The influence of pasteurization on microbe populations in valencia orange juice.

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Juice from valencia oranges was extracted, pasteurized at various temperatures, and the population sizes of microbes in the juice determined immediately and weekly during cold storage (0.5°C) for three weeks on semi-selective agar media. Three media were employed: 1) Dichloran Rose Bengal Chloramphenicol Agar (DRBC) incubated at 20°C, which selects for yeasts and molds; 2) Plate Count Agar (PCA) incubated at 37°C, which selects for aerobic mesophilic bacteria; and 3) Orange Serum Agar (OSA) incubated at 20°C, which favors the development of citrus juice colonizing microbes. Duplicate juice samples were collected in 1 L volumes in sterile containers. Each container was sampled during storage, a dilution series in sterile water was prepared, and each dilution was distributed to triplicate agar plates of each medium. Colonies on PCA were counted after three days. Colonies on DRBC and OSA were counted after five days.

When the juice of unwashed fruit immediately after harvest was extracted,populations of microbes in the unpasteurized juice was about 200 colonies per milliter of juice, most of which were yeasts. Pre-washing fruit before extraction by passing the fruit through 3% (wt/vol) soda ash for one minute reduced populations by about one half in tests one and two (Figures 1 and 2) increased bacterial populations compared to fruit that had not been washed in a third test (Figure 3a, 3b, 3c). Soda ash can support the growth of some bacteria, probably the solution had a significant bacterial population in it during the third test. The solution itself should be periodically heated when the fruit are absent to prevent bacterial growth in the solution.

Tests one and two were preliminary tests that employed fewer media and only one sampling time, after three weeks of juice storage. Populations of microbes in the juice after pasteurization at all temperatures tested (71°C to 83°C) were low (<10 colony forming units per milliter of juice) or zero in the juice three weeks after it was extracted (Figures 1 and 2).

Test three employed all three media and was the most comprehensive. Populations of microbes in the juice after pasteurization at all temperatures tested (71°C to 83°C) were low (<10 colony forming units per milliter of juice) or zero in the juice immediately after the juice was extracted and for two weeks afterward. After three weeks, populations, particularly of yeasts on DRBC, increased significantly in most of the samples.

In conclusion, pasteurization temperatures employed in all three tests adequately reduced microbe populations for between two and three weeks in chilled juice.