

Abstract:

The development of unacceptable flavours in fresh carrots is a problem in the Norwegian distribution chain. We have studied various possible causes. Critical conditions identified are mechanical stress, external ethylene, elevated temperature during storage, and modified atmosphere in packaging. Also, sensitivity to mechanical stress differed among carrot varieties. The physiological responses to mechanical stress were increased aerobic and anaerobic respiration, and increased ethylene production. Too tight packaging gave hypoxic fermentation and accumulation of ethylene and CO₂. The responses were amplified by increasing temperature.

Mechanical stress and external ethylene resulted in off-flavours such as bitter taste, aftertaste and earthy flavour, and reduced the desirable attributes sweet taste and acidic taste. Several of these sensory attributes were related to reduced sucrose content. Bitter taste was correlated with 6-methoxymellein, although the level of this bitter principle was far below published threshold values. Hard mechanical stress and hypoxic packaging generated ethanol flavour and sickeningly sweet taste, both being highly correlated to carrot ethanol content. Contrary to mechanical stress and external ethylene, hypoxic packaging resulted neither in other off-flavours nor in a reduction in sugars or an increase in 6-methoxymellein. The effect of ethylene on synthesis of 6-methoxymellein was inhibited by high CO₂ concentration in packages.

Carrots being gently handled and stored in perforated plastic bags at low temperature retained the most favourable taste.