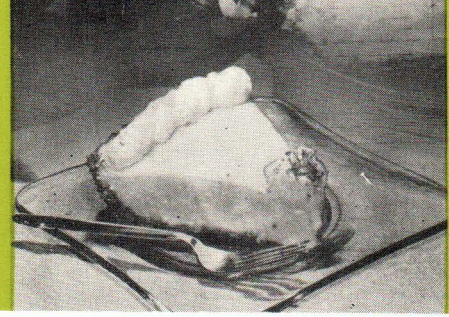
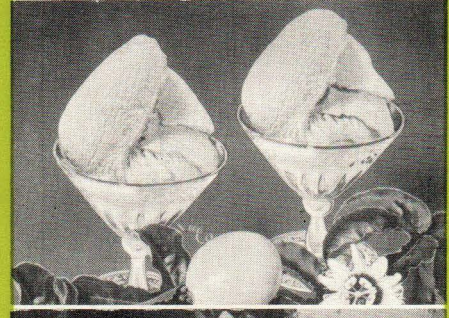
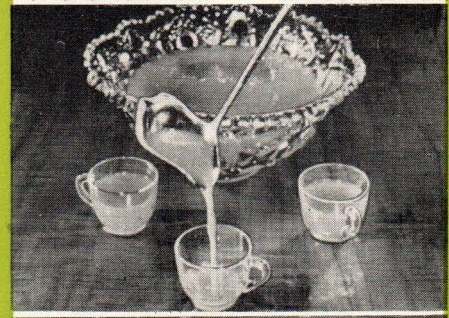
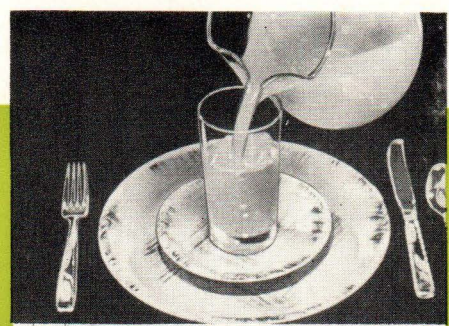


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Consumer Uses of PASSION FRUIT JUICE

A GUIDE TO MARKET DEVELOPMENT

Frank S. Scott, Jr.



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CONSUMER USES OF PASSION FRUIT JUICE A Guide to Market Development

Frank S. Scott, Jr.¹

Hawaiian passion fruit juice, because of its strong, unique, and appealing flavor, lends itself to a wide variety of uses. In Hawaii, it is commonly used as a sweetened, diluted pure juice, as a blend with other juices, and as a flavoring for sherbet. To a lesser extent it is used as a mixer for certain alcoholic beverages and as a flavoring ingredient for salads, pies, cakes, and other desserts.

In face of a partially developed Hawaii market and an essentially undeveloped mainland market, a greater dissemination of information as to the various uses of the product would seem essential as a background for market development.

This report is a summarization of the various uses which consumers are making of the product and an evaluation of these uses as possible means of stimulating sales. It is expected to serve primarily as a general guide to market development in light of probable demand according to use and form of processed product. As the industry is further developed, more detailed and comprehensive reports on individual uses can be expected to be forthcoming.

Fruit juices are sold largely on the basis of one or both of two qualities, flavor and vitamin C content. Inasmuch as vitamin C, or ascorbic acid, is one of the nutrients less likely to be supplied by other foods and cannot be stored by the body, it is considered by nutritionists to be the most valuable nutrient to be obtained from fruit juices. Although passion fruit contains some vitamin C and in fact more than some other fruit products with low ascorbic acid ratings, the diluted ready-to-use juice does not contain enough of that vitamin to justify its use as a primary source of vitamin C.² It may, however, be feasible to fortify the juice with ascorbic acid or with a small amount of another juice, such as that from the barbados cherry which is known to be exceptionally high in ascorbic acid content.

Research is in progress to determine the presence of possible antibacterial agents in the juice which, if found, would increase its value from a health standpoint.³ In the meantime, however, the *pure* passion fruit juice, although

¹Associate Agricultural Economist, Hawaii Agricultural Experiment Station, and Associate Professor of Agriculture, University of Hawaii.

²Scott, Frank S. Jr., *Consumer Preferences for Frozen Passion Fruit Juice*, Hawaii Agricultural Experiment Station, Agricultural Economics Report 29, December, 1956.

³This research is being conducted by the Department of Bacteriology, University of Hawaii, in cooperation with the Food Processing Laboratory at the University of Hawaii and the Economic Planning and Coordination Authority, Territory of Hawaii.

not devoid of vitamins, must sell largely on the basis of its outstanding flavor supplemented by an appealing texture and color. As a blend with other juices or as a flavoring ingredient, the lack of a high vitamin C content would, of course, be no serious deterrent.

Data on consumer uses were obtained from surveys in two test cities, Redlands, California, and Kailua, Oahu, T. H. Redlands provided a market where only a very small percentage of the population had ever heard of passion fruit juice prior to its introduction in the test market. Kailua, on the other hand, has a population structure reasonably comparable with that of Redlands but is a more developed market in the sense of familiarity with the test product.

USE AS A PURE JUICE

In the Kailua survey, which was made in the spring of 1956, 73 percent of the homemakers interviewed indicated they had used passion fruit juice in one or more ways. In the Redlands survey, which was conducted during September, 1955, three months after the juice had been introduced, only 28 percent of the people indicated they had used the juice.

Of those who used the juice in Kailua, 83 percent had used it as a drink by itself; 47 percent at breakfast time; 36 percent at other meals; 89 percent between meals; and 13 percent as a picnic drink. But in Redlands, although 90 percent of those who bought the juice indicated having used it as a juice by itself, only 19 percent used it as a breakfast drink; 8 percent at other meals; 83 percent between meals; and 2 percent as a picnic drink.

FOR PURPOSES OTHER THAN AS A PURE JUICE

There seems to be a strong inclination both in Kailua and Redlands to use passion fruit juice as a blend with other juices. In Kailua, 48 percent of the homemakers interviewed had used the juice as a blend and in Redlands, 21 percent had used it for that purpose.

It is significant that although the percentage of consumers using the juice as a blend was lower in Redlands than in Kailua, nevertheless a substantial number of Redlands people used it for that purpose. There had been very little publicity either in Kailua or Redlands directed at encouraging consumers to use the juice as a blend. However, quite a large number of Redlands consumers suggested, after tasting the juice for the first time, that it would make a good punch base. These opinions are consistent with experience in using the juice as a blend. The strong tangy flavor of passion fruit dominates punches in which it is used. Manufactured frozen punch bases containing passion fruit juice as a blend with papaya, guava, and/or certain other juices are rapidly increasing in popularity. Homemade blends of half passion fruit juice and half guava juice, papaya juice, pineapple juice, or one of the citrus juices are becoming popular in Hawaii. Consideration is also being given to the possible use of passion fruit juice as a blend to give a stronger flavor to Thompson seedless grape juice.

Greater familiarity with the product in Redlands would be expected to result in home use as a blend at a level more comparable with that in Kailua.

TABLE 1. Percentage of consumers making various uses of passion fruit juice, Kailua, Oahu, T. H., and Redlands, California

Test area and income group	One or more ways as a pure juice	As a pure juice			Other uses				
		At breakfast	At other meals	Between meals	As a picnic drink	As a juice blend	Mixer for alcoholic beverages	Passion fruit pie	Other
<i>Kailua</i> [*]									
Under \$4,000	87	49	42	91	13	44	8	3	1
\$4,000-\$6,999	82	46	37	88	12	47	12	5	4
\$7,000 and over	82	48	27	90	18	50	16	7	7
All groups	83	47	36	89	13	48	12	5	4
<i>Redlands</i> [†]									
Under \$3,000	91	22	0	91	0	19	3	0	—
\$3,000-\$5,999	88	17	7	85	2	23	9	2	—
\$6,000 and over	92	26	13	79	3	17	5	0	—
All groups	90	19	8	83	2	21	8	1	—

^{*}Based on a 25 percent personal interview sample of Kailua households.

[†]Based on a 47 percent personal interview sample of Redlands households.

The juice also seems to be a "natural" in combination with carbonated beverages and as a mixer for certain alcoholic beverages, especially vodka, gin, and rum.

It is interesting to note that in Redlands, where there had been no publicity concerning its use as a mixer for alcoholic beverages, 8 percent of the people who bought it had used it at least once for that purpose during the first three months after its introduction. In Kailua, where consumers would be expected to be more familiar with the various use possibilities, 12 percent had used it as a mixer.

The use as a mixer was greatest among the higher income group of over \$7,000 in Kailua and among the middle income group of \$3,000 to \$5,999 in Redlands.

Five percent of the Kailua people and 1 percent of the Redlands people who bought the product used it for making passion fruit chiffon pie. The recipe for this pie was featured in recipe booklets made available, but not widely distributed, in both Kailua and Redlands.

CONSUMER OUTLETS BY TYPE OF PRODUCT PROCESSED

If passion fruit production in Hawaii is to become a major industry, it appears relatively certain that the bulk of the product will necessarily be sold as a frozen juice concentrate in 6-ounce cans and perhaps to some extent in 12-ounce cans.

The pattern of utilization for most of the major juice fruits during recent years has shown a decline in the relative importance of fresh fruit and heat processed juice and a marked increase in sales of frozen concentrates. For example, the percentage of the Florida orange crop marketed as fresh fruit has declined from about 60 percent during the 1945-46 season to less than 30 percent during the 1955-56 season.⁴ At the same time, the percentage of the Florida crop going into frozen orange juice concentrate has increased from less than 1 percent during 1945-46 to 54 percent during 1955-56. The percentage going into heat processed single strength juice and other processed products decreased from 40 percent during 1945-46 to less than 13 percent during 1955-56. The aggregate decrease was not as great as the percentage decrease because of a marked increase in Florida orange production during the two periods used for comparison. The change-over has not been as rapid in California. This is primarily because of the relatively greater importance of the navel orange which is especially good for eating out of hand in contrast to the almost predominant production of the Valencia or juice orange in Florida. Other factors retarding the change-over in California are a reduction in orange acreage in the face of urban developments and the fact that California Valencia oranges are produced during the summer when Florida oranges are short in supply.

Other juice products have moved more or less in the same direction as orange juice. The frozen product retains more of the natural flavor and

⁴Frye, Robert E., "Trends in Marketing Oranges," *Agricultural Marketing*, USDA Agricultural Marketing Service, March, 1957, pages 8-9.

freshness in nearly all instances than does the heat processed product. The modern housewife does not want to take time to extract the juice from the fresh fruit.

Since the variety of forms other than frozen juice in which passion fruit may be marketed satisfactorily appears to be more limited than for oranges, it would seem that sales of the frozen concentrate would constitute an even greater percentage of the market outlet than is true of orange juice; particularly if passion fruit is to become a major industry and not one which caters primarily to the high-price low-volume specialty trade.

CONSUMER ACCEPTANCE OF THE FRESH FRUIT

Passion fruit has been used primarily for its juice and is not considered a product which lends itself to marketing as a fresh fruit. Nevertheless there has been some justification for assuming that a certain percentage of consumers would prefer to buy the fruit and extract their own fresh juice rather than to accept the quick frozen or heat processed products. With this in mind and in order to stimulate consumer purchases during a temporary period of overproduction in the summer of 1956, the Territorial Economic Planning and Coordination Authority and the Hawaii Agricultural Extension Service arranged for the sale of the fresh fruit in certain Honolulu markets. Although demonstrations during the introductory period encouraged considerable movement of the product, the volume of repeat sales was discouraging.⁵ Consumers reported considerable difficulty in extracting the juice and store managers were almost unanimously of the opinion that the product could not be sold satisfactorily as a fresh fruit.

In addition to the difficulties involved in juice extraction by the consumer, fresh passion fruit is less edible and more perishable than oranges. Diluted passion fruit juice on the other hand is highly palatable.

HEAT PROCESSED JUICE

Heat processed passion fruit juice with water added to provide a palatable strength or as a blend with papaya or orange is meeting with some favor in the Honolulu market and to a limited extent on the Mainland.

Present methods of heat processing do not adequately retain the tangy flavor and pleasant aroma of the product. The loss of flavor is considered more noticeable than in the case of orange juice and the disadvantage is even greater because mainland consumers over a period of years have become accustomed to the somewhat burnt flavor of canned single strength orange juice. Even if a completely satisfactory method of heat processing were developed, the frozen concentrate must be depended upon in developing a large volume industry. This is borne out as indicated above by the trend which has taken place in the juices with which passion fruit must compete. In fact, some partially heat processed juices are sold in the frozen

⁵Shiroma, Edward, *The Marketing of Passion Fruit in Hawaii*, typewritten report, January, 1957.

food cabinets in order to increase sales by taking advantage of that rapidly expanding outlet. This does not mean that commercial interests should not go ahead and sell as much of the heat processed product as the market will accept and at the same time yield profitable returns to the industry. The heat processed product has made a place for itself in the Hawaii market, especially as a blend with papaya juice or orange juice in spite of the superiority of the flavor of the frozen or fresh juice.

BULK SALES

A number of outlets other than as a frozen concentrate or a heat processed ready-to-use juice are worthy of mention.

With the industry still relatively small, bulk sales of the frozen product are of considerable importance. An important outlet at the present time is for use as one of a number of tropical juices in frozen concentrated and heat processed punches manufactured by mainland firms. Some bulk juice is also going into chain store juice bars and into other institutional outlets. But unless mainland processors are interested in using substantial quantities of passion fruit juice to strengthen the flavor of their own products, such as Thompson seedless grape juice, this outlet can readily be saturated.

SALES IN MILK BOTTLES

In Hawaii one of the largest outlets for passion fruit juice is in the form of the diluted frozen juice in a ready-to-use form that is distributed by dairies, both as home deliveries and through retail markets. The 1956 Kailua study indicated that sales in milk bottles were 82 percent as great as the sales of the frozen concentrate in 6-ounce cans as measured on an equivalent basis.

Bulk shipments of frozen juice for use by mainland dairies may well prove to be an excellent outlet and an economical means of reaching the consumer insofar as low cost market development is concerned.

PASSION FRUIT SHERBET

Passion fruit sherbet appears to offer a good potential as a minor outlet for passion fruit juice. During the spring of 1955, a short time after its introduction, passion fruit sherbet became the best selling sherbet in Hawaii. Without further promotion it has since dropped to second place, being exceeded by orange, with pineapple ranking third and guava fourth. The volume of sales of flavors other than these in Hawaii is not appreciable.

It would seem that some impetus to passion fruit sales could be gained on the Mainland not only through encouraging the manufacture of passion fruit sherbet but also through publicizing the value of passion fruit as a flavoring for homemade sherbets and ices. Passion fruit sherbet is rapidly making a place for itself in the California market and has been well accepted in scattered areas in other parts of the country. A rapid increase in interest on the part of ice cream manufacturers indicates that a more intensive mainland distribution can be expected within a relatively short time.

It should be realized, however, that use of a product as a flavoring does not usually call for a large volume of production.

Even if passion fruit sherbet sales on the Mainland were to equal half of the volume of orange sherbet sales, only an estimated 3 million pounds of juice would be required, assuming the same strength ratios as in comparing the juice concentrates. At a juice yield of 7,000 pounds per acre, this would require about 430 acres. And it should be remembered that orange sherbet has become a favorite only after many years.

It is estimated that passion fruit sherbet manufactured in Hawaii during 1956 required juice from about $\frac{1}{4}$ of one acre. The requirement for supplying the entire nation at this rate would be 281 acres. This compares with an estimated mainland market potential for the frozen concentrate in 6-ounce cans at 21 cents per can which would require production from at least 4,000 acres.⁶

WINES AND LIQUEURS

Wines have been manufactured from passion fruit juice on an experimental basis. Although a palatable wine which retains the unique passion fruit flavor can be developed from passion fruit juice, it is not yet feasible commercially because the high acidity requires an addition of sugar in excess of the limit established by Federal food and drug regulations. If it is found possible to reduce the acidity through selective breeding or to obtain exception to the regulation on sugar content, wine production may prove a reliable outlet for a substantial acreage of passion fruit.

A liqueur is manufactured from the purple passion fruit in Brazil and perhaps in other areas. Some chemists are of the opinion that it may be possible to develop a satisfactory liqueur from Hawaii's yellow passion fruit but insofar as is known no conclusive findings have been made available.

SUMMARY AND CONCLUSIONS

Although a variety of uses for yellow passion fruit juice loom important in light of current output, it appears that the primary outlet after an intensive development of the mainland market would be as a pure juice or possibly a blend with one or more other juices, providing that a proportionately large amount of passion fruit juice would be included in the blend. If passion fruit is to follow the pattern of directly competing products, the amount which can be sold as a frozen concentrate will exceed that sold as a heat processed ready-to-use product. The mainland consumer demands the flavor and freshness which is retained to a greater extent in the quick frozen than in the heat processed product. Also the concentrate is a less bulky item in the customer's shopping bag.

Sales of passion fruit juice in milk bottles have been successful in Hawaii. Sales in milk bottles in Kailua during 1956 were 82 percent as

⁶Scott, Frank S. Jr., "The Mainland Passion Fruit Market," *Hawaii Farmer*, October, 1956, page 13.

great as sales of the frozen concentrate in 6-ounce cans on an equivalent basis.

There is good indication that the product will make a place for itself not only as a "cooler" or between meal refreshment, but also as a breakfast drink.

With very little publicity concerning its use as a breakfast drink, 47 percent of the consumers in Kailua, Oahu, T. H., and 19 percent of the consumers in Redlands, California, had used passion fruit juice for that purpose.

Insofar as taste and texture are concerned the product lends itself well to use at breakfast-time. There is good indication that its use as a breakfast drink could be expanded considerably if the vitamin C content were brought up to a level at least equal to that of frozen orange juice concentrate. This could be done either by fortifying the product with ascorbic acid or blending it with a product naturally high in vitamin C, such as the barbados cherry.⁷

Mainland consumers can be expected to more or less follow the pattern already apparent in Hawaii and use passion fruit juice to some extent for flavoring pies, sherbets, other desserts, homemade punches, and as a mixer for alcoholic beverages.

There is a good possibility that a substantial amount of wine will be manufactured from the product providing that the acid content of the fruit can be reduced through selective breeding. Further research in developing a marketable liqueur should be encouraged.

In light of these findings and observations, it would seem wise not only to continue to develop various bulk outlets which loom large at the present time, but also to begin planning for coordinated mainland market development for stimulating retail sales in 6-ounce cans which promises eventually to be the largest market outlet.

⁷Scott, Frank S. Jr., *Consumer Preferences for Frozen Passion Fruit Juice*, Hawaii Agricultural Experiment Station, Agricultural Economics Report 29, December, 1956.

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