Title On-the-farm contamination of satsuma mandarin fruit at different orchards in Japan

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Abstract

Preharvest sources of microbial contamination of satsuma mandarin fruit (cv. Miyagawa Wase and Matsuyama Wase) during fruit development were assessed in three orchards (Gobo, Kokawa, and Shimotsu region) at Wakayama prefecture, Japan. There were differences in altitude, soil type, water source, and frequency of fertilization and pesticide applications among the three orchards. Samples of fruit and field attributes, which included organic/chemical fertilizer, agricultural water, pesticide solution, soil, weeds, and cloth sheet used as mulch, were collected at different months of the year and analyzed for microbial population. With fruit at harvest time, bacteria and fungi were detectable in the peel and were below the detection level in the flesh. High levels of total bacteria, coliforms, and fungi were found in soil and weeds at all orchards throughout the year. The microbial population of organic fertilizer was much higher than that of chemical fertilizer, which was below the detection level. The coliforms counts in agricultural water were below the detection level throughout the year in two orchards, while at the Shimotsu orchard, the counts increased from 2.3 log CFU/ml in the spring to 3.0 log CFU/ml in the summer. The total bacterial counts of pesticide solution, which contained agricultural water for the mixture, were in the range of those of the agricultural water used at two orchards. *Bacillus cereus* was isolated from soil, agricultural water, pesticide solution, organic/chemical fertilizer, and fruit. *Salmonella* was detected in pesticide solution only from the Shimotsu orchard in summer. No *Escherichia coli* O157:H7 was isolated from any of the samples tested. These data suggest that agricultural water used for the pesticide solution or came in contact with the soil or fertilizer probably was the source of preharvest contamination of satsuma mandarin fruit during fruit development.