yr of unwashed potatoes (an average of 2,500 cwt/wk).[3]

An acceptable means of dealing with dirt from unwashed potatoes will be of increasing concern to chip plants due to the continuing emphasis on cleanliness of the environment. Savings are made in transportation costs when potatoes are shipped to chip plants washed, because dirt and culls, which, according to sample results, may amount to about 24 cwt in a 400-cwt load, would not be transported by highway or rail carrier.

Results from the test samples do not support the view of some chip processors that washed potatoes tend to break down in the holding rooms more often than do unwashed potatoes under comparable conditions. Potatoes may be exposed to decay-causing organisms by improper conditions connected with washing, although washing itself should not make problems in holding the potatoes in the customary chip plant facilities.

Payment on weight at the shipping point should always be advantageous for the shipper, for either unwashed or washed potatoes because he will suffer no loss from weight loss of the potatoes in transit. In contrast payment on weight received should always be advantageous for the chip processor because he will not have to pay for the weight loss of potatoes in transit.

3Personal communication with Dr. Ora Smith, Cornell University, regarding annual volume of chip plant.

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KEEPING QUALITY OF DICED MANGO-ORANGE JUICE SALAD GELS[1]

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Abstract. **Periodic examinations were made over a 1-year period on packs of pasteurized diced mango-orange juice salad gels stored at 32° and 80°F. One pack was prepared from 'Kent' and the other from 'Keitt' mangos. 'Valencia' orange juice was used in the preparation of both packs. Quality factors considered in the examination of the canned products to determine shelf-life were flavor, color, texture and syneresis.**

The authors presented information to this society in 1973 on the preparation and processing of pasteurized, diced 'Keitt' mango-orange juice salad gels packed in hermetically sealed cans (1). Because of the insufficient number of samples, the storage period at 80°F was limited to 26 weeks.

Information is presented in this paper concerning the shelf-life of pasteurized, diced mango-orange juice salad gels prepared from 'Kent' and 'Keitt' mangos.

Materials and Methods

One batch each of salad gels was prepared and processed with 'Kent' and 'Keitt' mangos using the procedure of Rouse et al. (1). Other ingredients included 12.8° Brix 'Valencia' orange juice, cane sugar and a gel blend of Sea Gels DG and GH. The latter is a mixture composed of 60 to 40 parts by weight of Sea Gel DG to Sea Gel GH (1). Formulation for the ingredients is presented in Table 1.

The pack prepared with 'Kent' mangos was hermetically sealed in 300 X 407 size cans and the one prepared with 'Keitt' mangos was hermetically sealed in 211 X 304 easy-open-cans. The ends of both can sizes were enamel-lined and the body of the cans tin plated. To the 12,000 g 'Keitt' batch had been added 1 ml coldpressed orange oil. The products were placed at 32° and 80°F storage for 1 year and examined periodically by the authors

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Table 1. Formulation for diced mango-orange juice salad gels.

	g	%
Gel blend (Sea Gels DG and GH)	96	0.8
Orange juice (12.8°Brix)	4668	38.9
Sugar	1236	10.3
Diced mango	6000	50.0
Total	12000	100.0

for changes in color, flavor, gel structure and syneresis.

Results and Discussion

Data in Table 2 show the effect of storage at 80°F on the pasteurized, canned salad gels containing 50% mango by weight. Salad gels prepared from the 'Kent' fruit were more intense in mango flavor and contained a deeper yellow color than those gels prepared from 'Keitt'.

A slight but not objectionable storage flavor had developed in the sample of the 'Kent' salad gels examined after 48 weeks storage at 80°F. This flavor did not worsen when the examination was made 4 weeks later. Very slight syneresis was noticeable in the canned product when it was opened after having been in storage for 1 year. No other changes were apparent.

At the end of 24 weeks the authors detected a very slight terpene flavor in 'Keitt' salad gels. This was the pack that contained added coldpressed orange oil. Again, this slight off taste did not seem to increase with storage time at 80°F. At the end of 1 year the flavor was judged to be as good as it was after 24 weeks at 80°F storage. No changes were observed in color, syneresis or gel structure of the salad gels.

The pasteurized packs of the 2 mango varieties that were in storage for 1 year at 32°F (data not shown in tabular form) were judged to have no syneresis and no change in gel structure, color or flavor. The products retained the fresh flavor of the fruit at this storage temperature.

Conclusions

1. The quality can be maintained in pasteurized, diced mango-orange juice salad gels for a shelf-life of 52 weeks at 80°F and a shelf-life in excess of 1 year at 32°F.

Table 2. Effect of storage at 80°F on pasteurized, canned, diced mango-orange juice salad gels.

Storage period	Gel structure	Color	Flavor	Syneresis on opening can	Syneresis after 1 hr
			'Kent'		
Initial	firm	good	good	none	none
24 wk	firm	good	good	none	none
40 wk	firm	good	good	none	none
48 wk	firm	good	good-[z]	none	none
52 wk	firm	good	good-	very slight	very slight
			'Keitt'		
Initial	firm	good	good	none	none
24 wk	firm	good	good-[y]	none	none
40 wk	firm	good	good-	none	none
52 wk	firm	good	good-	none	none

[z] Slight storage flavor first detected.

[y] Very slight terpene flavor first detected.

2. Gel products from 'Kent' mangos contain more flavor and color than those prepared from 'Keitt' mangos.

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GROWTH OF MICROORGANISMS IN CHILLED ORANGE JUICE

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Abstract. **The growth of lactic acid bacteria and yeasts in chilled orange juice was investigated. Three suspensions were prepared, each consisting of 4 strains of Lactobacillus, 4 of Leuconostoc, and 4 of yeasts. Each composite suspension was inoculated into a series of bottles containing sterile prechilled orange juice so as to obtain a final concentration of 1, 100, and 1,000 organisms per ml. The samples were stored at 35°, 40°, 45°, and 50°F, and were plated periodically throughout the test period.**

The yeasts grew at all temperatures investigated, their rates of growth increasing with the temperature. The Lactobacillus organisms grew at 50°F but not at 45°F or below. Leuconostoc strains did not grow at 35°F, but grew slowly at 40°F, and rapidly at 45°F and 50°F.

Fermentation by yeasts occurred in 1 week or less at 50°F and in 1 to 2 weeks at 45°F, depending on the level of inoculation. At 35° and 40°F it occurred in 3 weeks but was satisfactory at 35°F for the lowest level of inoculation.

Spoilage from growth of Lactobacillus was detected between 12 days and 2 weeks at 50°F. It did not occur at 45°F or below. Leuconostoc required 13 days to 5 weeks at 40°, 45° and 50°F. Spoilage did not occur at 35°F.

Shelf life of chilled orange juice is dependent upon the initial microbial population at time of packaging and the temperature maintained until it reaches the consumer.

There has been in recent years an increasing demand by the general public for convenience-type foods. Chilled orange juice (COJ) is no exception. In the past 10 years the consumption of this product has increased from 27.3 million gals. in the 1962-63 season to 112.4 million gals. in 1972-73 (5). To continue this phenomenal growth the quality of the product must be maintained from the producer to the consumer.

Chilled juice is a broad class of product sold in single strength form usually refrigerated at the retail level. It may be packed as a sterile or unsterile product and it may contain preservatives. In the non-sterile form it is subject to microbial growth and spoilage—the predominant microflora being yeast and lactic acid bacteria. This orange juice is generally prepared from frozen orange concentrate (FCOJ) by reconstituting with chilled water to the desired Brix level. The resulting product may or may not be pasteurized prior to packaging. The juice is usually filled into paper cartons, glass or plastic jugs at a temperature of 35°F or less. The level of contamination at the time of filling has a direct bearing on the ultimate shelf life of the product. The purpose of this study was to determine the growth of yeast and lactic acid bacteria that might be present in marketing non-sterile chilled juice at temperatures normally encountered from the producer to the customer.

Experimental Procedure

The test organisms used in this investigation consisted of: (1) 4 strains of yeast (*Zygosaccharomyces vini* and *Z. rouxii*[1] and 2 isolates from frozen concentrated orange juice); (2) 4 strains of *Leuconostoc* (2 of *Leuconostoc* sp. and 1 each of *Leuconostoc mesenteroides* and *L. citrovorum*)[2]; and (3) 4 strains of *Lactobacillus* sp.[1]

Each isolate was maintained for 3 weeks in sterile single strength orange juice (SSOJ) to insure active growth; then on Potato Dextrose Agar (PDA) slants prepared in 8 oz. screw cap bottles. Incubation was at 86°F (30°C) for 48 to 72 hrs. Growth on each slant was washed with sterile

[1]Received from Research Dept., Continental Can Co., Inc., Chicago, Il.
[2]American Type Culture Collection (ATCC 8082 and 8293).