

Abstract:

Handling of fruits often causes damage to horticultural produce. Soft spots on tomatoes (*Lycopersicon esculentum*) are examples of fruit bruising, but in contrast to apple bruises they are hardly visible. Therefore, an objective quantification method for bruise damage is needed. Thermal imaging measures infrared energy radiated from the surface of an object and shows potential for bruise detection in fruits. This research aimed to develop a measurement set-up and measuring procedures to detect bruised spots on the tomato surface. A measurement set-up was constructed from rusty iron in order to avoid high emission and high reflectance of the set-up material. Tomatoes were shielded by a tube to avoid disturbing reflectance and irradiation from the surroundings. An ice-cooled plate behind the tomato minimized the background emission and enhanced distinction between a tomato and its background on the thermal images. Three temperature treatments have been compared with respect to bruise detection: cooling the fruits for 90 minutes at 1°C, warming up the tomatoes in an oven at 70°C for 1 or 2 min. and shortly warming up the tomatoes by means of microwaves during 7 or 15 s. Differences between bruised and intact tissue were most pronounced after a 15 s treatment by means of microwaves. On the one hand, high noise levels were experienced throughout the surface on the thermal images. Especially detection of bruises located at the tomato cross walls showed difficulties that might be the result of the surface shape. On the other hand, bruises appeared as cold, circular shaped spots on the fruit surface. The latter could favour automatic bruise detection.