

Title Simulation of a forced-air-twin-chamber for measuring heat treatment uniformity in harvested tomatoes

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Abstract

A heat transfer simulation model combining convection and conduction was developed to predict accurately the temperatures of air and produce (tomatoes) placed within a custom designed experimental set-up used for the measurement of the uniformity of hot air treatment. The thermal conductivity of the produce and air humidity have significant effects on the uniformity of heat treatment, particularly on the temperature gradients generated in the design. Tomato position, signifying the length of tunnel, is another factor to be considered when designing such experimental device. While air velocity is a factor affecting heat treatment uniformity, the tomato orientation did not show any significant effect. The simulation was experimentally validated and found to be accurate. This method could also be used for other fruits.