

**MORPHOLOGICAL TRAIT AND BIOCHEMICAL EFFECT ON  
SEED DESICCATION TOLERANCE**

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## ABSTRACT

### MORPHOLOGICAL TRAIT AND BIOCHEMICAL EFFECT ON SEED DESICCATION TOLERANCE

Seed desiccation is referring to drying process or removing water from the seed. This process carries various benefits to humankind such as for future storage, genetic preservation, seed bank production and to minimize usage of space. The seed response towards desiccation process is classified into three types based on storage behavior. They are the recalcitrant, orthodox and intermediate seeds. Morphological (seed size, seed coat ratio and seed being in juicy and fleshy fruit etc.) and ecological (origin of seed) factors are of significant importance in influencing the survival rate of seed during desiccation. Besides, seed physiology also plays a role in its desiccation tolerance. Seed that naturally survives desiccation is orthodox seed whereby it undergoes maturation drying that causes vacuole volume reduced followed by metabolic shutdown and sometimes, de-differentiation also happens. This situation causes oxidative stress due to imbalance between reactive oxygen species (ROS) and antioxidant enzyme but the amount of sugar and protein in the desiccating seed is able to act as a protective mechanism to prevent damage of the seed. This mechanism is triggered by water stress that naturally happens in the orthodox seed. The amount of antioxidant is also found at high levels in some orthodox seeds. Unlike orthodox seed, recalcitrant seed is developed and shed at high moisture content which makes it remain metabolically active. This seed also does not undergo maturation drying at the end of seed development. Thus, it becomes sensitive to the postharvest desiccation. Recalcitrant seed also has some amount of sugars and proteins but they cannot act as a protective mechanism. Intermediate seed is a seed that is more tolerant to desiccation than recalcitrant but not at lower temperature and extreme desiccation levels. In other word, intermediate seed has characteristics in between orthodox seed and recalcitrant seed.

*Keywords: Seed storage, recalcitrant seed, orthodox seed, intermediate seed, maturation drying, reactive oxygen species*