Title	CFD modeling of a fungicide thermonebulisation system for fruit storage rooms
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Abstract

Postharvest treatments are recent development dedicated to control fungal storage decay of fruits. They offer a promising means to reduce the use of fungicides in the orchards, minimize residues on the fruits and improve ecological and environmental sustainability. In particular, thermonebulisation fogging of fungicides uses fine fungicide particles (0.1 to 10 micrometer diameter) that are generated by an aerosol electrical generator at +/- 190°C and distributed by a forced airflow in the storage room. A three-dimensional computational fluid dynamics (CFD) model was developed, validated and applied to predict the distribution of the fungicide droplets inside the fruit storage room. An Eulerian-Lagrangian multiphase flow model was used. The model takes into account two-way coupling with turbulent dispersion of the droplets. The droplet diameter distribution at the exit of thermonebuliser was measured and used as an input to the model. The product loaded in vented bins was considered as a porous medium, where the loss coefficients to the three orthogonal directions were approximated using a separate direct CFD simulation of the stacks. The dynamic behaviour of the fan was also taken into account. The distribution of the fungicide droplets was highly affected by the air flow distribution inside the room. Good agreement was found between measured and predicted results.

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