

Title Effect of curing at different temperatures on phytohormone and biochemical composition of onion cv. Red Baron during long-term postharvest storage

Author Gemma A. Chope and Leon A. Terry

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Abstract

Long-term storability of onions is a result of first, dormancy induction and then sprout suppression, but little attention has been given to understanding the underlying physiological mechanisms of these processes. In the UK, bulb onion drying and storage technology is based on 1970's research and was therefore carried out on cultivars different from those used today. Thus, it is likely that alterations to current curing and drying methods, e.g. a reduction in the temperature and duration, could deliver benefits in the form of energy savings and reduced carbon emissions, whilst still producing onion bulbs of a satisfactory quality standard. Technologically advanced refrigerated and controlled atmosphere (CA) storage systems can maintain availability of onions for prolonged periods, but are energy intensive, and depend partly upon the use of the sprout suppressant, maleic hydrazide (MH). Increasing pressure from both consumers and retailers to eliminate residues in food, means that future use of MH as a sprout suppressant is uncertain. The system of topping onions in the field, lifting into store and then drying at 28°C for 6 weeks may not be suited to modern cultivars and could adversely affect storage life. Recent work, has shown that a decline in endogenous abscisic acid (ABA) was correlated with storage life in both CA and regular atmosphere, and that the concentration of ABA in freshly harvested bulbs was ca. double that measured before versus after curing. Thus, maintaining ABA concentration could extend dormancy and storage life. This study examined the effect of curing at lower temperatures (20, 24 and 28°C with subsequent storage at 0°C) on the storability and biochemical characteristics, including ABA and other hormones measured using LC MS/MS, of onion bulbs. Storage life (determined by sprout growth) was not significantly affected by curing temperature. Sucrose concentration increased, and glucose concentration decreased during curing at all temperatures, however, immediately after curing the concentrations of glucose and fructose were less in those onions cured at 28°C, whereas the sucrose concentration was higher in onions cured at lower temperatures.