

Title Methods to Minimize the Effect of Ethylene Sprout Inhibitor on Potato Fry Colour
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Abstract

Ethylene is an effective potato (*Solanum tuberosum* L.) sprout inhibitor, but it often darkens fry colour. Trials were conducted over nine consecutive storage seasons to identify ethylene application methods which would mitigate darkening while retaining adequate sprout inhibition, using cv. Russet Burbank plus cvs Shepody, Asterix and Santana in some years. Tubers were stored for up to 35 weeks in closed chambers with ethylene gas delivered via the ventilation airstream. Exposure to continuous $4 \mu\text{l l}^{-1}$ ethylene after suberization and cooling were completed was designated the ethylene check. Alternative ethylene treatments included commencing exposure either before or after suberization was completed; gradually introducing the ethylene either by a concentration gradient of eight steps over 4 or 8 weeks or by increasing the duration of exposure from 6 to 24 h per day in four weekly steps; repeatedly interrupting exposure for several hours per day or for durations of 1 or more days; and warm storage. Selected ethylene treatment combinations were applied in each year, plus untreated controls, chlorpropham-treated (CIPC) checks and ethylene checks. Sprout growth, fry colour, loss of mass and disease incidence were evaluated at regular intervals. In all cultivars and all years, the ethylene check darkened fry colour more than the other treatments. Commencing before suberization ended, gradually introducing the ethylene by either concentration or time gradient and interrupting the exposure all reduced the negative effect of ethylene sprout inhibitor on fry colour. Continuous ethylene treatments inhibited sprout growth as effectively as CIPC, except at 13 °C storage. Interruptions of 18 h and 2 or more days reduced sprout inhibition. Regardless of cultivar variations, an early start using either a concentration or time-increment gradient had the least effect on fry colour while maintaining good sprout inhibition.