Title	Effect of container openings and airflow rate on energy required for forced-air cooling of horticultural produce
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Abstract

A research tool previously developed to investigate air distribution in horticultural produce containers during forced-air precooling was used to determine the effect of airflow rate and opening configuration on air pressure drop and rate and uniformity of cooling process. Further analysis performed on previously tested opening configurations determined their influence on energy efficiency. A system efficiency coefficient, consisting of the overall Energy Added Ratio (EAR) was demonstrated as a functional tool during the container design, since it considers peculiarities of the forced-air cooling system and produce physiology.

The results obtained for containers with handling openings and 2, 4, 8, and 16% opening area were used to evaluate the additional energy required to remove the heat generated by the forced-air fan and produce respiration. These results were also compared to produce in bulk and to produce packed in containers having 4-0.5%-holes in the corners to analyze the influence of hole positioning. A four large 0.5% opening configuration results in poor energy performance and cooling uniformity when compared to uniformly distributed smaller holes. Furthermore, the airflow rate could be optimized based on the respiration rate of the produce and container opening area.