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8.1.1??Dormancy: the phenomenon of suspended animation

Most plants enter a state of latent life at least once throughout their life cycle. This is dormancy, concisely de?ned as 'the temporary suspension of visible growth of any plant structure containing a meristem' (Lang 1987). It encompasses a wide-spread but remarkable phenomenon and is really a collective term covering a number of processes in different plant organs. This has led to problems with terminology, which Lang resolves into three types of dormancy based on their controlling factors:

1. Endodormancy, often called 'true' dormancy, which is the prevention of growth due to factors within a meristem. Failure of a bud to grow in early winter due to insuf?cient chilling, even if it is exposed to warm conditions, is an example of endodormancy.
2. Paradormancy, which is the suspension of growth caused by factors outside the meristem but within the plant. It is typically an influence of one organ over another, and includes an apical bud preventing outgrowth of a lower bud, which relates to apical dominance (see Martin 1987 for review). Dormancy imposed by factors in the seed coat is, strictly speaking, a version of paradormancy, because the embryo germinates readily when excised from the seed.
3. Ecodormancy, which is the prevention of growth due to environmental conditions such as lack of water or temperature extremes. This is also referred to as quiescence or imposed dormancy (Crabbe 1994).

These de?nitions are tailored towards woody perennials, but we are also interested in equivalent phenomena in seeds and vegetative storage organs. Indeed there are underlying similarities, for example in endodormancy release induced by chilling. A dormant bud on a perennial contains reduced leaves and floral and/or vegetative meristems, and relies on the rest of the plant for water and nutrients. A storage organ, such as a bulb or tuber, is also a plant propagule containing meristems (Figure 7.17e) and its own reserves of nutrients. Likewise, a seed contains a whole plant — the embryo — and associated storage reserves. Resumption of bud growth leads to shoot emergence through the bud scales, and seed germi-nation results in radicle then shoot emergence through a protective seed coat. These morphological differences may require variations in the physiological control of dormancy.

Why is dormancy important in agriculture?

Plants are generally adapted to their natural environments but many economically important species are cultivated in other climates. Adaptations are genetically based and may be impossible to switch off, or at least dif?cult to overcome. Temperate fruit trees, such as peaches, eventually become endodormant even in the tropics. Without chilling or human intervention, they do not resume normal growth and may even die. Generally, though, plants will eventually dispense with dormancy-breaking requirements rather than die, often described as a conversion from an obligate to a facultative state. Although tropical perennials cannot tolerate cold temperate winters, they still exhibit endodormancy phases which alternate with dramatic ‘flushing’ of new vegetative shoots, often with striking red-coloured leaves, as in *Syzygium* and mango trees. Dormancy may also prevent or retard seed germination or sprouting of bulbs, thus reducing the number, quality and uniformity of plants in a crop.
