

## MARKETING JUICE FROM ARKANSAS' SEEDLESS TABLE GRAPES

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### Introduction: Field Loss vs Value Added

Product development followed by market testing of a grape juice product has opened opportunities for value-added research. In this study, raw product characteristics of the grapes plus laboratory preparation and juice preference test results were combined to demonstrate the feasibility of a value-added market for juice from Arkansas seedless table grapes. The product was value-added because the grapes would have otherwise been discarded or a field loss.

Production of seedless table grapes became feasible for Arkansas' growers with the 1977 release of a cultivar which had been developed to be adaptable to local climates. In 1985, The Ozark Table Grape Growers Assn., Inc. (OTGGAI), Searcy, AR, was organized because the market volume was expanding beyond the stage in which almost every grape could be sold to buyers eager to taste the new Arkansas product. OTGGAI grower members now account for more than 50% of the seedless grapes in the state, and their harvests are expected to increase from 281 tons in 1989 and 480 tons in 1990 to more than 1000 tons in succeeding seasons. The OTGGAI vineyards represent approximately: 180 acres-fully productive, 60 acres-intermediate, and 50 acres-newly planted. Grape tonnage utilized in juice processing by OTGGAI is expected to range upward from 10% of the 1989 (28 tons) and 18% of the 1990 crop (86 tons).

### Objectives

Objectives of the study were: (1) laboratory development and sensory evaluation of the most acceptable juice products from seedless table grapes and (2) consumer preference testing of the new juices in comparison to existing commercial grape juices. An additional objective was to initiate processing development research so that alternative value-added markets would be available as Arkansas vineyards reached maturity and full production. Because the Arkansas Agricultural Experiment Station seedless grape cultivars, Venus, Reliance, Marrs, and Saturn, had been released relatively recently (1977, 1982, 1984, and 1987 respectively), extensive processing evaluations had not previously been made to provide a basis for comparisons.

Sale of a fresh product has always been the primary goal and source of income for Arkansas seedless table grape growers. Therefore, in Table 1, the total cost of production would be allocated to the expected 5-ton fresh market sales while the 1 ton of juice grapes would be bearing only the extra costs of processing into juice. These "out-of-grade" grapes used for juice were portrayed as representing a net \$275/ton value-added profit feature in the crop budget. On this basis the juice processing represents development of a viable alternative market for Arkansas seedless table grape growers.

### Procedure

The consumer evaluation stage was implemented in grocery stores in four locations: (1) Clinton, AR (2,080 popn) a small trade center in a mixed farming/grape growing area; (2) Hot Springs, AR, (36,228 popn) a medium size metropolitan city; (3) Little Rock, AR, (178,134 popn) the state capital and center of a metropolplex trade area serving twice its population; and (4) Searcy, AR, (13,622 popn) a county - seat trade center in a mixed farming/grape growing area.

Grocery store customers were asked to evaluate flavor and color of: (1) the new OTGGAI grape juice and (2) two grape juices from a nationally established brand name - (a) Concord, the traditional industry standard, and (b) a relatively new red grape juice product which carried the brand name. The tests were set up so that the grape juice products were observed by customers as they entered the produce area of the designated stores. The evaluation periods were set on Thursday, Friday, and Saturday to get exposure to as large a sample of grocery shoppers as possible within a short period. To increase the sample size, as many adult shoppers as could be accommodated were asked to evaluate the Juices .

In the tests, each respondent was approached and asked to evaluate the flavor and color of three juices using a 9-point hedonic scale ranging from 'like extremely' to "dislike extremely." The juices were in clear plastic cups identified by code number only: #579 (new OTGGAI grape juice brand) #148 (Concord, national brand); and - 914 (Red, national brand). The order of tasting and viewing was balanced through randomizing the order of viewing the three samples. After the initial test, the juices were arranged into another of the possible combinations before another individual sampling. After each respondent had evaluated the juices, other family classification and market information questions were asked. The numbers of respondents are listed by time period for the four grocery stores in the test. (Table 2 - A).

### Results

As illustrated by percentages of respondent ratings frequencies, both the Concord and red grape juices tended to receive higher average hedonic scale preference ratings than the OTGGAI brand (Figures 1 and 2). Estimates of the means of

the preference ratios revealed that in the total sample the Concord (#148) and red (#914) grape juices achieved sample means of 7.84 and 7.27 for flavor and 8.08 and 6.85 for color. (Table 2, B and C). While the new (OTGGAI) juice (#579) received the lowest scores, an average rating of 6.63 for flavor and 6.34 for color on a 1 to 9 scale indicated it was acceptable.

Comments of respondents to open ended questions tended to indicate that panel participants expected grape juice to have the sweetness and deeper colors of the two national brands. Even though there were 1136 comments made describing features of the new juice which were disliked, the 859 reasons for liking it included praises for the flavor in more than 68% of these entries. In describing the new flavor, panelists used terms such as "crisp, tangy, and not too sweet." (see Appendix Tables 2 and 3).

### Implications of Study

Successful marketing of a new grape juice product will require close coordination of food scientists and agricultural economists in product development and market introduction. The results of the taste tests reemphasize the importance of the combination of flavor and color in obtaining consumer acceptance. Even with a unique and desirable flavor, the market share to be garnered by a new grape juice product will depend on a combination of factors which must be explored individually. For example, new formulation of the juice from Arkansas' Venus grapes would be advantageous in order to find methods for deepening the color of the final product. Addition of grape skin extracts and deeper colored grape juice concentrates are acceptable food processing practices which could accomplish this. Also, changes in the label and/or promotion material should consider emphasizing the difference between the darker, "sticky sweet" juices and the crisp, tangy, not so sweet juice flavor.

Sensory evaluation research must be continued to evaluate grape juice consumption patterns and the influence of habit and promotion on market penetration. The favorable comments can be useful even though the new OTGGAI juice was not 'liked' as well as the other grape juices. The hedonic scale ratings simply indicated how the new juice was ranked against two popular national brands. The information gained will be useful in reformulating the product for future seasons. Now that food scientists have demonstrated the feasibility of acceptable grape juice products from Arkansas seedless table grapes, economists must redirect efforts to find ways to begin the market development process.

**Table 1. Seedless Table Grapes: Estimated Costs and Returns per Acre plus Value-Added Potential, Years 5-30, Northwest Arkansas, 1987.**

Item	Unit	Price	Quantity	Total
Expected Yield	ton	\$	6.0	\$
Fresh Market Sales	ton	\$ 800	5.0	\$4000
Total Production Costs <sup>1</sup>	acre	\$1719	1	\$1719(-)
Sub-Total				\$2281
Value Added Market Sales				
Juice Sales	gal/ton	\$ 4	170	\$ 680
Processing costs	gal/ton	\$ 1.85	170	315(-)
Harvesting Costs	ton	60	1	60(-)
Hauling Costs	ton	30	1	30(-)
Sub-Total				275
<b>Total Expected Returns</b>			<b>2556</b>	

<sup>1</sup>Carroll . Garner, "Table Grape Production: Preliminary y Analysis of the Costs and Returns, Northwest Arkansas, 1987", Cooperative Extension Service, University of Arkansas, Fayetteville, Arkansas 72701

**Table 2. Number of Respondents And Average Values of Flavor And Color Preference Ratings by Date And Cities of Grape Juice Preference Tests, University of Arkansas, 1989.**

		Dates/Cities				Total
		Sept. 7 - 9 Searcy	Clinton	Little Rock	Sept. 21 - 23 Hot Springs	
A. Total Number of Respondents		288	228	279	435	1230
		sample means				
B. Flavor Preference Ratings	Juice # 148	7.87	8.00	7.78	7.81	7.84
	Juice #914	7.07	7.66	7.55	6.96	7.27
	Juice #579	6.06	7.15	6.45	6.98	6.63
Number of respondents		288	228	276	435	1227
		sample means				
C. Color Preference Ratings	Juice # 148	8.21	8.34	8.08	7.98	8.08

Preference Juice #914	6.71	7.47	6.90	6.67	6.86
Ratings Juice #579	5.99	7.16	6.00	6.45	6.34
Number of respondents	280	214	270	417	1181

#148 - Concord juice (National Brand)

#914 - Red grape juice (National Brand)

#579 - OTGGAI grape juice (New Brand)

Appendix Table 1. Sample Frequencies

<u>Sex of Respondent</u>		
	<u>Frequency</u>	<u>Percent</u>
Female	587	70.7
Male	285	29.3

  

<u>Age of Respondent</u>		
<u>Range in Age</u>	<u>Frequency</u>	<u>Percent</u>
20 or less	60	5.6
21 - 30	176	16.4
31 - 40	216	20.1
41 - 50	251	23.4
51 & over	370	34.5

Appendix Table 2. Number of comments About Juice #579, OTGGAI Brand Grape Juice after Sensory Evaluation, University of Arkansas, 1989.

A. What did you like about juice #579?	<u>Number of Respondents</u>	<u>Percent of Respondents</u>
Liked New Juice's Flavor/taste	408	33.17
Liked Other Things About New Juice	122	9.92
Liked New Juice's Right Balance	93	7.56
Liked New Juice's Degree of Sweetness	91	7.40
Liked Everything About New Juice	79	6.42
Liked New Juice's Color	31	2.52

  

B. What did you dislike about juice #579?	<u>Number of Respondents</u>	<u>Percent of Respondents</u>
Disliked New Juice Because Too Sour	230	18.70
Disliked New Juice Because Other	230	18.70
Disliked New Juice Because of Color	180	14.63
Disliked New Juice Because of Off Flavor	131	10.65
Disliked New Juice Because Too Sweet	48	3.90
Disliked Everything About New Juice	30	2.44
Disliked New Juice Because Not Sour Enough	18	1.46

Appendix Table 3. Number of Respondents by Frequency of Making Comments

"Liked Features of Juice #579"

Frequency	Number of Respondents	Cumulative Percent	Cumulative Frequency	Percent
0	602	48.9	602	48.9
1	439	35.7	1041	84.6
2	148	12.0	1189	96.7
3	40	3.3	1229	99.9
4	4	0.1	1230	100.0

"Disliked Features of Juice #579"

0	478	38.9	478	38.9
1	461	37.5	939	76.3
2	210	17.1	1149	93.4
3	70	5.7	1219	99.1
4	10	0.8	1229	99.9
5	1	0.1	1230	100.0



Figure 2. Percentages of Respondent Ratings of Colors of Three Grape Juices  
1999 Arkansas Grocery Store Customer Panel

