

Dormancy and cold hardiness in temperate woody plants
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Temperate woody plants undergo seasonal changes during their annual life cycle. These plants develop winter dormancy (rest) prior to the onset of sub-freezing temperatures. Researchers consider this a necessary prerequisite for achieving complete cold acclimation and increased resistance to adverse environmental conditions.

Dormancy generally will be induced by short daylength or low temperatures in temperate woody plants. At the end of the summer, the growth will cease and buds will set depending on their original provenances. The first phase of dormancy is referred to as correlative inhibition when the terminal bud inhibits the growth of lateral buds. This means if the terminal buds are removed, the lateral buds will start to grow. After this phase, temperate woody plants enter their rest period which means by removing terminal buds, the lateral buds will not grow. Overcoming the rest period in temperate woody plants depends on their chilling requirement. The amount of chilling required is species specific and genetically controlled. Woody plants which satisfy their chilling requirement thereafter enter the quiescence phase of dormancy. Their release from quiescence is dependent on warm temperature. We have shown that any near-lethal (sub-lethal) stress is able to break the rest period in woody plants and subject them to injury at post-low temperature environment.

Cold hardiness is the ability of plants to survive subfreezing temperatures or is the seasonal transition of plant hardiness from tender to hardy condition. Temperate woody plants first develop cold hardiness (cold acclimation) by responding to short days and warm temperature, second to low temperatures and third the subfreezing temperatures. These three stages are believed to be necessary for complete cold hardiness development in temperate woody plants. The mechanism of low temperate survival in plants is complex. Many plants are able to supercool water to -40° F in their tissues to avoid freezing and survive the harsh winters.