

Title Changes in garlic quality and composition after heat-shock treatments, low temperature storage, or modified atmosphere storage

Author M.I. Cantwell, G. Hong and X. Nie

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Abstract

For good quality, garlic must have minimal internal sprout development. Low temperature storage (0°C), controlled atmospheres, and hot water dips can all retard sprout growth and maintain visual quality of garlic. It is important to know if these treatments affect the composition, especially the concentration of the garlic flavor precursor alliin. Our objective was to determine whether postharvest treatments effective for sprout control resulted in undesirable compositional changes in garlic. Garlic was stored 6 mo at 0-1 °C and 70-80% RH in air or controlled atmospheres (0.1, 0.5, 1% O₂ alone or with 0, 5, 10, 15 and 20% CO₂). Peeled cloves were stored 4 wk at 5 or 10 °C under different atmospheres. Water dips (45-60 °C for 2.5 to 60 min) were applied to cloves in which sprouts had begun internal development. Sprout growth was measured as the ratio of the internal sprout length to clove length to clove length, color as L* a* b* values, and firmness as N force. Flavor potential was estimated by alliin and allicin concentrations (HPLC), and thiosulfinates and pyruvate (spectrophotometry). Sprout ratios increased in 6 cultivars stored at 0-1 °C in air for 6 months, and alliin and allicin concentrations increased by 10 to 40%, depending on cultivar. Sprout growth was reduced by CO₂ containing atmospheres, but not by low O₂. Thiosulfinates increased in air-stored, but not CA-stored garlic, while alliin concentrations remained stable or decreased. For peeled garlic, CO₂ (5-15%) in air or in low O₂ (1-3%) retarded quality changes at 5 and 10 °C for 3-4 weeks and did not affect garlic composition. Hot water at 55 °C for 10 min retarded sprout growth and had no effect on firmness or thiosulfinate concentrations. Low temperature storage, controlled atmospheres and heat shock treatments can all be effective options to retard garlic sprout growth with minimal impact on compositional quality.