

贮藏条件对解除休眠水曲柳种子生理特性的影响

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摘要:【目的】探究贮藏期间水曲柳种子生理指标的变化规律, 为水曲柳种子短期干燥贮藏提供理论依据。【方法】以贮藏在 -20°C 和室温($25^{\circ}\text{C}\pm 2^{\circ}\text{C}$)下的含水量 14%水曲柳种子为材料, 分别测定种子的电导率、丙二醛、抗氧化酶活性和内源激素含量, 选择萌发表现最稳定的含水量 7%种子在 -20°C 贮藏处理作为对照。【结果】含水量 14%种子在室温下的电导率始终高于其他处理, 0 d~180 d 时 MDA 含量持续升至 4.60 mmol/L, SOD 活性呈“S”型变化, GA_3/ABA 和 AsA 含量在 30 d~180 d 逐渐升高; 含水量 14%种子在 -20°C 下贮藏 90 d~180 d 时 MDA 含量显著下降 19%, SOD 活性和 GA_3/ABA 缓慢降低。在 -20°C 条件下, 含水量 7%和 14%种子的电导率、POD 活性、CAT 活性、IAA/ABA 和 AsA 含量变化规律一致, ZT/ABA 呈相反的变化规律。各贮藏阶段, 种子的 SOD 活性与 ZT/ABA 之间呈显著正相关, POD 活性差值与发芽率差值呈显著正相关, ZT/ABA 和 GA_3/ABA 之间呈正相关。【结论】含水量 14%水曲柳种子在室温下的活力减弱不会引起 GA_3/ABA 下降, 可能与种子细胞膜透性增加和 MDA 积累有关, 含水量 14%种子在低温下保持高活力可能通过 ZT 与 SOD 之间协同作用。

关键词: 水曲柳; 种子; 干燥贮藏; 酶活性; 内源激素

Abstract: 【Objective】To study the changes of physiological indexes of *Fraxinus mandshurica* seeds during storage, and to provide theoretical basis for short-term drying storage of *F. mandshurica* seeds. 【Method】The electrical conductivity, malondialdehyde, antioxidant enzyme activity and endogenous hormone contents of 14% *F. mandshurica* seeds stored at -20°C and room temperature ($25^{\circ}\text{C}\pm 2^{\circ}\text{C}$) were determined, respectively. The 7% seeds with the most stable germination performance were selected as the control. 【Result】The conductivity of 14% water content seeds at room temperature was always higher than that of other treatments, MDA content continued to rise to 4.60 mmol/L from 0 d to 180 d, SOD activity showed an "S" type change, and GA_3/ABA and AsA content gradually increased from 30 d to 180 d. When seeds were stored at -20°C for 90 to 180 days, MDA content decreased significantly by 19%, SOD activity and GA_3/ABA decreased slowly. At -20°C , the electrical conductivity, POD activity, CAT activity, IAA/ABA and AsA contents of 7% and 14% water content seeds showed the same changes, while ZT/ABA showed opposite changes. SOD activity was positively correlated with ZT/ABA, POD activity difference was positively correlated with germination rate difference, and ZT/ABA and GA_3/ABA were positively correlated. 【Conclusion】The decreased activity of 14% water content seeds at room temperature does not cause the decrease of GA_3/ABA , which may be related to the increase of seed cell membrane permeability and MDA accumulation. The high activity of 14% water content seeds at low temperature may be through the synergistic interaction between ZT and SOD.