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## Hawai'i Avocado Industry Analysis, Part 1: Supply Focus

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**D**ecline of the sugarcane and pineapple industries in Hawai'i has resulted in an increased shift toward diversified agriculture. According to the Hawai'i Agriculture Statistics Services' 2005 summary of diversified agriculture sales in Hawai'i, tropical fruits, excluding pineapple, were ranked seventh, comprising 5.9 percent of total diversified sales. Among the different tropical fruits, avocado makes up 27 percent of Hawai'i's market share in fruits. The data show that during the period 1990–1995, local avocado production declined. However, this trend reversed and increased, from 500,000 pounds in 1995 to 800,000 pounds in 2005 (Figure 1). There was also an increase in the commercial value of this crop, from \$273,000 in 1995 to \$600,000 in 2005. At the same time, avocado imports briefly declined until 1999 but then started increasing dramatically, compared to local production. Imports rose from 700,000 pounds in 1999 to 2,130,000 pounds in 2005. These numbers clearly show the demand for this fruit in the local market and suggest that Hawai'i's avocado farmers can benefit by tapping into this opportunity. Yet, local avocados currently contribute only about 30 percent toward meeting this total demand, and their share of the market also is showing a decreasing trend compared to imports. According to the Hawaii Avocado Association, inadequate delivery of new production and marketing information to the industry is hindering its expansion. A lack of research, educational, and promotional programs for avocado growers also was felt by association members (Bittenbender et al. 1989).

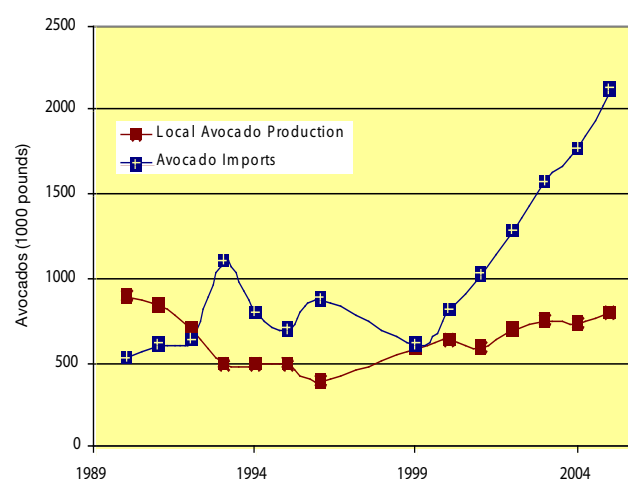
This report aims to minimize this knowledge gap. It describes production trends and the current situation in terms of the industry structure, identifies unique features of the Hawai'i avocado industry in terms of the varieties available and grown, evaluates how growers have been

responding to the increasing demand, and presents opportunities and suggestions for expansion for Hawai'i avocado growers.

### Structure of the industry

This analysis begins with the current status of the Hawai'i avocado industry in terms of industry productivity, imports and waste, production costs and prices received and farm characteristics of Hawai'i's avocado growers in 2005–2006. A literature search and a questionnaire survey taken of avocado farmers helped in obtaining the information. The Hawai'i Agricultural Statistics Service (2005) indicated a total of 150 avocado farms in Hawai'i (National Agricultural Statistics Services 2005). For the purpose of conducting our survey, a list of the Hawai'i avocado growers was obtained from the Hawaii Avocado Association. Using this list, we contacted

**Figure 1. Hawai'i avocado supply trend, 1990–2005.**



the growers via telephone and e-mail, and 55 growers agreed to participate in the survey. A questionnaire was sent to them. About 75 percent of the surveys were completed in face-to-face interviews, and the remainder was completed via telephone. Of the farmers who were interviewed, about 90 percent were from Kona, and the remaining growers were spread out over the rest of the islands, with 6 percent from Hilo and about 5 percent from the other islands (2 percent from Kaua'i, 3 percent from O'ahu). There were no respondents from Maui. The questionnaire was designed to focus on two broad areas. One part focused on farm-related information such as the farm size, number of years in farming, the nature of land ownership (leased or owned), part-time or full-time farming status, the cost of production, and farm income. The next part focused on marketing information, cultivars grown, quantity produced, quantity sold, selling outlets, and prices received. The information collected is meant to help Hawai'i avocado farmers, existing as well as new, gain a better understanding of the current industry structure and situation.

### Industry supply, imports, wastage, and price in 2005–2006

Background research and survey results indicated that about 150 avocado farms in Hawai'i currently produce about 800,000 pounds of avocado that reaches the local market. However, the survey results revealed that about half of the avocados produced do not reach the market. This suggests that the actual current production, including waste, could be about 1.2 million pounds. In 2005–2006, Hawai'i imported about 2 million pounds of avocados, which shows that there is considerable demand for the fruit. The avocado farmers should be able to tap into this demand, replace imports, and enhance the industry. The average avocado farm size was about 2 acres, and the total avocado acreage was about 286 acres. Total production per acre is estimated to be 2400 pounds (Table 1).

### Cost of production, income, and prices received

Information collected for the year 2005–2006 (Table 2) revealed that the average cost of production for avocado was \$900 per acre. This was calculated by totaling the different costs incurred by the growers, including farm wages, farming costs, marketing costs, and operational overhead. The average income received from avocados

**Table 1. Production, acreage, waste, and import data for the Hawai'i avocado industry.**

Variable	Value
Number of avocado farms in Hawai'i	150*
Total cultivated acreage	286 acres**
Average avocado farm size	1.9 acres**
Minimum	0.1 acre
Maximum	18 acres
Standard deviation	3 acres
Average avocado yield/acre	2400 lb**
Average number of avocado trees/acre	50 trees
Total production	800,000 lb*
Amount wasted (includes not harvested + not sold)	392,000 lb**
Percentage wastage	49 percent
Potential supply (production + wastage)	1,192,000 lb**
Avocados imported	2,000,000 lb*

\*National Agricultural Statistical Service, 2005

\*\*Data from survey

was \$2761 per acre. From the cost and income data, the margin per farm was calculated, and it was found to be \$1861 per acre.

Background research revealed that avocado farmers sell their produce mainly to wholesalers and grocery stores or through direct sales at farmers' markets. Prices received from these sources are shown in Table 2. It is not clear why wholesalers pay more than grocery stores for avocados, although it should be noted that the price standard deviation for wholesalers is much larger than that for grocery stores.

### Farm characteristics

Characteristics of the Hawai'i avocado farms were explored through the survey (Table 3). Most (67 percent) of the farmers own their land, while 29 percent of the farmers have leased lands. Forty-two percent are full-time farmers, while the rest describe themselves as part-time farmers, which suggests that they may have additional non-farm employment. Only a few farms (13 percent) are more than 15 acres; the rest are smaller. Most (76 percent) of the farmers sell their avocados through direct sales, including selling at farmers' markets or to a wholesaler.

**Table 2. Cost, price, and income data for Hawai'i avocado farmers in 2005–2006.**

Cost, price and, income	Mean	Standard deviation
Average cost of production/acre	\$900	\$841
Average annual income per acre from avocados	\$2,761	\$2,467
Margin per acre	\$1,861	
Average price received		
Wholesaler	\$0.86/lb	\$0.45/lb
Grocery store	\$0.66/lb	\$0.10/lb
Farmers' market	\$1.05/lb	\$0.43/lb

**Table 3. Farm characteristics of Hawai'i avocado farms in 2005–2006.**

Farm characteristics	Percent
Ownership	
Owned land	67
Leased land	29
Both	4
Employment	
Full-time	42
Part-time	58
Size	
Less than 5 acres	44
5–15 acres	44
More than 15 acres	13
Sales outlets	
Direct sales	76
Wholesale	24

### Unique features of the Hawai'i avocado industry

In the following section we attempt to present the unique feature of the Hawai'i avocado industry in terms of types of avocado grown, their availability, and the current percentage of production. Previous studies have pointed out that among the tropical and subtropical fruits produced in Hawai'i, avocado has a somewhat unique presence, because all three avocado races are available in Hawai'i, and many avocado cultivars have been tried here (Hamilton 1987, Hamilton and Evans, 1999). The three avocado races include Guatemalan, which has hard, tough, thick, pebbled skin and is medium to large in size, each fruit weighing more than 0.4 pounds; the Mexican race, which is thin- and smooth-skinned and smaller in fruit size; and the West Indian race, which has smooth, thin skin, and fruits that are medium to large in size. Many of the cultivars grown are mixtures of these races.

Currently, due at least in part to lack of information and effective marketing strategies, Hawai'i avocado growers are not able to meet the year-round demand or maintain a consistent market supply. As a result, markets mostly depend on imported avocados. To find out the potential of local avocados for year-round availability and supply, we attempted to identify the cultivars of avocados that are currently being grown and estimate their availability throughout the year.

### Hawai'i avocado cultivars: availability and production

Production data about the cultivars currently grown and their harvest periods were collected from the growers through the survey. Figure 2 shows the principal cultivars currently grown. The table suggests that there is a potential for year-round production of avocados, with different cultivar availability varying with the fall–winter and spring–summer seasons. Sharwil, Kahalu'u, Malama, Linda, and Nishikawa are the ones available during fall–winter, and Yamagata, Ohata, Murashige, and locally grown Hass are available in spring–summer. The black areas represent the “high season” and the white areas represent the “lean season” for the particular cultivar; the gray areas indicate that the cultivar is not available during those months. This information can be useful for coordinating supply and demand between avocado farmers and buyers.

Total production percentage for each of the cultivars currently being grown was estimated. Results for the top five cultivars revealed that Sharwil is the most-produced (45 percent), followed by Malama (21 percent), Yamagata (11 percent), Murashige (3 percent), and Hass (0.9 percent).

Previous studies pointed out that during the 1980s, as a strategy to enhance avocado farmers' incomes, there was a drive to increase Sharwil production, and hence it was

**Figure 2. Major avocado cultivars grown in Hawai'i and their seasonal availability (black = high season, white = lean season, gray = not available; F/W = fall-winter, Sp/S = spring-summer). Information is from the survey of growers and may not reflect cultivar performance in all areas of the state.**

Avocado cultivars	J	F	M	A	M	J	J	A	S	O	N	D	Season available
Sharwil	Black	Black	Black	White	White	White	White	White	White	Black	Black	Black	F/W
Kahaluu	Black	White	White	Gray	Gray	Gray	Gray	Gray	Black	Black	Black	Black	F/W
Nishikawa	Black	Black	Black	Gray	Gray	Gray	Gray	Gray	Gray	White	White	White	F/W
Yamagata	White	Black	Black	Black	Black	Black	White	White	White	White	White	Gray	Sp/S
Ohata	Gray	Gray	Gray	Gray	Black	Black	Black	Black	Black	Black	Black	Gray	Sp/S
Linda	Gray	Black	Black	Black	White	White	White	White	White	White	White	Black	F/W
Malama	White	Gray	Gray	Gray	Gray	Gray	Gray	Black	Black	Black	Black	Black	F/W
Murashige	White	White	White	White	Black	Black	Black	White	White	White	Gray	Gray	Sp/S
Hass	White	White	Black	Black	Black	Black	Black	White	White	Gray	Gray	Gray	Sp/S

extensively propagated. The intention was to export the local Sharwil production to Canada, Alaska, and other parts of mainland USA. However, this move was not a success due to regulations of the USDA Animal and Plant Health Inspection Service (APHIS) that permitted export of Hawai'i avocados to the mainland and other regions only if the fruit could be certified to be free of fruit flies, which unfortunately proved to be not cost effective for Hawai'i's avocado farmers. However, the farmers have continued to grow Sharwil.

It is clear from the survey that Hawai'i has the potential to grow different cultivars of avocado catering to specific tastes and preferences of both consumers and commercial buyers while ensuring a year-round supply. It is therefore important to tap into this unique feature of the local industry, which is its ability to grow and supply different kinds of avocado. In order to achieve the goal of enhancing the local avocado industry and substituting imports by tapping into its potential, some suggestions and strategies have been identified and put forward, and the willingness of avocado farmers to adopt these strategies is discussed in the following section.

### Opportunities for expansion of the Hawai'i avocado industry

Previous studies pointed out that smallholder farmers are often at a disadvantage in adjusting to new market conditions, as they are not well organized. They have low capital, use traditional techniques, operate on a small scale, depend on family labor, and sell their produce individually (Roedel et al. 2002, Bittenbender et al. 1989, Jang et al. 2002). Above all this, they are faced with severe competition from the big players in the field, i.e., imports (Roedel et al. 2002, Bittenbender et al. 1989).

Smallholder farmers do not possess the bargaining power of large-scale farmers. There are also limitations due to lack of investment in market research and knowledge of producers, buyers, and consumers. For island farming communities, efficient marketing systems are limited due to geographic remoteness, poor infrastructure, and lack of marketing systems.

In order to overcome these challenges, growers need to understand markets, strategically plan their activities, and have access to means to improve products and upgrade their production systems.

Perhaps the greatest potential benefit, but the one most overlooked in the fresh produce industry, is the change that arises from working closely with customers, including wholesale buyers and individual consumers. Close and trusting relationships between producers and customers can lead to fewer product defects and improved forecasting accuracy, thus improving product quality and meeting consumer demand (Dooley et al. 1998). It involves coordination and sharing of information between producers, markets, and customers, with the result being a rise in competitive advantage through satisfying consumer needs.

Besides coordinated efforts, studies on agricultural producers by Duval et al. (1998) and Dooley et al. (1998) conclude that farmer alliances, such as cooperatives, are crucial for agricultural industries to maintain profitability and customer satisfaction, particularly from a producer/farmer perspective. Cooperatives provide a critical link in the food and fiber supply chain. Agricultural cooperatives are generally classified according to the three major functions they perform: marketing, supply, and service. Many cooperatives combine all three types of functions in their operations (University of Manitoba and ARDI Report 1999). The marketing functions that cooperatives perform influence farmers' ability to market their commodities, and this directly affects the profitability of their operations (McNamara et al. 2001). By forming strong alliances with one another, specifically when there are large numbers of smallholder farmers, farmer cooperatives can increase the bargaining capacity of their members, which is considered a crucial strategic move that can ensure stronger coordinated and collaborative linkages, consistency in supply, improved marketing capacity, and enhanced profitability (Yang et al. 2002) while reduce transaction costs (Pingali et al. 2005), thereby achieving a stronger competitive advantage.

Information through multiple forms, such as labeling, branding, advertising campaigns, and use of information technology, has been found to be highly beneficial in agribusiness, as it ensures quality standards, transparency, and product identity, which were all found to be directly correlated to customer satisfaction.

With regard to the Hawai'i avocado industry, most smallholder farmers are not in a position to meet the regulations for packaging and transportation and thus have limited marketing potential. Yet, cooperative efforts among avocado growers have not taken shape. Despite the potential avocado has for value-added niche markets,

**Table 4. Willingness of Hawai'i avocado farmers to adopt suggested strategies.**

Willing to:	No		Yes	
	Number	%	Number	%
Switch to new varieties	18	33	37	67
Join cooperatives	17	31	38	69
Adopt branding	6	11	45	88

not many steps, such as branding, labeling, or any other such consumer-awareness efforts, have been taken to exploit these opportunities.

The advantages of the three strategies mentioned above, namely (1) meeting consumer preferences through coordinated efforts, (2) forming farmer cooperatives, and (3) adopting branding to ensure information flow, should be considered. We recommend adoption of these strategies by Hawai'i avocado farmers.

Results from our analysis show the majority (67 percent) of the avocado growers are willing to switch and grow new cultivars based on customer preferences, are willing to join a cooperative (69 percent), and are willing to adopt branding (88 percent) (Table 4). This strongly suggests that all players are ready to coordinate production with buyer and consumer demand. It is therefore strongly suggested that the Hawai'i avocado industry seriously consider and adopt these key opportunities for enhancement and expansion.

### Conclusion and suggestions

Considering that almost half of Hawai'i avocado production is being wasted, without even reaching the market, meeting consumer demand is not just a matter of increasing production but of increasing the efficiency of producers' operations and coordinating production efforts to meet consumers' preferences. Thus an innovative strategy for the industry is to form a collaborative supply and marketing effort by both avocado growers and marketers, possibly through a cooperative. The efforts in the avocado industry initially would include communicating reliable consumer-preference information to growers and increasing consumers' willingness to pay for locally grown avocados. Then, the cooperative can promote standards preferred by the consumers and

work to make supply available consistently throughout the year. When this occurs, the most preferred avocado cultivars can be produced in Hawai'i and be marketed in response to consumer preferences. Labeling the product and promoting it to chefs, visitors, and residents will be key complementary marketing strategies coordinating the growers' efforts with the consumers' preferences.

We have noted that various types of avocado can be grown to meet seasonal demand. Producers can use this information when planning future plantings. Data from this study reveal that growers are willing to switch varieties in order to better meet consumer demand, to form cooperatives, and to branding or labeling. Thus government policies must be formulated that provide greater assistance to local smallholder farmers to enhance production, reduce wastage, improve infrastructural facilities, develop marketing strategies, and substitute locally produced avocados for imports.

The role of the CTAHR Cooperative Extension Service is crucial. Cultivars that are most preferred by customers must be promoted for year-round production. Government support should be provided to farmers and farmer cooperatives that will help increase their revenue and make the industry self-sufficient. Policies that support farming and provide incentives to farmers to continue farming must be encouraged, and state branding programs, such as the Hawai'i Seal of Quality, must be encouraged in order to increase customer awareness, improve coordination, and enhance sales.

Finally, continued surveying of buyers (wholesalers, chefs, and consumers) is essential in order to build state-wide branding and innovative marketing programs for the various avocado cultivars.

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