Blueberry supply chain: Critical steps impacting fruit quality and application of a boosted regression tree model to predict weight loss

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Abstract

Blueberries have increased in popularity in recent years due to their nutritional benefits and sensory characteristics. However, to preserve quality and extend shelf-life, they need to be maintained at refrigerated temperatures and high relative humidity, conditions that are not routinely met along the supply chain. Poor temperature management leads to quality deterioration, increasing waste/losses along the supply chain. This study examined the impact of each step along the supply chain on the physichochemical quality and shelf-life of blueberries, identifying the most critical steps from field to consumption. The following steps were identified as critical in the blueberry supply chain: shipping to distribution centre (DC) (72h at 5°C), store display (48h at 15°C), and consumer (48h at 20°C). Given the economic importance of weight loss and its link to fruit quality and shelf-life, a boosted regression tree (BRT) model was built to predict weight loss using the post-harvest environmental conditions of a simulated supply chain applying different temperature-time scenarios. The model explained 84 % of the variance on the test set and highlighted the interactions of supply chain conditions on weight loss.