



## *Garden practice*

# Hardening off

Young plants raised in a warm, protected environment need time to acclimatise to outdoor conditions. What are the best ways to treat them?

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*‘Hardening off’* is the process of acclimatising plants grown indoors, in a protected environment, until they become robust enough to flourish outdoors. It is a gradual process, during which plants modify their physiology to survive the vagaries of an outdoor life. Leaves become thicker and waxier; and growth slows and is tougher.

Bedding plants, ornamental or vegetable seedlings propagated under glass in spring, and tender or half-hardy plants that have been given winter protection all need hardening off. However, this does not make half-hardy plants frost resistant.

Hardening off takes two to three weeks, depending on plant type, the temperatures at which it grew under protection, and the garden's location. Hardy plants are quicker to acclimatise than half-hardy or tender plants. Ideally, transfer plants from heated to cooler conditions on a cloudy day, or cover with newspaper or fleece initially to avoid scorching or wilting.

Timing is critical: tender plants should not be planted out until after the last frost in your area. Listen to weather forecasts and have temporary protection, such as cloches, fleece or newspaper, ready should late frosts occur.

Hardening-off techniques depend on the facilities available. Plants raised in a heated glasshouse or on windowsills ideally should be moved into a cold glasshouse for two weeks, then into a well-ventilated cold frame for a final week. If you do not have a glasshouse, move plants into a cold frame. Open it a little during the day and close it at night, increasing ventilation gradually over time. Remove the cover a few days before planting. Cover cold frames with carpet or hessian if late frost is forecast.

If you do not have a cold frame, place plants at the base of a sheltered, south-facing wall or hedge, or other sheltered position during the day, initially protected by two layers of fleece. In the first week, bring plants indoors at night, and use a single layer of fleece for the first part of week two. After about 10 days, depending on the weather, remove the fleece during the day and leave plants outdoors at night if mild. Leave them uncovered towards the end of the third week, before finally planting out. ●

## Before planting out

Help indoor-raised plants acclimatise to outdoor conditions by gently exposing them to lower temperatures and increased ventilation



### Ventilated glasshouses

Permanent structures, with excellent light levels, good ventilation and temperature control. Suitable for most plants and stages of growth, especially larger individuals.

**Advantages:** ideal for large numbers of plants, with several levels of storage space; good access for watering and maintenance. Shading is easy to provide on this scale.

**Disadvantages:** it can be difficult to provide an ideal hardening-off habitat if other plants are being grown in the same space and need different conditions. Vigilance is needed to avoid draughts and temperature extremes.



### Cold frames

Unheated, box-like structures, with brick, glass or wooden sides and a clear, hinged or removable cover (the 'light'). Ideal for smaller plants in pots, trays or modules.

**Advantages:** suitable for smaller gardens; versatile (use also for early vegetable crops). Glass-sided frames let in more light; brick frames are warmer and more draught proof.

**Disadvantages:** Temperature control can be difficult as frames may heat up rapidly; space is limited (so unsuitable for tall plants). Lightweight aluminium frames with 'lights' open can be damaged by strong winds.



### Using fleece (by a warm wall)

Lightweight and permeable, horticultural fleece provides shade and shelter. Placing plants under fleece next to a warm wall offers shelter and radiated heat. Ideal for hardening off larger plants in trays or pots.

**Advantages:** fleece is lightweight, cheap, can be cut or folded to size; requires little storage space. South-facing walls are a free source of radiated heat.

**Disadvantages:** Fleece needs securing firmly; has a limited life span; and can tear unless handled carefully. As south-facing walls are desirable for planting, space may be limited.

## After planting out

If space is short, plant out young vegetables and bedding plants in fine weather and give them extra protection for a few days



### Mini tunnels

Lightweight covers made from rigid or flexible plastic or polythene, in a range of styles such as barn or tunnel cloches. Ideal for protecting blocks or rows of vegetables from chill wind and rain while maintaining humidity and temperature.

**Advantages:** polythene tunnels are inexpensive and adaptable; rigid tunnels are light and easy to move; they prevent young plants from desiccating.

**Disadvantages:** Require storage space; watering may be difficult, polythene is easy damaged; cloches can be short lived and some are awkward to dismantle. With some designs ventilation may be poor or inadequate.



### Bell cloches

Lightweight, curved cloches that protect plants from wind and rain, raise air and soil temperatures around the plant and allow in light from all angles. They should remain in place for several days until temperatures rise. Larger cloches are ideal for outdoor crops such as tomatoes, aubergines or courgettes. Individual cloches for small plants are simple to make – just remove the base from plastic bottles.

**Advantages:** curved sides prevent water from dripping onto the crops; suitable for individual plants; aesthetically pleasing.

**Disadvantages:** limited in size and height; only suitable for single plants. Little control over ventilation.



### Horticultural fleece

Lightweight, usually flexible sheet of woven fibres, which lifts up as plants grow. Using a double layer provides some useful frost protection while allowing light and water to penetrate. As plants become more accustomed to being in the ground, reduce to a single layer. Best used over large areas, or along rows over crops such as bedding plants and vegetables.

**Advantages:** Lightweight, covers large areas with ease; provides good protection from the wind and also from pests such as flea beetle and birds; permeability reduces the need to water.

**Disadvantages:** Needs weighing down securely; can become dirty and unsightly; difficult to apply in windy, adverse weather.

## Gentle steps or single shock?

**Guy Barter**, RHS Chief Horticultural Advisor, says that gardeners with good nerves could set some plants straight out



RHS / BOB MARTIN

There will be a slowdown in growth when plants are exposed to stress. Hardy plants can protect themselves from cold, so a brief hardening period (no more than 10 days, often as little as five) is sufficient. Prolonged hardening off causes more harm than good; some research suggests there is no difference between setting plants straight out or hardening off – if you have the nerve you might like to try this.

Tender plants, however, can be damaged if hardened off at temperatures below about

12°C (54°F), so do not plant these out until the risk of temperatures below about 10°C (50°F) has passed. Soft, sappy tomatoes are known to benefit from acclimatisation to dry air and wind, but not cold, before planting out.

Cold-stressed tomatoes develop a purple tinge, peppers and aubergines go grey, sweet corn leaves bleach while those of courgette and other cucurbits may crisp. Do not harden off or plant these crops out while the weather is cold enough to cause such damage.

❖ **Cold-tolerant ornamental bedding** is

raised in higher temperatures than vegetable seedlings, so needs less rigorous hardening. Plant out a bit later than vegetable seedlings, hardening off at 10–12°C (50–54°F): *Alyssum*, *Antirrhinum*; *Calendula*; bedding fuchsia, dahlia, and lobelia; *Petunia*; *Tagetes*.

❖ **Cold-sensitive bedding** should be planted out only when night temperatures no longer fall below 10°C (50°F), and are around 14–16°C (57–61°F) during the day: *Pelargonium*, *Begonia*, *Impatiens*, *Canna*, *Ipomoea*, tender fuchsia.

❖ **Cold-tolerant (hardy) vegetables** need only brief hardening off at around 10°C (50°F).

❖ **Cold-sensitive vegetables** are not planted out if temperatures are falling below 10°C (50°F): pepper, squash, pumpkin, tomato, courgette, aubergine, sweet corn, sweet potato.