be fully waterproof and should be installed and certified by a qualified electrician.
- Where bottled gas is used, storage cylinders should be sited safely, outside, with correctly installed pipes or hoses to connect them. If paraffin or gas is used for heat, adequate

Position electrical equipment safely, unlike here (left). Your electricity supply should always be installed with an RCD (Residual Current Device)

ventilation is also essential, especially if the greenhouse is well insulated.

- Obvious as it may seem, it is all too easy to create hazards and potential trip points. Shelves, for example, if they are installed above staging, may be at head-height.
- Fan heaters, if installed near the roof ridge – as often recommended for optimum air movement – could also be hazardous and should not be sited where they can be bumped into. All wires and cables should be neatly stowed away and armoured mains cable should be buried out of harm's way.
- A greenhouse itself can be a hazard – and is highly vulnerable – if vehicles pass nearby, or if children play in the area. To avoid accidental impact you may need to cordon off your greenhouse with posts, fences, hedges, or with attractive planting.



Garden chemicals - friends or foes?

HOWEVER WELL you manage your greenhouse and garden you will be troubled from time to time by pests and diseases. Many gardeners adopt the orthodoxy of organic gardening, where most, but not all, chemicals – and certain practices – are excluded. Others prefer to apply the most effective commercial remedy available to solve their problems. How you grow and care for your plants is entirely up to you, but different techniques will vary in their effectiveness. Although you will doubtless make a few mistakes this will arm you with valuable experience for the future.

Almost all gardeners, whether they use organic methods or not, will be concerned about the environment and will want to adopt the least damaging practices.

Purely organic Organic principles are widely understood and adopted by a good many gardeners. Running your greenhouse as part of an organic regime requires very little sacrifice. If your management is good, your hygiene meticulous, and the growing conditions are favourable, it should be possible to keep the worst pests at bay by using biological or mechanical methods, or by using approved pesticides such as soft soap. The bacterium *Bacillus thuringiacus* will control a large range of invertebrates (including some non-harmful ones).

Chemical fertilisers are frowned upon by organic gardeners, so it is important to check that all liquid feeds, including inorganic sources of trace elements, are excluded unless derived from a purely 'natural' source such as seaweed.

Integrated pest management

This is a non-organic method, originally developed for agriculture, which aims to apply pesticides judiciously and only when absolutely necessary. In a greenhouse that means controlling common pests such as whitefly, vine weevil or red spider mite, as far as possible by using good management, but by applying proprietary pesticides such as thiacloprid (sold in garden centres as Provado) when absolutely necessary. It is essential to follow the



Photo by Ward Stepmann, BCP Centre

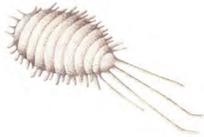
This minute *Encarsia* wasp will parasitise the whitefly and help control it

manufacturers' instructions closely when using any garden pesticides.

Biological control Using one creature to destroy another can be an effective means of controlling some pests and also has the blessing of the Organic movement. There are mites and microscopic wasps for controlling whitefly and red spider, and toxic nematodes for killing slugs and vine weevils. Most products can only be used on growing plants or in conditions warm enough to sustain the predators. If using biological control you cannot use insecticides, as these will destroy the predators as well as pests.



Lily beetle
— 8mm



Mealy bug
= 2-4mm



Red spider mite
. 0.5mm



Soft scale insect
= 2-6mm



Thrips
= 1-2mm



Vine weevil
— 9mm



Vine weevil grub
— 10mm



Whitefly
= 1.5mm



Woolly aphid
= 1-2mm

Controlling common pests

SOME PESTS such as slugs and snails live in the garden but will eventually sneak into your greenhouse, while others may be imported on plants you may buy or be given. Constantly check your plants looking for signs of attack and then deal with the culprits swiftly, using your preferred method of control.

The most troublesome greenhouse pests are:

- Red spider mite, found on leaf undersides where a fine web develops
- Whitefly, tiny, pure-white insects, fly up from plants when disturbed
- Vine weevil; the larvae are soil-borne and devour roots, particularly of cyclamen, fuchsias and primulas
- Aphids, the familiar sap-sucking greenfly and blackfly, cluster on new growth
- Thrips (thunder flies) are tiny insects that eat young plant tissue, including flower petals
- Mealy bug, white, sap-sucking pests, leave sticky deposits where they feed.

Prevention is better than cure

- To suppress red spider mite, damp the glasshouse down regularly during summer to raise humidity. Also, try to avoid growing susceptible plants, unless you really love to grow them.

- Keep whitefly numbers down by suspending yellow adhesive strips above the plants. The insects are attracted to the colour and become attached.
- Vine weevil are hard to detect but keep a lookout for the adults, which are grey beetles, about nine millimetres long, and have a distinctive snout. They feed at night, nibbling notches around the edges of leaves.
- A resident toad in your greenhouse can provide company on lonely afternoons – though the conversation might be a little one-sided – and will also help to keep the slug population down.

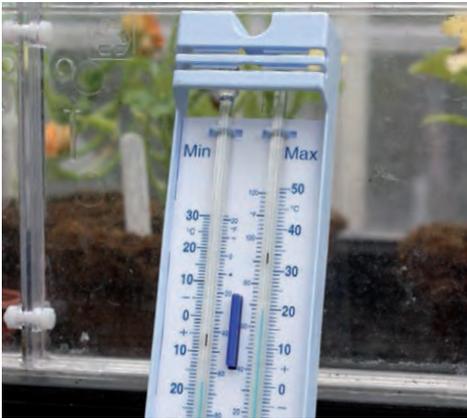


Leaf miner (makes tunnels inside leaves)
= 1-8mm

Troubleshooting

HERE ARE some common problems which might trouble you.

- **Can't set the desired temperature on the heater.** Use a maximum-minimum thermometer to record night minimum temperatures, and to give current ambient temperature. Pick a moment when the ambient greenhouse temperature is about right for a night's minimum – probably evening or early morning, when it's cold outside - and adjust your heater control until it just clicks on at this temperature. Repeat this over several days, recording night time readings, until you've struck the right balance. Any temperature below



A maximum-minimum thermometer will record daily fluctuations in temperature

about 4°C is dangerous for tender plants since sharp frost could cause an overnight dip to freezing.

- **Automatic vents not opening or opening too much.** Adjust their sensitivity by using the thumb screws. This, too, will need adjustment over several days before you strike the right balance and, as with the heater, a thermometer might be handy.
 - **Propagation bench is too cool.** Your soil-warming cable may be inadequate for the heated area. Remove the growing medium, re-lay the cable over a smaller area, or install further cable.
 - **Plants not growing and looking stressed in winter.** If leaves are yellowing, or plants are shedding leaves or if they are simply withering, check that overnight temperatures are not too low. Check, also, that you are not over-watering, causing roots to rot.
 - **Plants going mouldy.** Increase ventilation. On sunny days in winter open the door for a while to allow fresh air in. Clean up any grey mould
- and pick off affected leaves and stems.
- **Plants on slatted staging drying out (above).** Evaporation rates are high with slatted staging and that will not suit thirsty plant types. Gravel trays, laid on top of the staging and filled with moistened horticultural grit will make a good base for plant pots and will reduce evaporation and boost humidity. Alternatively, fit the trays with capillary matting, perhaps also installing an automatic watering system.
 - **Seedlings and young plants growing leggy.** This is caused by inadequate light. Make sure all shading is removed. Sow a little later in spring for better light, or consider installing growing lights if your greenhouse is in a shaded spot.



Books & societies

THE BEST WAY to hone your expertise is to enjoy using your greenhouse, learning as you grow. If you need further information the following books will help.

- ***The Greenhouse Gardener*** Anne & John Swithinbank, Frances Lincoln 2006. Sound general guide to the world of greenhouse gardening.
- ***How to Garden: Greenhouse Gardening*** Alan Titchmarsh, BBC Books 2010. An inexpensive guide suitable for beginners and more experienced growers covering topics from installation to planning the greenhouse year.
- ***The Greenhouse Expert*** Dr D G Hessayon 1994. Excellent and modestly priced guide for the novice.
- ***Growing Under Glass*** Kenneth A Beckett, RHS/Mitchell Beazley Practical Garden Guides series. Third edition 1999. An excellent practical guide covering what to grow in different temperature regimes. Good glossary of terms.
- ***The RHS Plant Finder***. Royal Horticultural Society. Published annually. A directory listing more than 70,000 garden plants, including glasshouse plants and sources of supply. (Online marketing sites such as e-Bay are also a useful way to find elusive plants.)

Specialist societies

Several plant societies specialise in greenhouse plants. Contact them through their websites or representatives.

- ***Alpine Garden Society***
www.alpinegardensociety.net
- ***British Cactus and Succulent Society***
www.bcsc.org.uk
- ***The British Fuchsia Society***
www.thebfs.org.uk
- ***Carnivorous Plant Society***
www.thecps.org.uk
- ***The National Begonia Society***
www.national-begonia-society.co.uk
- ***Orchid Society of Great Britain***
www.orchid-society-gb.org.uk
- ***The Pelargonium and Geranium Society***
www.thepags.org.uk
- ***Royal Horticultural Society***
www.rhs.org.uk



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