

# LANDSCAPE PLANNING

Practical Techniques for the Home Gardener

The online companion to the book

## ARTICLE

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Seeds of perennial plants are ingenious creations of packaging and timing.

### Garden Science:

#### Perennial Seed Germination

**Seeds of perennial plants are ingenious creations of packaging and timing. Each seed contains a living embryo, a chemical time clock and a bundle of genetic information evolved over thousands of years. Even in their dry and dormant state, perennials seeds are taking in oxygen, giving off carbon dioxide and waiting for just the right sequence of conditioning events to trigger germination.**

The embryo slumbers deep within the seed, sustained by nourishment drawn from the surrounding fleshy carbohydrate endosperm within the seed coat. The seed's chemical clock ensures that germination takes place in circumstances that will favour successful seedlings. The clock mechanism is actually one or more germination inhibitors, which can be both chemical and physical. For example, the most common physical inhibitor is the testa, or seed coat, which is an impermeable covering that must be gradually softened and eroded before moisture can trigger germination within the embryo. The seed coat can also contain coumarin, a growth-inhibiting chemical (with a scent like fresh mown hay) that helps prevent premature germination. Seed coats in contact with moist soil for weeks or months will leach away coumarin while being slowly degraded by bacteria and fungi, until the tissue is thinned and moisture is able to enter.

Seeds with more complex chemical growth inhibitors produced in the embryo prevent germination in vulnerable circumstances, such as the temporary warmth of a mid-winter thaw. Embryos manufacture abscisic acid, a growth-suppressing chemical that maintains dormancy through a series of warm and cold cycles. Eventually the chemical timeclock causes production of abscisic acid to decline in anticipation of spring, and the embryo begins producing gibberellins and cytokinins, growth hormones (sometimes called auxins) that will break dormancy and spur germination in the correct season.

Chemical growth inhibitors require a combination of time and temperature sequences before germination can proceed. Many perennial seeds, including primrose (*Primula* spp.), columbine (*Aquilegia* spp.), globeflower (*Trollius* spp.), monkshood (*Aconitum* spp.), Penstemon, garden phlox (*Phlox paniculata*) and turtlehead (*Chelone* spp.), have simple chemical inhibitors requiring only a moist cold period (called stratification) to trigger germination. These seeds fall to the ground in autumn, lie in the soil over winter and germinate in spring. Other seeds, peonies for instance, are more complicated, requiring firstly a period of several weeks of moist warmth, followed by stratification, before finally germinating in another moist, warm period. (Trillium seeds need two years of alternating warm and cold periods before germinating.)

Light is also a factor in germination. Balloon flower (*Platycodon grandiflorus*) and shasta daisies

(*Leucanthemum x superbum* syn. *Chrysanthemum x superbum*) require light to germinate and shouldn't have their seeds covered, while some, such as delphiniums and violets, require darkness and should be covered with ½ inch of soil.

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