

## **The ecological significance of physical dormancy: from conundrum to clarity**

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### **Abstract**

Impermeable seed/fruit coat, i.e., physical dormancy (PY) occurring in seeds of many-but not all- genera of 19 angiosperm plant families, has been traditionally viewed as a dormancy that regulates germination timing. However, several conundrums exist, from evolutionary origin to contemporary function. In addition, a few recent studies showed that PY is a redundant trait in the tropics; consequently, species with water-impermeable coats occur (only) in temperate ecosystems, and the species in the tropics select physiological dormancy (PD) as an adaptive strategy. In this work, an attempt is made to show that 1) climate drying acted as the evolutionary driver for the evolution of PY; 2) other factors including fire, crypsis, endozoochory, and protection during persistence (both from deterioration and against microbial attack) act only on a small proportion of the seeds, thus seasonal temperatures are more meaningful dormancy-breaking cue; 3) sub-dividing PY is plausible; 4) primary dormancy is not a requirement for the induction of secondary dormancy, i.e., non-dormant seeds can become impermeable after dispersal; 5) how moisture content regulates onset and breaking of PY; and 6) PY is more dominant in tropics and species tend to select PD when we move away from the equator.