

Botanical Words for April 2022: Seed Dormancy and Germination

Most of us are busy starting seeds so it seems like a good time to look at a variety of botanical terms associated with the germination process.

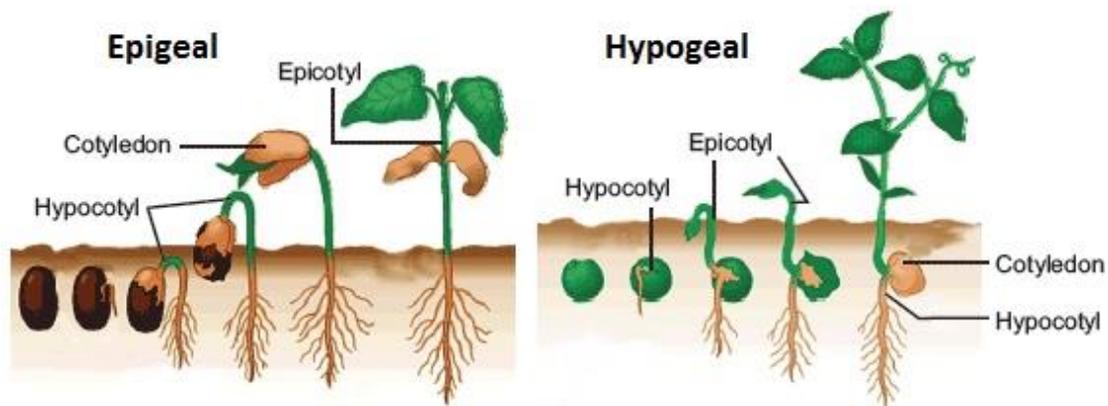
True dormancy is an evolutionary adaptation that prevents seeds from germinating during the wrong season. Breaking **physical dormancy** requires **scarification**, the process where the seed coat or **testa** is etched and damaged thus weakening it. Breaking **physiological dormancy** requires **stratification** where seeds are exposed to cold and/or warm temperatures and moisture. This helps soften the seed coat and wash away any internal germination-inhibiting chemicals, such as the plant hormone **abscisic acid**, contained within the embryo or endosperm. Seeds moving out of true dormancy transition into **quiescence**, a resting state where the embryo remains unable to germinate until favourable conditions – light, temperature and moisture – occur.

Seeds germinate in two different ways. In **epigeal germination**, the **cotyledons** (seed leaves) rise above the soil surface, protecting the growing shoot tip of the plant. Once above the soil, cotyledons access carbon dioxide and sunlight allowing photosynthesis to occur. Exposed cotyledons are at risk from grazing, frost, or other environmental damage. Consequently, seedlings produce true leaves and grow quickly enabling young roots to obtain nutrients from the soil. Most **dicots** (plants with two cotyledons) exhibit epigeal germination.



Broccoli (*Brassica oleracea* var. *italica*) seedlings showing epigeal germination – the heart-shaped cotyledons are visible above the soil and small, true leaves can be seen emerging between them. Image Credit: E. Rude.

Plants that employ **hypogeal germination** have cotyledons that remain below ground. Most **monocots** (plants with one cotyledon), and some **dicots**, exhibit hypogeal germination. Often, the cotyledons are fleshy and contain abundant nutrients. With hypogeal germination there is less risk of damage from frost or grazing as nutrients for developing seedlings are stored underground. Some monocots develop a protective leafy sheath called a **coleoptile**, which protects the growing shoot tip as it moves upward through the soil. Grasses and corn fall into this category and are considered more evolutionarily advanced as little energy is expended on flowering.



In epigeal germination, cotyledons rise above the soil. In hypogeal germination, cotyledons remain below the soil.
Image Credit: Plant Science 4U.