Abstract

Priming offers an effective means to raise seed performance in fresh seeds of sweet corn (*Zea mays* L.) hybrid carrying mutated shrunken-2 (sh-2) genes. However, primed sh-2 seeds generally have poorer longevity than non-primed seeds. The effects and mechanisms of priming on sh-2 seed longevity remain unclear. This study evaluates the effects of partial vacuum storage on longevity and free radical processing systems of primed sh-2 seeds. Priming was achieved by mixing the seeds with moist vermiculite and incubation at 15 or 20 °C for 36 h, followed by air-drying to the original moisture level. Primed seeds were vacuum-packed and stored at 25 °C for up to 12 months. Priming improved seedling emergence, reduced lipid peroxidation and enhanced antioxidative systems prior to storage. The longevity of 20 °C-primed seeds was decreased considerably in comparison with non-primed seeds when they were stored under non-vacuum conditions for 12 months. In contrast, 15 °C-primed seeds showed higher viability and vigor than non-primed control seeds when they were stored under non-vacuum conditions. Partial vacuum storage proved useful in extending the longevity of 15 °C-primed seeds for up to 12 months. The improved longevity was related to the decreased free radicals-mediated peroxidative responses. Partial vacuum improved seed vigor (e.g., the emergence percentage, the shortened mean emergence time and the increased seedling growth) were related to the reduced free radical-mediated peroxidation.