

# Pili Nut

Economic Fact Sheet #17  
June 1992

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## CROP PROFILE

### SPECIES

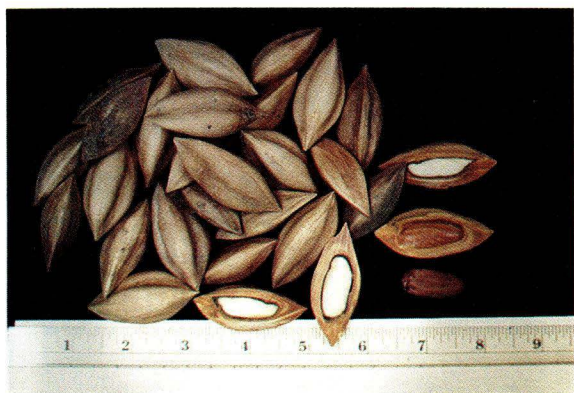
- The pili nut, *Canarium ovatum* Engl, belongs to the Burseraceae family. It is native to the Philippines. Most of the trees are wild and found in forests.
- A number of other *Canarium* species bear nuts sometimes called pili nuts. Some species, such as *C. album* in Indochina, are eaten like an olive.
- No extensive research is known on any aspect of culture and use. Further research is needed on taxonomy, cultivar selection and breeding, culture, propagation, harvesting, processing, and use to develop pili nuts as a potential orchard crop.
- According to research conducted at the Institute of Plant Breeding, University of the Philippines at Los Baños, the criteria for evaluation and selection of outstanding pili seedlings include:

fruits should be large, round, have a thin pulp and shell and a large, round kernel; kernels should have high protein and oil contents, be almost white with little or no discoloration and odor, and have a tender and crisp texture and mild nutty flavor.

- Pili nuts were first introduced to Hawaii about 1922 from the Philippines.

### PRODUCTIVITY

- Pili nut trees can be propagated by seed, marcotting, budding, and grafting. There is a significant interval before trees have sufficient yields for commercial operations. Trees start to bear fruit in the fifth or sixth year when grown from seedling, with economic yields in the 10th year. For marcotted and grafted trees, production starts in the second or third year, while an economic yield may be expected during the fifth or sixth year. With the long time span before production, intercropping with quicker-bearing crops is desirable.



- Trees are generally grown from seed in the Philippines, but this practice is not recommended, since pili does not breed true from seeds. The pili nut tree is dioecious, having male and female flowers on separate trees.

- Pili nut trees grow best on deep, fertile, well-drained soils with a pH of 5.0 to 7.0. Trees can be grown from sea level up to 1300 feet, require a warm, humid climate with evenly distributed rainfall throughout the year, and cannot withstand frost.

- Unlike macadamia nut trees, which cannot withstand strong winds, the pili nut tree is a good windbreak because of its spreading roots and prominent buttress. The trees are also a good reforestation crop.

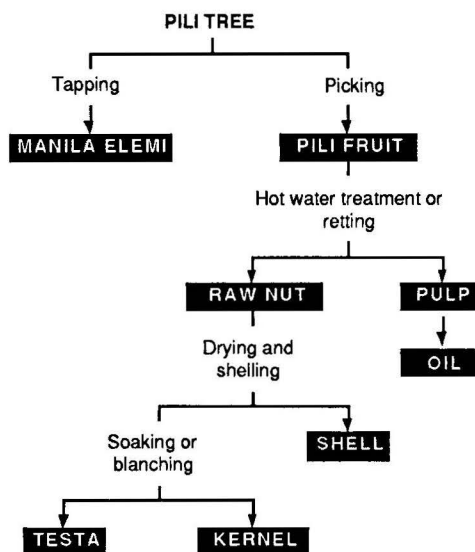
- The oblong, greenish fruits are black when ripe and are 2.4 to 2.8 inches long. Each fruit contains a single hard, thick-shelled, triangular nut covered by a small amount of pulp. Pili nuts are shaken or knocked from the tree and manually picked from the ground.

- Yields vary considerably in the Philippines. The spacing of trees should be at least 40 ft x 40 ft to 50 ft x 50 ft. The peak yield is about 2200 lb/ac per year.

- No serious pests or diseases are reported.

### USE AND PRODUCTS

- The kernel is the main product from the pili tree. It can be eaten raw or roasted; when it is roasted, some consider pili nut to be superior to almonds. Kernels contain about 71.1% fat, 11.4% protein, 8.4% carbohydrate, 6.3% water, and 2.8% ash. A fat content varying from 68.5% to 78.6% has been reported.



### Processing of pili nut

- In the Philippines, the kernel is made into several products, including plain roasted nuts, white- or brown-sugar-coated nuts, and pudding. Kernels are also suitable for the manufacture of nut chocolate.

- The pulp is edible when boiled. Its texture and appearance are similar to sweet potato's, and it is rich in oil and protein. In the Bicol, Philippines, oil from the pulp is extracted for cooking and lighting.

- Processing of pili nuts involves pulp removal, drying, storage, and kernel extraction. Shelling is done manually by using a special machete placed across the middle of the nut. The pili shell is too thick and hard to be opened with ordinary nutcrackers and may have been an obstacle to pili orchard development. Research is needed to identify trees that produce easy-to-crack, thin-shelled fruits, after which mechanical processing may be possible. The shell is an excellent source of fuel. In Indonesia, shells of other *Canarium* species are made into ornaments.

Nutritional content of selected tree nuts per 100 gm (3.53 oz)

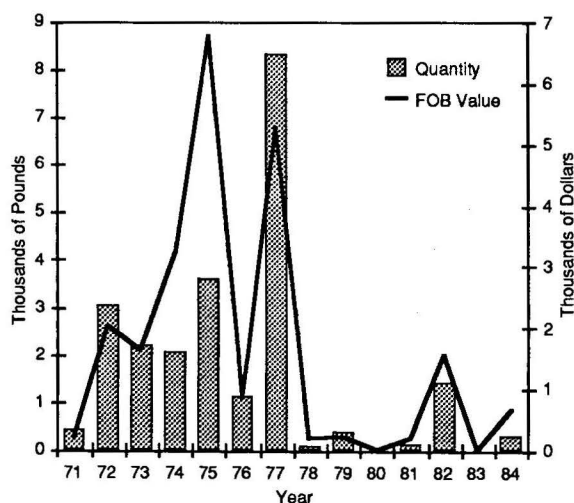
Nut	Water (g)	Cal	Prot (g)	Fat (g)	Total												
					carb (g)	Fiber (g)	Ash (g)	Ca (mg)	P (mg)	Fe (mg)	Na (mg)	K (mg)	β-Car (μg)	Thia (mg)	Rib (mg)	Nia (mg)	Vit C (mg)
Pili nut	6.3	669	11.4	71.1	8.4	2.7	2.8	140	554	3.4	3	489	24	.88	.09	.5	Tr
Almond	4.7	598	18.6	54.2	19.5	2.6	3.0	234	504	4.7	4	773	0	.24	.92	3.5	Tr
Brazil nut	4.6	654	14.3	66.9	10.9	3.1	3.3	186	693	3.4	1	715	Tr	.96	.12	1.6	—
Cashew	5.2	561	17.2	45.7	29.3	1.4	2.6	38	373	3.8	15	464	60	.43	.25	1.8	—
Macadamia	3.0	691	7.8	71.6	15.9	2.5	1.7	48	161	2.0	—	264	0	.34	.11	1.3	0
Pecan	3.4	687	9.2	71.2	14.6	2.3	1.6	73	289	2.4	Tr	603	78	.86	.13	.9	2
Pistachio	5.3	594	19.3	53.7	19.0	1.9	2.7	131	500	7.3	—	972	138	.67	—	1.4	0
Walnut	3.1	628	20.5	59.3	14.8	1.7	2.3	Tr	570	6.0	3	460	180	.22	.11	.7	—



- Fresh nuts can be stored for a few weeks before they become rancid, while roasted nuts can be stored for several months.
- A resin, Manila elemi, can be tapped from the pili trunk. Several other *Canarium* species also produce elemi. This resin is used as an ingredient of plasters and ointments. It is also used in adhesives, plastic, printing inks, paints, varnishes, and fireproofing and waterproofing compositions.

## WORLD SUPPLY AND DEMAND

- The Philippines is the only known commercial producer and processor of pili nuts in significant quantity. There has been no large-scale commercial planting. Production comes mainly from wild trees and scattered plantings that are often interplanted with coconut and hemp.
- In 1958, more than 19,700 acres of pili nuts were planted in the Philippines. However, the planted acreage declined to about 7000 acres in 1978 due to indiscriminate cutting of productive trees. Over 76% of the planted acreage was in the Bicol region. The average annual production between 1974 and 1978 was 10.2 million lb.
- In 1913, the Philippines exported over 2.6 million lb of pili nuts to countries such as the United States, France, the United Kingdom, and Japan. Exports have declined since then because of limited local supply, poor method of removing the pulp, lack of an effective cracking device, and sales of rotten nuts.



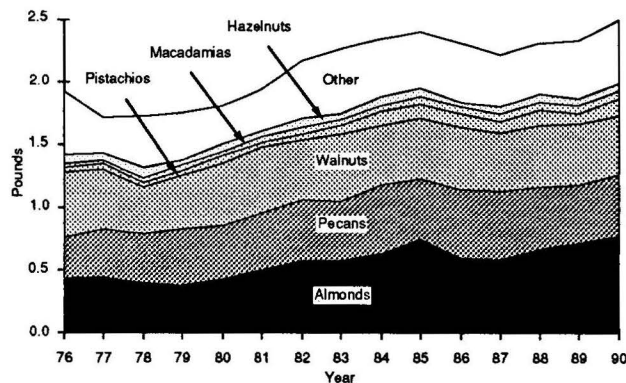
Philippines' exports of pili nuts, 1971-84

- In 1984, the Philippines exported 332 lb of pili nuts, at an F.O.B. value of \$664. Eighty-three percent went to Sweden, while the remainder was shipped to Guam.
- The 1990 retail price of in-shell pili nuts in Metro Manila was about \$0.67 per lb. A 1.8-oz package of sugar-coated pili nuts sold for \$0.27.

## SELECTED NUT MARKETS

### THE UNITED STATES

- U.S. per capita consumption of tree nuts (shelled basis) was estimated at 2.47 lb in 1990, an increase of 28.7% from 1976. Almonds (0.77 lb/capita), pecans (0.48 lb/capita), and walnuts (0.48 lb/capita) were the leading tree nuts consumed.
- In 1991, the United States imported more than \$373 million (C.I.F. value) of tree nuts. Cashews were the largest volume imported (\$253.7 million), followed by pecans (\$53.7 million), Brazil nuts (\$15.8 million), pignolia (\$13.9 million), chestnuts (\$12.3 million), and macadamias (\$11.9 million).
- The major suppliers of imported tree nuts were India for cashews, Mexico for pecans, Australia for macadamias, Brazil for Brazil nuts, Turkey for hazelnuts, Italy for chestnuts, Portugal for pignolias, Hong Kong for pistachios, India for walnuts, and China for almonds.
- The 1991 average U.S. import prices (C.I.F.) of shelled nuts were \$6.10/lb for pignolias, \$3.71/lb for macadamias, \$2.86/lb for pistachios, \$2.33/lb for cashews (in shell and shelled), \$2.22/lb for pecan, \$1.80/lb for almonds, \$1.38/lb for chestnuts (in shell and shelled), \$1.34/lb for hazel-



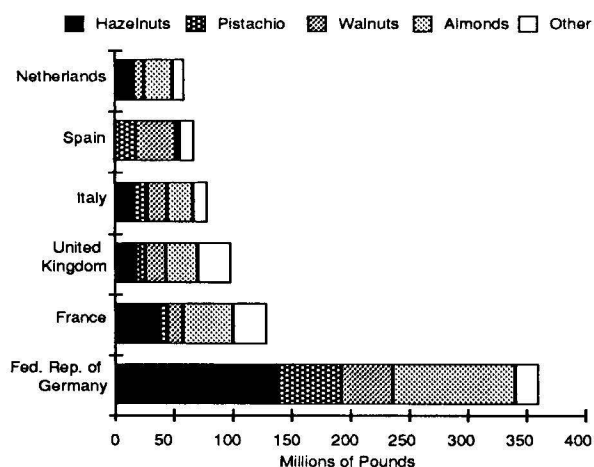
U.S. per capita consumption of tree nuts, 1976-90

nuts, \$1.14/lb for walnuts, and \$1.00/lb for Brazil nuts.

- According to Arbitron/SAMI, the total 1990 retail sales for snack nuts through supermarkets and drugstores was \$558 million, a 1.8% decline from the previous year. In terms of value, peanuts led sales, followed by cashews, pistachios, macadamias, and almonds, respectively.

### EUROPEAN COMMUNITY

- The European Community (EC) imported over 872 million lb of tree nuts in 1989, compared to 717.6 million lb in 1986. In 1989, hazelnuts (28.7% of the imported quantity) were the leading tree nuts imported, followed by almonds (27.4%), walnuts (16.7%), pistachios (13.1%), chestnuts (5.4%), cashews (3.3%), Brazil nuts (2.7%), pecans (0.6%), and other (2%).
- In 1989, the Federal Republic of Germany dominated the tree nut imports among the EC members, with 41.5% of the total EC import volume. Of the eight tree nuts imported, Germany was the largest importer of hazelnuts, almonds, pistachios, walnuts, and pecans. France, the United Kingdom, and Italy were other major importers.
- Between 1986 and 1989, pistachio imports increased 127.4%, the highest percentage change among the eight tree nut imports. Pecans were

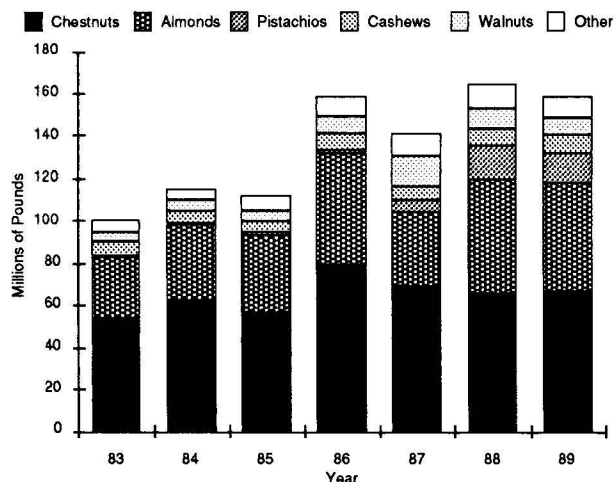


Major EC importers of tree nuts, 1989

second with 81.5% growth during the same period, while chestnuts were third with an increase of 52%.

### ASIA

- In 1989, Japan imported more than 150.8 million lb of tree nuts, an increase of 57% from 1983. Chestnuts and almonds dominated the Japanese tree nut import market; together they accounted for three-fourths of the total quantity imported in 1989. China was the major supplier of chestnuts, with 93.5% of the import market share, while the United States supplied almost all of the almonds.
- Hong Kong imported about 88.4 million lb of tree nuts in 1989. Cashews accounted for 33.5% of the total quantity imported, of which Vietnam and China supplied more than two-thirds. Other imported nuts include chestnuts (16.2%), almonds (2.7%), and hazelnuts (0.1%).
- Cashews were also the major imported nut in Singapore. In 1990, about 76% of the tree nut imports were cashews. Almonds were a distant second with only 2.9% of the import market share.
- In 1989, South Korea imported 8.1 million lb of tree nuts. Almonds imported from the United States accounted for 84.8% of the total.



Japan's tree nut imports, 1983-89

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Hawaii Agricultural Experiment Station, HITAGR, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa. Noel P. Kefford, Director and Dean.

A list of references is available from the authors upon request.