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Response of germination rate to cryopreservation of onion (*Allium cepa* L.) seeds with variable initial moisture contents and viabilities

Young-yi Lee[1]*, Jung-yoon Yi[1], Eun-ho Son[1] and Hong-jae Park[1]

[1]National Institute of Agricultural Sciences, RDA, Republic of Korea

[Introduction]

Onion (*Allium cepa* L.) seeds are known as short-lived seeds which have poor longevity and lose viability rapidly under sub-tropical condition.

Cryopreservation, the storage of viable cells, tissues, organs, and organisms at ultralow temperatures, usually in liquid nitrogen (LN), has successfully preserved various plant species (Bajaj 1995, Engelmann 2004, Benson 2008, Reed 2008). The physiological state of germplasm before cryobanking has important implications for its long-term stability and viability (Benson 2008). In this study, cryogenic storage using liquid nitrogen (LN) was applied to preservation of onion (*Allium cepa* L.) seeds.

[Materials and Methods]

10 accessions of onion (*Allium cepa* L.) seeds in which initial seed moisture contents (IMC) were ranged on 4～12% were plunged into liquid nitrogen (LN) for liquid phase of cryopreservation treatment or placed with base of LN for vapor phase treatment.

Germination rate of onion seeds was examined according to ISTA (International seed testing association). Seeds were bedded top of paper and incubated at 20/15 (day/night) °C for 12 days. First check was performed after 6 days of incubation and final check was done after 21 days of incubating.

For variable level of initial seed viabilities accelerate aging treatment was applied using condition of 45 °C degree and 98 % of RH.

[Results and Discussions]

The onion seeds of 10 accessions were cryopreserved in liquid (-196°C) or vapor (-180°C) phase of LN tank for 1 day with variable seed moisture contents (SMC) and germination rates (GR) using accelerated aging treatment for 5 days then examined GR. The initial moisture content (IMC) and germination rate (IGR) of seeds were regulated to range of 4～12 % and 65.3～98.7 %, respectively. Measurements showed that the GR of onion seeds after cryopreservation had no drastic decrease even in low initial viabilities except 3 accessions. In 3 accessions, the GR was decreased within 5% of IGR after seed cryopreservation of vapor phase. Almost seeds with 4～6% of IMC showed good storability as GR after cryopreservation of liquid phase and consequent thawing at the room temperature. Accelerated aging (AA) treatment (45°C, 95% RH) was applied to seeds for control level of IGR before cryopreservation. Variable level of IGR showed no significant change after cryopreservation while AA treatment decreased seed viability in different degrees with varieties.

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*Corresponding author: Tel. +82-31-299-1804, E-mail. youngyi@korea.kr