

## Effects of Temperature Regimes for Storage of Ginseng Seeds during Cold-stratification for Spring Sowing

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Spring sowing of ginseng seeds often results in failure of seedling establishment. Storage condition during winter, sowing time, and seed treatment might effect on germination. Here we tested effects of temperature regimes of seed storage on spring sowing. Dehisced wet or dry ginseng seeds were stored at 2°C, -2°C, -3.5°C, or alternating temperature: at 2°C until December, -3.5°C in January, and 2°C in February, and sowed in March. In overall, emergence rate was dependent on storage temperature, and -3.5°C resulted poorest emergence than other conditions. Storage of wet seeds in alternating temperature resulted highest emergence rate. Seed dry also affected on emergence rate, while it was dependent on the storage temperature. In terms of growth, storage at 2°C as wet seed resulted highest growth, and dried seeds resulted poorer growth than wet seeds. As a modification of alternating temperature, seeds were stored at 2°C at first, then transferred to -3.5°C at Nov 30, Dec 20, and Jan 10, each. When transfer date was delayed, emergence rate was increased. We suggest that seed storage temperature for ginseng should not be decreased below -2°C, and alternative temperature regime for successful spring sowing could be useful.

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