

FOODS

USED BY

FILIPINOS

IN HAWAII

 $\mathbf{B}\mathbf{Y}$

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BAHAY KUBO (MY NIPA HUT)

Bahay kubo kahima't munti Ang halaman doon au lumalati; Singkamas at talong, sigarrillas, mani, Sitao, batao, patani.

Kundol, patola, upo't kalabasa At saka mayroon pang labanos, mustasa; Sibuyas, kamatis, baoang at luya, Sa palibot' ay puro linga.

This Filipino folk song tells of the many vegetables growing in the garden surrounding the little nipa hut in which the Filipinos live. The song includes the names of many of the vegetables described in this bulletin, as well as eggplant, peanuts, onion, garlic, ginger, and others. The authors wish to thank Emilia S. Cavan, of Manila, for permission to quote the poem, which appears in her book Filipino Folk Songs (Manila, 1924).

Foreword

THE CONDITIONS described in this bulletin were true at the time the manuscript was completed in 1941. Since that time the war has prevented the importation of foodstuffs from the Philippines and has caused some changes in the employment of Filipinos in Hawaii. However, since the war has not materially altered the food habits and the health of the Filipinos in Hawaii, the manuscript has not been revised.

The bulletin was written primarily for the use of teachers, extension agents, public health nurses, dietitians, and others interested in the welfare of Filipinos in Hawaii. Parts of it should also be of help and interest to Filipino students in intermediate and high schools, who can interpret the findings and recommen-

dations to those parents who cannot read English.

We studied chiefly the foods and dietary habits of Filipinos whose incomes were low, rather than those of Filipinos in the educated, well-to-do group. However, the bulletin should also apply to those who are financially well situated, since among Filipinos, as among all other racial groups, undernourished children and unwise expenditures for food and other wants may be found in families with higher incomes.

The abbreviation I., T., or V. after Filipino words indicates to which dialect the word belongs—Ilocano (I.), Tagalog (T.), and Visayan (V.).

CAREY D. MILLER

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ABSTRACT

The emigration of various dialect groups from the Philippines to Hawaii and their present distribution in the Territory are discussed. The diet and health of Filipinos in the Philippines and in Hawaii are compared.

Chemical analyses (including those for calcium, phosphorus, and iron) and vitamin assays are reported for 22 food products much used by Filipinos in Hawaii. The use and nutritive value of each food are discussed. Other foods used by the Filipinos are listed. There are 17 figures, 15 illustrating the foods analyzed, one picturing a Filipino garden, and one a map of the Philippines showing areas from which Filipinos in Hawaii migrated.

Recommendations for improving the diet of Filipinos in Hawaii are given. A brief discussion of Filipino methods of food preparation is followed by recipes using the foods analyzed.

A short technical section describes the preparation of the samples and methods of chemical analyses and vitamin assays of the foods.

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The Filipinos in Hawaii

THE FILIPINOS, like other national groups that came to Hawaii, brought with them certain characteristic food habits, some bad and some good. An appraisal of their foods is complicated by the following facts: (1) the Filipinos now resident in Hawaii came from different regions of the Philippines; (2) foods commonly used by some Filipinos are ignored or spurned by others; and (3) even when a food is common to two or more groups, its name or names in one dialect may not be recognized by those speaking another dialect.

Many writers (12, 28, 59)¹ have pointed out that the Filipinos are ethnically a mixed group of people and that the word Filipino "is essentially a political

and geographic term rather than a racial label" (12).

To understand the food and dietary problems of Filipinos in Hawaii, one should have some knowledge of how and why the Filipinos came here, of the regions in the Philippines from which they emigrated, and of food and dietary studies made in their homeland.

The story of Filipino immigration into Hawaii is long and involved, and has been treated fully by Bruno Lasker (30). A brief summary taken from Lasker and other sources follows.

This immigration began in 1907 when importation of Japanese labor ceased, causing a shortage of plantation workers. Initial experiments with Filipino labor in 1906 and 1907 showed Filipinos to be satisfactory workers and paved the way for a stream of Filipino immigration during the next 24 years.

The first group that arrived, consisting of 15 men from the farming regions of North Luzon, proved to be good workers. When a later group, consisting of youths from the city of Manila, unused to labor on the land and with no particular liking for it, proved unsatisfactory, the Hawaiian Sugar Planters' Association recruiting agents turned to the Visayan Islands, especially to the overcrowded districts of Cebu. The Visayans came in considerable numbers and comprised the majority of Filipino immigrants up to 1922. Nearly all who arrived after that date were Ilocanos, from the Ilocos country of North Luzon. Filipino labor immigration continued, under the auspices of the Hawaiian Sugar Planters' Association, until late in 1931.

The principal homelands of Filipinos resident in Hawaii are shown in figure 1. Although there are Filipinos in Hawaii from many provinces of the Philippines, the majority came from three sections—Ilocanos from the Ilocos coast provinces, Tagalogs from thickly populated areas adjacent to Manila, and Visayans from the central islands of Cebu, Bohol, Leyte, Masbate, and Oriental

¹ Italic numbers in parentheses refer to Literature Cited, pp. 78-80.

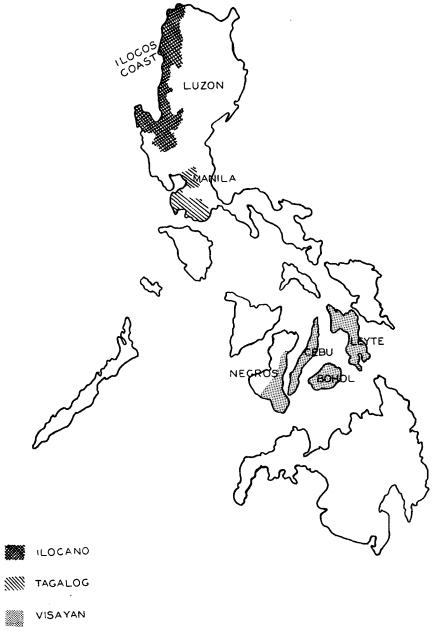


Figure 1. Map of Philippine Islands showing areas from which Filipinos emigrated to Hawaii.

Negros. The large majority from each section came from a low economic class whose diet was simple and restricted.

From Lasker's data we have estimated that approximately 70 percent of all the Filipinos who came to Hawaii were Ilocanos, that about 30 percent were Visayans, and that less than 1 percent came from Tagalog and other linguistic and geographic groups. However, by 1930 most of the Visayans in Hawaii had returned to their homeland or had gone to the mainland United States, largely as a result of labor difficulties on the plantations. Therefore the estimates on emigration are not a reliable index of the division of the linguistic groups now resident in the Islands. Dr. Romanzo Adams estimated that in 1941 about 80 percent of the Filipinos in Hawaii were Ilocanos and that the remainder were from other linguistic groups, with Tagalogs and Visayans predominating.

The number of Filipinos in the Territory of Hawaii gradually increased from 1908 to 1931. In 1910 Filipinos constituted 1.2 percent of the total population in the Islands; in 1920, 8.2 percent; and by 1930, 17.1 percent. A peak of 17.6 percent was reached in 1931. From 1931 through 1941 there was a fairly steady decrease because many returned to the Philippines. According to the 1940 census,² the Filipinos in Hawaii (including both citizens and aliens)

comprised about 12 percent of the total population.

Since 1933 Filipinos have tended to move from plantation work into other types of employment, and consequently the number on the plantations has decreased.

Diet and Health in the Philippines

BEFORE THE WAR the food habits of families in the Philippines of relatively low economic level were investigated by Filipino scientists (19, 24, 49, 50, 51, 52), and some of the studies were made in the regions from which Filipinos now resident in Hawaii came. From all available published data, we may summarize the character of these food habits and their nutritive significance.

In normal times polished rice constitutes the bulk of the diet for all groups studied thus far and, with other grain foods (especially corn in some sections), furnishes 60 to 90 percent of the total calories in the diet. Except in some rural areas, most of the rice (see pp. 21-22) is polished; consequently the vitamin B_1 intake is generally low and beriberi is widespread. Beriberi most often occurs in pregnant and nursing mothers who, being under unusual nutritional strain, show the results of the deficiency of a diet which is marginal for vitamin B_1 . Rice and other cereals furnish the greater part of the vegetable protein, which commonly constitutes 55 to 70 percent of the total protein in the diet. The most important sources of animal proteins are fish and shellfish, which Filipinos generally prefer to beef and pork.

Dietary studies in the Philippines indicate that vegetables and fruits furnish a smaller proportion of calories in the diet (about 7 percent) than in the

² United States Bureau of the Census. Hawaii: population, sixteenth census of the united states: 1940. Racial composition of the population of Hawaii. 1 p. 1941. [Mimeographed press release dated March 10.]

average low-cost diet in the United States (about 12 percent) (54). Studies made in Philippine rural areas show that sugar, sweets, and fats constitute a

very small percentage (1 to 3 percent) of the total calories (table 1).

Dr. Isabelo Concepcion, formerly of the University of the Philippines, an ardent advocate of improving the national health through improvement of diet, has made some of the most detailed dietary studies. He has pointed out that typical diets in the Philippines are deficient in fat, animal protein, calcium, and vitamins A, B₁, and C (20). To improve such diets, he recommends increased use of milk, especially for young children, more fats and oils, the use of partially milled rice, and much greater use of vegetables, especially the green leaf vegetables. Some urban groups need to reduce their consumption of meat and fish. Dr. Concepcion's recommendation for distribution of calories among the food groups in Filipino diets is given in table 1 (18).

Comparison of diets in the Philippines with diets in Hawaii may be found

on pages 14 and 15.

Mortality rates published in 1939 by the Bureau of Health in the Philippines (3) show that the principal causes of death are: first, tuberculosis; second, beriberi; and third, malaria.

Tuberculosis is caused by bacterial infection; consequently, contact and crowded conditions tend to increase the incidence. However, poor nutrition greatly decreases resistance to this disease, especially when the diet contains insufficient amounts of fats and of vitamins A and C (ascorbic acid).

Beriberi is directly due to an inadequate intake of vitamin B₁ (thiamine). If the beriberi death rate is high in any community (as it is in the Philippines), it may be inferred that the diets of even those portions of the population that show no sign of the disease are deficient in thiamine (and probably in other

members of the vitamin B complex).

The widespread occurrence of beriberi in the Philippines is deplorable when one considers that it was demonstrated years ago that inadequacies of the diet are the principal cause of the disease and that United States army physicians stationed in the Philippines were among the first to prepare concentrates of rice polish for its cure (14). It is true that tikitiki, or extract of rice polish, is made under government supervision, and that the use of rice bran to prevent beriberi has been recommended (57), but the more practical plan of using partially milled rice appears to have received little attention from public health officials, and little or no educational work has been done to further its use. A tax on white rice and the sale of unmilled or partially polished rice at a price lower than that of white rice, as advocated by Heiser (25, 26), seems to have had little support from the Filipinos.

Diet and Health of Filipinos in Hawaii DIETS OF FILIPINO PLANTATION FAMILIES

In 1936, Mrs. Edna Clark Wentworth studied the cost of living of 101 Filipino families of a low economic group living on a sugar plantation. She and her assistants first inventoried all food on hand in each home. Thereafter for

4 weeks a Filipino assistant visited each home three times a week to record food acquired since the last visit, whether by purchase, by gift, or from gardens. At the end of the period Mrs. Wentworth made a final inventory and calculated the quantity of foods each family had consumed. Some of her data on food consumption for the 101 families were summarized in a publication of the Institute of Pacific Relations (56).

A more detailed study of the diets of 20 of these families was made by Mrs. Eda L. Carlson, a home economics student at the University of Hawaii working under the direction of the senior author. These data are published here with the permission of the Institute of Pacific Relations, under whose

auspices the original study was conducted.

Some of the children in the 20 families studied were receiving food at the health center on the plantation, and the adult male unit fraction for each child was reduced according to the caloric value of the food supplied by the health center. The number of meals eaten away from home and the number of guest meals provided were too small to affect the results and were therefore not considered in the evaluation of the family dietaries.

The Institute study segregated the families into three expenditure groups. Of the 20 families selected for the dietary study there were about the same number in each expenditure group. Families having three, four, or five children living at home were selected, the only exception being one family with two children.

Tables 1 and 2 summarize food consumption data on the 20 plantation families and compare them with data from the Philippines.

TABLE 1
Percentage distribution of calories in the diets of 20 Filipino plantation families in Hawaii compared with that in average dietaries of families of laborers in the Philippines and with Concepcion's standard for Filipinos. Also average calorie intake per adult male unit per day

Food groups	20 Fili	PINO FAMILI HAWAII	ES IN	559 FAMILIES OF LABORERS	104 FAMILIES OF WORKING	Concep- cion's
	Minimum Maximu		Mean	IN RURAL PHILIP- PINES	MEN IN MANILA	STAND- ARD
	Percent	Percent	Percent	Percent	Percent	Percent
Cereals	57.1	85.5	71.5	83.4	70.9	50
Animal protein foods*	3.9	13.2	6.9	6.6	11.3	10
Milk and dairy products	0.6	14.5	4.2	0.1	0.9	10
Vegetables	0.5	22.8	4.2			
Fruits	0.02	2.4	0.2}	7.8	7.0	17
Legumes	0.0	3.4	1.0			
Sugar and candy	0.1	10.0	6.0			
Fats	0.0	14.4	4.3	2.0	9.9	13
Miscellaneous	0.0	6.1	1.7			
Average calorie intake per adult male unit			2017	2.000		
per day			2,817	2,309	2,107	

^{*} Meat, fish, shellfish, poultry, eggs, bagoong, shrimps, etc.

TABLE 2

Nutritive content per adult male unit per day of diets of 20 Filipino plantation families in Hawaii, the average for 106 Filipino families of laborers in the Philippines, and Sherman's recommended standard

FILIPINO PLANTATION FAMILIES IN HAWAII	Calories	PROTEIN	CALCIUM	Phos- phorus	Iron
Number					
		Grams	Grams	Grams	Grams
1	2,138	49.1	0.101	0.744	0.00788
2	3,097	94.4	.210	1.270	.01731
$\bar{3}$	2,773	74.8	.392	1.215	.01034
$\frac{3}{4}$	4,047	94,4	.281	1.512	.02112
5	2,887	65.0	.154	1.035	.01371
6	3,009	95.4	.263	1.423	.01478
7	2,519	65.7	,106	.999	.01137
8	4,186	95.5	.378	1.473	.01560
9	3,052	87.4	.304	1.411	.01700
10	2,275	56.0	.182	.823	.01014
11	2,842	68.4	.248	1.100	.01090
12	2,120	53.2	.148	.738	.00939
13	3,597	125.3	.701	1.946	.02307
14	2,390	54.7	.168	.806	.00745
15	2,306	62.6	.269	.939	.01139
16	2,478	55.1	.135	.843	.01213
17	1,666	56.5	.208	.843	.00952
18	3,511	90.1	.260	1.402	.01817
19	3,227	90.6	.251	1.226	.01534
20	2,210	62.9	0.161	0.893	0.01109
Average	2,817	75	0.246	1.132	0.0134
106 families of Filipino laborers in Leyte	2,223	76	0.209	1.423	0.022
Sherman's standard	3,000	70	0.63	1.32	0.015

COMPARISON OF HAWAII AND PHILIPPINE DIETS

Cereals supplied 70 percent or more of the calories in the diets of Filipinos in Hawaii as well as in the Philippines. (See table 1.) The proportion of 83 percent for the rural families in the Philippines (the Ilocos coast of Luzon and the Visayan Islands, from which many of our Hawaiian Filipino plantation families migrated) exceeded considerably that of 71 percent for the Hawaiian Filipino families and the Manila workingmen's families. The daily caloric intake for the 20 families in Hawaii was 500 to 700 calories in excess of that reported for the families in the Philippines.

Animal protein foods (fish, meat, eggs) contributed about 6 to 7 percent of the calories in the diet of the Hawaiian Filipino families and the rural families in the Philippines, but such foods comprised a larger proportion (11 percent) for the Manila families. Hawaiian Filipino families used much more milk and many more milk products than did any of the groups in the Philippines.

Fruits and vegetables furnished only about 5 percent of the total calories in the Filipino family diets in Hawaii but more than 7 percent in the diets of the families in the Philippines. This doubtless resulted in a diet of lower nutritive value for the Filipino families living in Hawaii, despite the fact that they had more milk.

The reports of the Filipino scientists group together the calories from sweets and fats. Percentages of calories from sweets and fats in the diets of the Manila and Hawaii families were about equal, and were about five times

as great as in the diet of the rural Philippines families.

The authors of the study of the Manila families give data (24) from which it is possible to calculate that sugar and sweets contributed 3.4 percent of the total calories for this group, whereas in the Hawaiian Filipino families these foods contributed 6 percent of the calories. In a diet containing generous quantities of all the other essential nutrients, sugar and sweets may safely supply 5 to 10 percent of the calories, but in a diet that is marginal or already deficient in minerals and vitamins, an increase in highly refined sweets in any form, which supply only calories, tends to decrease the relative intake of minerals and vitamins from other foods. Concepcion believes it is unwise to increase the sugar consumption of the Filipinos, especially of children and those with a limited diet, until their diets are greatly improved by foods that contain more minerals and vitamins (17).

Only one of the diet studies in the Philippines summarized in table 1 gives data on the intake of calcium, phosphorus, and iron. These figures are included in table 2 for comparison with similar data on the Hawaii families. There is a striking similarity in the intake of protein, calcium, and phosphorus per adult male unit of the two groups. There is more iron in the Philippine diet than in

the Hawaii Filipino diet.

The low calcium intake (0.246 gram per adult male unit per day) of the Filipino families seems to be characteristic of many oriental groups (1, 38, 41). This intake is only about one-half the requirement of 0.45 gram determined by Sherman and about one-third of the standard Sherman recommended (0.68 gram) for the 70-kilogram (154-pound) man.³ However, the weight of Filipino men is much less than that of Caucasians, being 50 to 55 kilograms (10, 16). If the difference in weight is considered, the calcium intake may be calculated to be about 75 percent of the minimum amount required. It is quite probable that a low calcium intake helps to account for the short stature of the Filipinos.

The quantity of protein appears to be adequate, but the quality could be improved. A large proportion comes from plant foods, and an increase in con-

sumption of animal protein foods would be desirable.

The vitamin intakes were not calculated for the 20 families for which data are given in table 2, and are not available for the Filipino families from the Philippines. However, from the figures for calorie distribution, it is possible to estimate that if highly refined white rice is used in such diets, the vitamin B_1 content is certain to be deficient. Because of the small quantity of fruits and vegetables used, the vitamin C content is certain to be below the moderate standard of 50 milligrams per day.

³ Since this study was made, the National Research Council has recommended an allowance of 0.80 gram of calcium daily for the adult man.

FEASTS

Many observers have commented on the generous hospitality of the Filipinos and their love of festivals and feasts. Cariaga (12) points out that festivals, in spite of being cooperative undertakings, are very expensive, especially in Hawaii. He explains that the Filipinos give feasts for several reasons: one "is to maintain prestige; another is that to give freely for community enjoyment is a social virtue."

Although the daily fare in rural areas of the homeland contains only small amounts of animal protein (see table 1), the concept of food suitable for a celebration is quite the opposite. Rice and the vegetables usually served are almost entirely absent from the festival table; expensive and frequently elaborate meat dishes constitute the menu. Cariaga states:

Chicken is boiled or stewed with pimento and other flavorings, and sometimes served with a sprinkling of green peas (usually canned) or with large stalks of canned asparagus. Barbecued pork roasted whole on a spit is the national delicacy, and no Filipino party would be complete without this crisp lechon. Beef cut into strips and fried, toasted over charcoal, breaded, or stewed with spices is also popular, and beef liver ground and made into an omelet is also a favorite (12).

Pigs, chickens, and ducks raised by Filipino families in Hawaii are used less for daily fare than for special occasions.

Social and group activities are psychologically desirable, but all persons concerned with the welfare of Filipinos should discourage such unwise expenditure of food money as is displayed at the typical Filipino banquet.

Feasts made up of meat dishes may be mentally and gastronomically satisfying, but they are physiologically and nutritionally unwise. Because the body can store little protein for future use, the quantities of the more expensive animal protein foods consumed should be about the same from day to day. The amount of meat and fish foods served at one feast could be used over a period of several weeks. Some of the money spent for meat and fish could very well be spent for milk for the children. Frequent use of internal organs, such as liver, is commendable and should be encouraged.

HEALTH OF FILIPINOS IN HAWAII

In Hawaii, as in the Philippines, tuberculosis ranks high as a cause of death among Filipinos, although the death rate in 1939 was 108 per 100,000 in Hawaii, as compared with 282 per 100,000 in the Philippines. From 1931 to 1941 either tuberculosis or pneumonia ranked first as the cause of death among Filipinos in Hawaii.⁴ Among the various racial groups in Hawaii the Filipinos had either the second or third highest death rate from tuberculosis for the four years 1936 to 1939, inclusive. Moreover, in 1939 the report of the Bureau of Tuberculosis showed that 20 percent of all cases of tuberculosis were among the Filipinos (22), who constituted only about 12 percent of the total population.⁵

⁴Personal communication from Miss Hester Lemon, Bureau of Vital Statistics, Board of Health, Territory of Hawaii.

⁵ Reports from the Board of Health, Territory of Hawaii, on tuberculosis among Filipinos from 1940 to 1944 indicate that the situation has not materially changed since the above was written.

Filipino deaths from beriberi are relatively fewer in Hawaii than in the Philippines. For 1939 and 1940 five other causes have each year accounted for a greater number of deaths. However, statistics furnished by the Board of Health show that from 1930 to 1940, 45 to 78 percent of all deaths due to beriberi in the Territory were among Filipinos, the total number varying from 52 in 1932 to 12 in 1940.

Since beriberi is directly related to insufficient vitamin B_1 in the diet, these figures indicate a great need for improvement in the food habits of this racial group. And although other factors are concerned in tuberculosis, here, too, better diet would undoubtedly reduce the number of cases.

NUTRITION AND GROWTH OF INFANTS AND CHILDREN

Studies in the Philippines (21) and in Hawaii (4) show that the growth of Filipino infants for the first 6 months is of the same order as that of Caucasians (American and British). After 6 or 7 months (about the period when Caucasian infants are receiving regular supplements to breast milk—cows' milk and other foods) the Filipino babies are 2 to 3 pounds lighter than the Caucasian. Concepcion reports studies (16) which indicate that Filipino children in

Concepcion reports studies (16) which indicate that Filipino children in the Philippines from the preschool age on seem to be smaller and lighter than children of other races, and he concludes that "of the different environmental factors affecting growth of the Filipinos, nutrition and intestinal parasites

are probably the most important."

The period between 6 months and 6 years is probably the most important, yet often the most neglected, period for Filipino children from the standpoint of nutrition and health. Every effort should be made to see that Filipino babies receive proper supplements to breast feeding, that other milk is added after 6 to 7 months of age and continued with generous supplies of vegetables, fruits, and whole grains during the important growing period up to school age.

DENTAL CONDITIONS

Although the specific factors and conditions that operate to cause dental decay have not been fully established and are under active investigation in many parts of the world, most workers in the field agree that a generally good diet low in refined sugar and with an abundance of minerals and vitamins for the pregnant mother and through the period of infancy as well as childhood and youth will promote the formation of sound teeth and help prevent decay.

Few published data are available on the condition of the teeth of Filipino children in Hawaii. Lam (29) in a study of 1,819 Honolulu kindergarten and first-grade children in 1931 examined 90 Filipino children. The Chinese, Japanese, and Filipino groups of children had an average of more than three defects per child. The Filipino average, 3.5 defects per child, was less than that of the other two groups.

Unpublished data supplied by Miss Helen Baukin⁶ for preschool and first-

⁶ Personal communication from Miss Baukin, supervisor of the Dental Hygiene Division of the Department of Public Instruction of the Territory of Hawaii.

grade children on all the Islands in 1929 and 1930 showed that 600 Filipino children were examined and that the average number of defects per child was 7.32. In this same survey 705 Chinese children showed 9.13 defects per child,

and 4,399 Japanese children 7.51 defects per child.

That the situation between 1930 and 1940 did not materially change for children of this age and a few years younger is indicated by unpublished figures furnished by Dr. Dorothy Dudley. In 1940 she examined 28 Filipino children between 3 and 6 years old in one plantation community and found 7.7 defects per child. Only one child in the group had no defects. On another plantation she examined 22 Filipino children between 3 and 6 years old, all of whom had some dental caries, and found that they averaged 8.8 defective teeth per child.

These data on the diet and the health of Filipinos indicate unsatisfactory nutritive conditions among many Filipinos, both children and adults, and point to urgent need for nutrition and health education of this racial group. A better standard of living would not necessarily improve this condition, but better choice of foods and home gardens doubtless would.

No data on the health condition of Filipino school children compared with

other groups are available.

HOME GARDENS IMPROVE DIET AND HEALTH

Thrifty and industrious Filipino families often have excellent gardens which yield sufficient vegetables and fruit to supplement what would otherwise be a limited and monotonous diet of low nutritive value. Other families equally favorably situated fail to use their opportunities to improve their diet by

maintaining a good home garden.

The vegetables grown in their garden by the family shown in figure 2 (p. 19) doubtless helped to keep the family in good health. At the time the picture was taken, the children were average or above the average standard for American children, both in size and weight for their ages and in weight for height. Examination by a dentist showed that the boy of 4 and the girl of 8 had perfect teeth, the baby of 10 months had two perfect teeth, and the girl of 10 had seven cavities, two of which were in permanent teeth. The father had excellent teeth, although one had a small cavity and two—one of them a third molar—were missing. The mother's teeth were not so good as the father's. She had three teeth missing—one of which was a third molar—and four cavities, two of which were in third molars. Her teeth may be considered excellent in comparison with those of average American women of her age.

In the picture, the mother is picking leaves from one of 16 marong-gay trees in the garden. Bitter melon may be seen growing on the fence. A complete list of vegetables found growing in this garden follows: bitter melon, Chinese cabbage, mustard cabbage, head cabbage, cowpeas, carrots, chives, chili peppers (both the seed pods and the tender tips of the plant are used), eggplant, lettuce, lemon grass, lima beans, luffa, string beans, Swiss chard, green onions, pumpkin, and tomatoes. Growing in a little pond in the center

⁷ Personal communication from Dr. Dudley.



Figure 2. Plantation family with an excellent garden.

of the garden (foreground) were taro, swamp cabbage, *Piper betel*, and watergrass (baláiba). The low wire fence served to keep out the *Bufo marinus*, to keep in the edible frogs, and to protect the fish kept in the pond. Some of the fish appeared to be a kind of carp, and there was also a catfish or two that had been caught in a fresh water stream and placed temporarily in the pond until needed. There were even a few small shrimps. Also in the garden were a number of young coconut trees, fruiting banana plants, and two papaya trees too young to produce fruit.

It was possible to study the diet and the health of this family with the assistance of the public health nurse in the community. A dietary study was made for a period of 1 week. An inventory of the food in the home at the beginning and at the end of the period was made. The family kept a record of all foods used during the week, including vegetables and fruits from the garden, fish and seaweeds from the sea, and gifts from friends, all of which were weighed.

The percentage distribution of calories from the various food groups, which may be compared with that of other Filipino families studied by reference to table 1, was found to be as follows: Cereals, 71.3; animal protein foods, 5.4; milk, 7.8; vegetables and fruits, 5.3; sugar and sweets, 3.9; and fats, 6.3.

Although the percentage of calories obtained from cereals is about the same as that for the 20 families studied, the percentages of calories from fruits and vegetables and from milk and fat are higher and that of sugar and sweets lower, all of which would tend to make a much better diet.

The nutritive value of the diet was also calculated on the basis of nutrients per adult male unit per day (see table 2) and found to be as follows: Calories,

3,000; protein, 80 grams; calcium, 0.44 gram; phosphorus, 1.32 grams; and

iron, 0.012 gram.

It is especially significant that this family had almost twice as much calcium per adult male unit as the average for the 20 families studied in Hawaii and a little more than twice as much as the Filipino families in the Philippines. Only one of the 20 families studied had as large a calcium intake, but the values for that family were much greater than for any of the other families in the group, not only for calcium but for all other nutrients. While the figure of 0.44 gram for calcium is much below Sherman's recommended standard of 0.68 gram, it is equivalent to the figure of 0.45 gram, which is usually considered the minimum requirement of a 70-kilogram (154-pound) man. The calcium intake is obviously marginal. It could be increased by the use of (1) brown instead of polished rice, (2) more vegetables of high calcium content, and (3) more milk than is now being consumed. The additional milk would be especially good for the younger children.

The vitamin intake for this family was calculated to be in excess of the need for vitamin A but about 33 percent deficient in both vitamins B_1 and C. Daily

use of brown rice and of papaya would correct these deficiencies.

If they could be found, it would be of great interest to study more families with good gardens and relatively good diets to see whether others show such good physical condition and dentition.

Foods Used by Filipinos in Hawaii

Filipinos use many foods common to all racial groups in Hawaii. The proximate composition and mineral and vitamin content of a number of such foods have been investigated by the Station laboratories;8 data for others have been reported in the literature and are generally available. The limited use of some foods did not seem to warrant a special study of their nutritive value.

This section includes (1) a list of foods often used in typical Filipino diets but for which descriptions and analyses are not included in this bulletin, (2) a brief discussion of cereals and their place in the Filipino diet, and (3) descrip-

tions, nutritive value, and use of 22 widely used Filipino foods.

LIST OF FOODS USED BUT NOT ANALYZED

FRUITS—avocado; banana, cooking and eating varieties; breadfruit (pakak, I.; rima, T.); guava; mango, green and ripe; papaya, green and ripe.

PROTEIN FOODS—meats, beef, pork, chicken, duck; fish, fresh and dried; shellfish (especially dried shrimp, hibe, T.), crab, lobster, opihi, shrimp, etc.;

eggs, duck and chicken.

VEGETABLES—bamboo shoots; cabbage, all kinds, especially nonheading types; corn, green; eggplant; fern fronds (pako, all dialects) (Athyrium esculentum Cop.); gourd, white-flowered; gourd, dishcloth (patola, I.). Legumes and legume products, fresh: bean sprouts, string beans, lima beans, yard-long

⁸ See Hawaii Agricultural Experiment Station Bulletins 60, 68, 77, 88, 96.

beans, young pods of sesbania, Lyon bean (sabauil, I.), yam bean (sinkamas, all dialects) (*Pachyrrhizus erosus* Urb.) root and the immature pods, which must be rubbed with salt or a dry cloth to remove hairs before cooking; dried: mungo, garbansos (Spanish beans), peanuts; bean products: miso, tofu. Okra; onions, mature and young green; peppers, red and green pods and green leafy tips; tapegrass (see p. 49); watercress; yam (ubi, all dialects and for various species); taro (gabi, T., V.) corms, stalks, and leaves.

MATERIALS USED FOR FLAVORING, SEASONING, AND COLORING—ajinomoto (Japanese food condiment composed of amino acids and salts or esters of amino acids, which in dilute solutions have a meatlike flavor; it is made by hydrolysis of vegetable or animal proteins with acid or alkali); annatto, a powder or sauce made from seeds of "lipstick" bush (Bixa orellana L.) high in pro-vitamin A (carotene); black rice (see p. 00); garlic; ginger, fresh roots; lemon grass (Cymbopogon citratus [D.C.] Stapf.), fresh or dried, used especially to season fish and shellfish dishes; patis (see p. 28); Piper betel, leaves used occasionally by adults for chewing with lime and nut of areca palm, and sometimes with tobacco; shoyu or soybean sauce; tamarind; vinegar.

MISCELLANEOUS—chocolate and cocoa; coconuts; mushrooms, dried; sea-

weeds (see pp. 44 ff.).

CEREALS—rice (see below); rice flour; noodles (mique, T.), made of wheat flour (see p. 23); corn; bread, all kinds.

FATs—pork fat; cottonseed oil.

CEREALS AND THEIR PLACE IN THE FILIPINO DIET

When cereals furnish 70 to 90 percent of the calories in the diet, the kind of cereal and the form in which it is eaten are matters of great nutritional importance.

RICE

According to a publication (45) of the Department of Agriculture and Commerce of the Commonwealth of the Philippines, "the cultivation of rice in the Philippines antedates historical records. Early historical accounts will bear out that in 1521 the Spanish navigator, Magellan . . . saw a race of sturdy 'Indios' farming rice."

Today most of the rice is raised by farmers cultivating small areas in the oriental fashion, transplanting by hand the young rice plants which are raised in seedbeds. Most of the harvesting and threshing is done by hand, but before the war power mills for polishing were in general use even in the remote districts (45). It is estimated⁹ that in 1941 approximately 90 percent of the rice used in the Philippines was polished and that not more than 10 percent was unpolished or partially polished rice.

The majority of adult Filipinos who migrated to Hawaii ate home-pounded rice, exclusively or for the most part, in the Philippines. As pointed out else-

⁹ Personal communication from Dr. I. Concepcion, National Research Council of the Philippines, Manila, 1941.

where (p. 12), such roughly milled rice is a good source of the B vitamins and contains more minerals than white rice.

Throughout the Orient, the use of white rice was once a mark of rank and wealth, just as the use of white bread was once an indication of high social and economic position in Europe. It is not surprising, therefore, that the Filipinos in Hawaii, like other oriental groups, use large quantities of white rice, which is normally cheap and generally available.

The percentages of total calories furnished by rice in family diets in the Philippines and in Hawaii are given in table 1 and are discussed on pages 11 and 14. None of the published dietary studies from the Philippines gives the daily rice consumption per person or per adult male unit, but one can estimate from the calories furnished by cereals that the daily consumption of rice per person must be approximately 1 pound. This is in good agreement with figures from a government bulletin published in 1939 which states that the per capita consumption of clean rice was 295 pounds per year, or about 0.8 pound per person per day (45).

The rice consumption of the 20 families studied in Hawaii (tables 1 and 2) ranged from 0.55 to 1.77 pounds, averaging 1.1 pounds per adult male unit per day.

When white rice is consumed in such large quantities, without adequate supplementary foods high in minerals and vitamins, a deficiency of vitamin B_1 is certain to result, although the degree may not always be severe enough to result in beriberi.

Filipinos use many types and varieties of rice for specific culinary purposes, though most of their rice is cooked without any special seasoning. They use glutinous rices, as do the Chinese and Japanese, especially for cakes, pastries, and other dessert dishes.

Some colored rices, which in normal times are imported from the Philippines, are used by Filipinos in Hawaii. So-called "black" rice is sold in Hawaii at a price five or ten times that of ordinary white rice. The apparent black color is due to the presence of deep red or purple pigments in the pericarp or outermost layer, 10 whereas the inner portion appears snowy white because it is of the glutinous or *mochi* type of rice. Red rice, which is occasionally seen in Hawaii, is a type with a tenacious red bran layer that may not be completely removed when the rice is polished. 11

When Filipinos in Hawaii were asked why they used some colored rice, in combination with white rice, they were usually vague as to the reason. Some stated that they believed it was to make the dish more attractive in appearance, others that it prevented beriberi. Inquiry of Dr. Concepcion in the Philippines brought the following explanation for the use of colored rice: Black rice, used mainly in specialties or fancy cookery, is used for the color. Red rice is used in certain places because of proximity of supply and demand, in some places because of as yet unexplained liking of the consumers; in other places

¹⁰ Personal communication from Dr. C. J. Engard, Botany Department, University of Hawaii

Hawaii.

11 Personal communication from Dr. I. Concepcion, National Research Council of the Philippines, Manila.

because of beliefs that red rice is superior to white rice; and among certain peoples because of the conviction that red rice is a good substitute for brown

rice (pinawa).

Frequent inquiries have come to the Station Nutrition Department regarding the nutritive value of black rice. Although no chemical analyses or vitamin assays of the colored rices have been made, it is believed that their nutritive values are not likely to be greater than those of ordinary brown or unpolished rice.^{11a} Black rice is used in quantities too small to make any real contribution to the diet, and the money spent for it by those with limited funds for food might much better be spent for ordinary brown rice or for local fruits and vegetables.

CORN

Corn, of American origin, has been grown in the Philippines since the 1500's and it now ranks next to rice as a food crop. It is grown in every province but forms a chief article of diet in the following: The Visayan Islands of Cebu, Oriental Negros, and Bohol; northern Mindanao; and the upper Cagayan Valley.

Dr. Concepcion reports that some is used in the immature stage as corn-onthe-cob. In the provinces named above, where it is used largely in place of rice, dry cracked corn is graded according to particle size, cooked, and served

as the main cereal.12

So far as can be learned, Filipinos living in Hawaii who may have used corn in place of rice in their homeland now prefer rice and use little or no corn in the dry stage. Green corn, however, is frequently grown in Filipino gardens in Hawaii.

WHEAT

Since wheat is a temperate zone plant, it is not grown in the Philippines. Flour and other wheat products that are imported occupy an unimportant place in the diet of the average Filipino and in many sections wheat products are never used.

Most Filipino families in Hawaii consume more bread than they did in their homeland because it is more available. At least one Filipino family runs an independent bakery in the Islands.

Mique (T.) or miki (dried noodles about one-fourth inch in diameter, usually sold in flat unwrapped packages) are in peacetimes imported from the Philippines. These are made of refined wheat flour, saline water, and some alkali to make them yellow in color (2). They are used especially in combination with meat or fish and vegetables to prepare a dish called *pansit*.

¹² Personal communication from Dr. I. Concepcion, National Research Council of the

Philippines, Manila.

^{11a} Biological assay of a sample of black rice made after this bulletin had gone to print showed it to have a thiamine content similar to that of unpolished (brown) rice—about 100 micrograms of thiamine per 100 grams of cooked rice, or approximately 240 micrograms per 100 grams on the dry, raw basis.

FOODS STUDIED— DESCRIPTION, NUTRITIVE VALUE, AND USE

ANCHOVY SAUCE

Buggoong a Monamon (I.), Bagoong na Dilis (T.), Ginamos Bulinao (V.)

"Bagoong" is the general term applied to a flavoring material made by mixing salt with small fish (i.e., anchovies), shrimps, clams, or oysters and allowing them to ferment for varying lengths of time, 2 days to 2 or 3 months, according to the product desired. It usually appears as a gray-colored mass, with the consistency of thick pea soup, and contains pieces of fish or shellfish. Sometimes the bagoong is tinted red or pink by adding ankak, a fermented rice product that has been colored with a kind of wood dye. Some varieties are seasoned with chili peppers or other condiments.



Figure 3. Bagoong—From left to right are Mabgas (fish), Alamang (shrimp), and Buggoong a monamon (anchovy); Center (mounted on a glass slide), dried anchovies.

Bagoong is used throughout the Philippines and by many Filipinos in Hawaii mainly as a condiment to flavor meat, fish, and vegetable dishes. It is reported from the Philippines that many families of the poorer classes live on a diet consisting chiefly of boiled rice and bagoong (12, 20, 24).

Most of the Visayans in Hawaii report that they use bagoong only occasionally, if at all, but the Ilocanos and Tagalogs use it three or four time a week

or even daily.

Buggoong a monamon is probably the type most widely used in Hawaii. Adriano and de Guzman (2) report that it is made in the Philippines as follows: "Anchovies are washed, drained, and put into large earthen jars, and salt is added (from 1 to 2 parts salt to 2 to 3 parts fish). The jars are tightly covered and the contents allowed to ferment from 2 to 3 months. At the end of this time the bagoong is ready for market. According to the Ilocanos, the longer the period of fermentation the better the flavor."

Buggoong a monamon is very popular in Hawaii, perhaps because it is the least expensive (in 1940 a 22-ounce jar retailed for 25 to 35 cents). More expensive types of bagoong (a 22-ounce bottle selling for 45 to 60 cents) may be found on the Hawaii market. They are bagoong-padas, bagoong-mabgas, and bagoong-ipon, all made of different varieties of small fish; bagoong a cabebe,

made of clams; and bagoong a alamang, made of shrimps (fig. 3).

Much of the bagoong used in the Islands is imported in normal times from the Philippines in 5-gallon cans or other large containers, and is packed by

wholesalers in small glass jars for the retail trade.

However, not all the bagoong sold in the Hawaiian Islands before the war came from the Philippines. Mrs. Kiyo Nakatani,¹³ who in 1940 investigated the product sold in seven Kona stores that catered to Filipinos, found that some of the bagoong had been made in Hilo and some had come from Japan. The bagoong made in Hilo contained chili pepper, ginger, and internal organs of the katsuo (bonito), and retailed at 10 cents per pound. One variety imported from Japan, similar to that made in Hilo but of better quality, was twice as expensive. Imported salted dried shrimp is also popular with the Filipinos in Kona.

Some families in the Hawaiian Islands make their own bagoong. One family visited had about a year's supply stored in crocks and large glass jars. All kinds of small fish and crustacea from the reefs are mixed with salt and allowed to ferment for months until the desired flavor and consistency are obtained.

A sample of typical buggoong a monamon from the Honolulu market was analyzed chemically to determine the proximate composition and its calcium, phosphorus, and iron content (tables 7, 8, 9). It was found to contain about 11 percent protein, but since bagoong is used in small quantities for flavoring other dishes, it is relatively unimportant as a source of protein in the diet.

The total ash content of the bagoong appears large (27.5 percent) because of the salt in the product (25.2 percent). This is a greater amount of salt than has been reported for two samples analyzed in the Philippines which contained 16 and 22 percent sodium chloride.

On the percentage basis, buggoong a monamon containing all the bones of the fish appears to be an excellent source of calcium, phosphorus, and iron,

¹³ Personal communication to the author.

but not more than a tablespoonful per person per day is likely to be used in most Filipino families. If the families have a varied diet the quantity of bagoong used is likely to be less.

However, chemical analyses of the bagoong as purchased (see table 8) are little indication of its nutritive value as consumed, for few Filipinos, if any, use it with all the fish bones. It is sometimes strained through a sieve and only the liquid portion is used. More commonly it is prepared as follows: The water in which vegetables are to be cooked is heated almost to boiling, about half a cup of the hot water is added to a couple of tablespoons of bagoong and stirred about in a dish, and the bagoong is mashed a little with a spoon. Then the mixture is allowed to settle and the liquid portion is poured off into the cooking pot. A second portion of hot water is added from the cooking pot (to which some of the bagoong has already been added), the fish and bones are stirred and pressed, and, after settling, the liquid portion is again poured into the cooking pot. By that time, not much except bones is left in the dish. The water containing the bagoong is brought to the boiling point and the scum that rises to the top is spooned off, because the Filipino housewife says, "It makes the vegetables black and does not taste good." The vegetables to be cooked are then added.

In order to determine the nutritive value of the buggoong a monamon as consumed, extracts of the sample originally analyzed were made by the addition of several portions of water, and the resulting product was analyzed for total ash, calcium, phosphorus, and iron.

The analyses showed that 88 percent of the ash was extracted. This large percentage is probably due to the fact that much of the total ash is common salt and therefore is readily soluble. Of calcium, 34 percent was extracted and of phosphorus 31 percent; a large proportion of these minerals remained in the fish bones that were discarded. The percentage of iron extracted was 82. A portion of the iron found in bagoong doubtlessly comes from contamination during its manufacture.

One tablespoon of unstrained buggoong a monamon furnishes about the same quantity of calcium, about two-thirds as much phosphorus, and six times as much iron as a half cup of milk. But 1 tablespoon of bagoong after straining or extracting with water furnishes about the same quantity of calcium, about half as much phosphorus, and 13 times as much iron as 3 tablespoons of milk.

Since the monamon from which the buggoong is made was devoid of vitamin A and thiamine, and it was impossible to induce the rats to eat the salty product, no vitamin D assay of buggoong a monamon was made. For all practical purposes it may be considered devoid of vitamins. Bagoongs made of other products were not tested, but the quantities normally used make it unlikely that they would furnish anything except flavor and salt.

The amounts of dried fish and various fish and shellfish sauces imported from the Philippine Islands into the Territory during the 4-year period 1937 through 1940 are shown in table 3.

The quantity of fish sauce (bagoong) imported in each of these 4 years was

about the same, an average of 360,000 pounds per year, but the declared value per pound for 1940 was almost twice that for each of the previous 3 years, 4.4 cents against an average of 2.3 cents (range of 2.2 to 2.5 cents). There was, however, considerable fluctuation in the quantities of dried fish imported. The number of pounds received in 1940 was two and one-half times that in 1939, five times that in 1938, and one and one-half times that in 1937. The declared value per pound in 1937 was only 2.3 cents, but it rose to 4 cents in 1938 and 1939 and to 6 cents in 1940.

The per capita consumption of imported bagoong and of dried fish in the period 1937 through 1940 is shown in table 4. The apparent per capita consumption of dried fish varied greatly in this period but that of bagoong remained about stationary. On the basis of figures obtained from Filipino families, we estimated the per capita consumption of bagoong in many families to be as much as 10 to 12 pounds per year, almost twice the quantity imported per capita. The homemade bagoong and that produced commercially in the Territory could easily account for the difference.

Table 3¹⁴
Importation of fish products from the Philippines into Hawaii

		DRIED FISH		Fish sauces				
YEAR	Pounds	Value	Declared value per pound	Pounds	Value	Declared value per pound		
1937 1938 1939 1940	43,765 13,398 26,926 70,317	\$1,007 540 1,068 4,185	Cents 2.3 4.0 4.0 6.0	353,205 409,682 340,573 343,399	\$8,927 9,064 7,808 15,211	Cents 2.5 2.2 2.3 4.4		

TABLE 4

Annual per capita consumption by Filipinos in Hawaii of dried fish and fish sauces imported from the Philippines

	. Year Filipino population*				Dried fish per capita consumption	FISH SAUCE PER CAPITA CONSUMPTION
					Pounds	Pounds
1937				52,922	0.83	6.7
1938				52,620	0.25	7.8
1939				52,289	0.52	6.5
1940				52,149	1.35	6.6

^{*} Population figures are from the Board of Health estimates.

¹⁴ Data collected by the authors from the Honolulu office of the Collector of Customs and the Bureau of Foreign and Domestic Commerce.

PATIS

Patis, used in Hawaii to a limited extent as a condiment, is a byproduct in the manufacture of bagoong made from shrimp (bagoong a alamang).

Adriano and de Guzman (2) report that after the shrimp and salt mixture has fermented from 5 to 10 days, it is pressed and that patis and heko are made from the liquid which is drained off. The brownish liquid is boiled and the scum which appears on top is skimmed off. This scum, a brownish-black product called heko, is used to flavor food. When no more scum or heko forms, the boiling liquid is allowed to cool until the sediment settles. The clear liquid is decanted, bottled, and sold as patis.

Patis is used for flavoring meat, vegetable dishes, and salads in much the same way as bagoong is used. However, much of the product known as patis in Hawaii is not the clear brown liquid flavoring material prepared as described here. Some families buy or make their bagoong in large quantities, and, after allowing it to stand until the heavier ingredients settle and there is a deep layer of clear liquid at the top, they pour off the clear portion and use it as patis. This furnishes what they consider a satisfactory product at less than half the cost of true patis.

DRIED ANCHOVIES

Monamon (I.), Dilis (T.), Bulinao (V.)

Dried anchovies, in normal times imported from the Philippines, and other imported small dried fish are important items in the Filipino diet in Hawaii. They normally retail at 25 to 35 cents per pound.

Balagtas (8) states that Anchovia commersoniana Lacepede is the most common of all the anchovies found in Philippine waters and that it is usually

dried or made into bagoong.

Adriano and de Guzman (2) report that "daing" refers to any kind of fish that has been salted and then dried. In Hawaii the term is most commonly applied to dried anchovies called monamon or daing a monamon. The washed fish are either soaked in a strong brine or placed between layers of salt. After standing 1 to 6 hours they are removed from the salt and dried in the sun for 1 to 2 days. However, a 1939 report from the Department of Agriculture and Commerce of the Philippines (44) states that "anchovies, because of their small size, are simply sun-dried without the use of salt." They state further, "There are about eight species of anchovies or dilis (Engraulidae) in the Philippine waters."

Dried anchovies-monamon or dilis-have been analyzed chemically and

assayed biologically for vitamin A, thiamine, and vitamin D.

Monamon is commonly used only for flavoring and the bones are discarded. If both the flesh and the bones are eaten, they are good sources of calcium, phosphorus, and iron. Feeding experiments demonstrated that monamon was devoid of vitamin A and thiamine.

Monamon was tested for its antirachitic potency and found to contain 366 International Units of vitamin D per 100 grams, a value equal to that of some canned salmon (salmon 200 to 800 International Units vitamin D per 100 grams) (32).

SHRIMPS

To Filipinos both in the Philippines and Hawaii, shrimps are an important flavoring food. Salt water and fresh water varieties are used in both the fresh and dried states.

In the Philippines, the farmer catches tiny fresh water shrimps from irrigating ditches or streams and uses them to flavor his dinengdeng (p. 57). In Hawaii also, Filipinos hunt for fresh shrimps in the ocean and streams and utilize them whenever possible.

Because the supply of fresh shrimps is limited, in normal times dried salt water shrimps imported from the Philippines or Japan are more generally used.

Adriano and de Guzman (2) report that hibe (T.), dried salt water shrimps, are prepared as follows: "The shrimp ranging from 2 to 5 cm. long are cooked in a small amount of water. The skin and other non-edible parts are removed and the cooked shrimps are sundried." Fresh water shrimps are cooked in salted water and then dried in the same way as salt water shrimps. The dried fresh water shrimps are called "hipong maalat" (T.).

Dried salt water shrimps (hibe) from the Philippines are reported to contain almost 50 percent protein. No values are given for the minerals (2). Japanese dried shrimps are reported to contain 41 percent protein, 0.700 percent calcium, 0.654 percent phosphorus, and 0.0133 percent iron (48). However, since dried shrimps are used in small quantities, mostly for their flavoring value, they make only small contributions to the protein and mineral needs.

No chemical analyses or vitamin assays of shrimps were made for this publication.

BANANA BUD

Sabunganay (I.), Puso ng saging (T.), Puso sa sab-a (V.)

Following the custom of their homeland, Filipinos in Hawaii use the young bracts and flowers of the banana bud as a vegetable, as do the peoples of India, Malaya, and the islands of the Netherlands East Indies (43).

The sample we analyzed was an equal mixture of the bracts and flowers of an apple banana bud and a Bluefield banana bud. The outer bracts are commonly discarded because they are tough, but the flowers are used. The young, tender inner bracts as well as the adhering flowers are used. In their preparation for table use, these portions are soaked in salt water (4 percent sodium chloride solution was used in the laboratory) for 5 minutes, rinsed in fresh water, and then boiled or fried with shrimp or fish. The bud has a bitter and astringent taste, and some recommend soaking in salt water for a much longer period (1 hour) and squeezing in fresh water three or four times to remove all the bitter flavor.

Banana bud was found to be a poor sauce of calcium, phosphorus, and iron.¹⁵ No biological determinations were made of the vitamin A and thiamine content, but chemical tests of the raw and cooked bud showed it to be almost

¹⁵ See page 69 for basis for comparative values of vegetables as sources of minerals and vitamins.

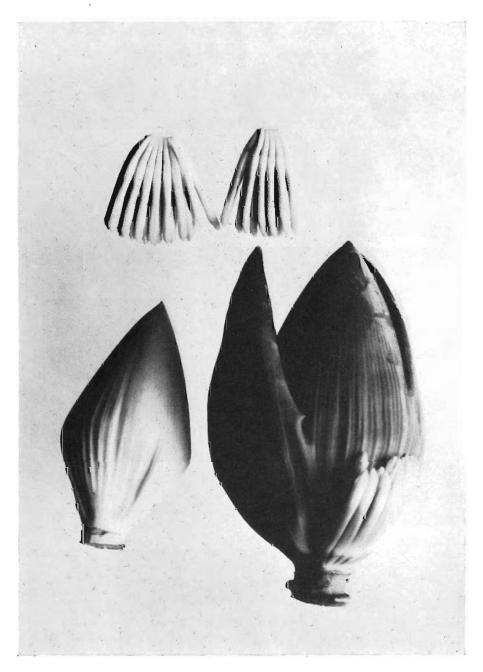


Figure 4. Banana bud.

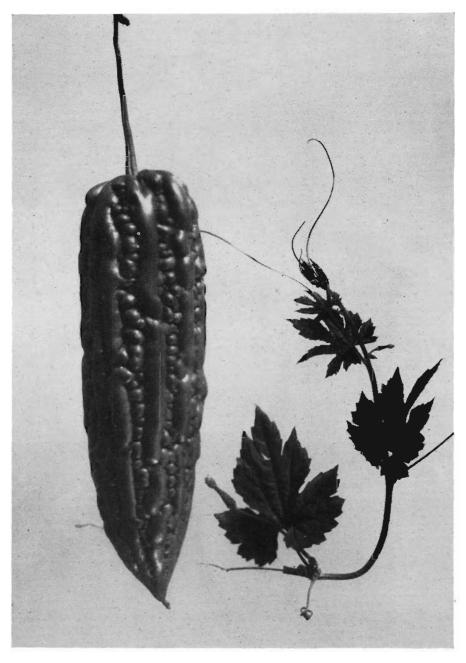


Figure 5. Bitter melon.

devoid of ascorbic acid. Since the original content of minerals in the bud is not great, there is probably little mineral left after soaking and washing.

Banana bud in the quantities used probably does not make any important

contribution to the diet.

BITTER MELON

Paria (I.), Ampalaya (T.), Palia (V.)

The plant of the balsam pear, or bitter melon, is an annual climbing vine. In some gardens it is allowed to creep along the ground; in others it is planted near a fence or a crude trellis so that it may climb. The young fruits are usually covered with paper to protect them from melonflies.

The pale green, warty fruit, about 5 inches in length, is used extensively by the Chinese and occasionally by the Japanese. In Hawaii, the Filipinos use the tender tips of the plant with meat, fish, bagoong, or in mixed vegetable dishes. The tips and tender leaves are sometimes precooked and combined with tomatoes or other vegetables in a salad. Filipinos use the greens more frequently than the fruit.

Small and young fruits are not so bitter as more mature ones. The entire young, immature fruits, including the seeds, are added directly to meat and fish dishes. The more mature fruits are parboiled and squeezed in salted water to remove some of the bitterness before they are added to the cooking pot. The seeds of the more mature fruit are always discarded.

Chung and Ripperton's (15) analyses of the fruit of the balsam pear showed it to be a poor source of calcium and a good source of phosphorus and iron. We found the fruit after cooking to be a poor source of vitamin A and thiamine but a good source of ascorbic acid. About half of the ascorbic acid was lost as a result of cooking.

Chemical analysis of the tender green tips showed that they had more than 6 percent crude protein $(N \times 6.25)$, an unusually large percentage for a green

leafy vegetable. Three samples were analyzed to verify this value.

Raw tender tips of ampalaya were found to be good sources of calcium, phosphorus, and iron. The cooked greens contain relatively less of these minerals if they are washed two or three times after cooking to remove some of the bitter taste. The cause of the bitter flavor is unknown, but most of the bitter substances in vegetables and fruits are tannins or glucosides.

The tender leafy tips, after being steamed for 10 minutes, were found to be an excellent source of vitamin A and a fair source of thiamine and ascorbic acid. In the raw state the leafy tips contain relatively large quantities of ascorbic acid, but the sample analyzed after cooking showed a loss of almost 80 percent of this vitamin.

COWPEA

Utong (I.), Sitaw (T.), Balatong (V.)

The cowpea, a legume that originated in Asia, is frequently confused with some varieties of beans by the layman, given special varietal names by some botanists, and by others merely placed in groups according to color of pods and

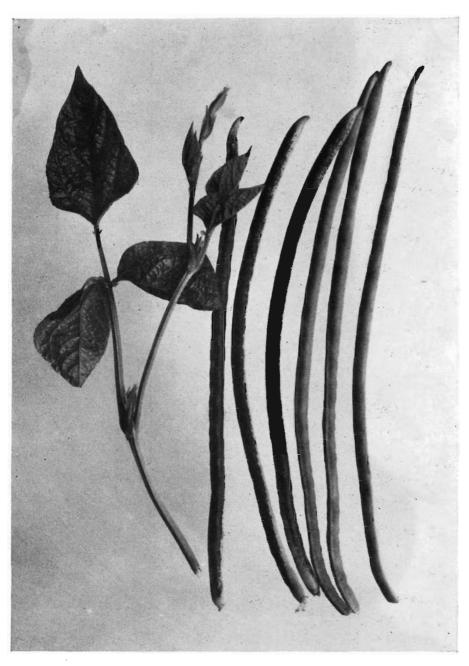


Figure 6. Cowpeas—two varieties, green (on the right) and reddish purple, and tips of the vine.

beans. The pods vary in color from green to red and black, with various combinations of colors.

In the young stage the fleshy pods with immature seeds are eaten much like string beans. When they become somewhat more mature and the fleshy portion is less tender, the seeds are removed and used like green lima beans.

In the pod stage in which we analyzed them, a green variety contained 3 percent and a red and green variety 3.4 percent protein, which is about 1 percent more than the average for string beans. These green cowpeas were found to be a fair source of calcium, phosphorus, and iron.

A variety with red flecks on the green pods was used for vitamin assays. In the cooked state, these were found to be a good source of vitamin A and a fair source of thiamine and ascorbic acid. Cooking destroyed 30 percent of the ascorbic acid.

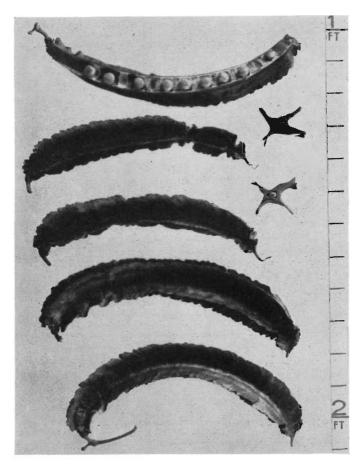


Figure 7. Goa or winged bean.

Filipinos use the young shoots of the cowpea, which vegetable markets sell in bundles weighing about 1 pound. The tender tips are broken off and used with some of the more tender leaves. They are cooked and served in a salad, or mixed with other vegetables, usually with tomatoes but also with bagoong and ginger.

The shoots analyzed contained slightly more protein (3.4 percent) than the

green cowpeas (3.0 percent).

The cooked shoots are a good source of calcium and iron and a fair source of phosphorus. No tests were made to determine their content of vitamin A and thiamine. Chemical determination of the ascorbic acid content showed them to be a good source in the raw state but only a fair source after cooking for 12 minutes.

GOA OR WINGED BEAN

Pal-lang (I.), Sigarillas or Kabay (T.), Segidillas or Cigarillas (V.)

One of the numerous legumes used in Hawaii by the Filipinos as well as by other racial groups is the Goa bean. The plant, originally from India and introduced into Hawaii by the Chinese or Filipinos, is a trailing or climbing vine. The delicate light green beans, often referred to as square beans, or winged beans, have flat sides and four thin green wings (fig. 7). At the tender stage when the pods are most desirable as a vegetable, the beans within are extremely small, one-eighth inch or less in diameter.

The beans are used in salads, soups, and vegetable, meat, and fish dishes. They are best when cooked not more than 5 minutes, since the delicate flavor

and texture are readily destroyed by overcooking.

In the green stage Goa beans are unimportant as a source of protein. They are a good source of calcium, a poor source of phosphorus, and a fair source of iron.

Cooked Goa beans are a fair source of vitamin A and thiamine, but are almost devoid of ascorbic acid.

HORSE-RADISH TREE

Marong-gay (I.), Malung-gay (T.), Camung-gay (V.)

The Filipinos doubtless brought the horse-radish tree (fig. 8) to Hawaii from their homeland. In Hawaii, it grows in many Filipino gardens and around the plantation camps. It will attain a height of 20 to 30 feet; but, since the tender ends and leaves are continually plucked for use as food, many trees

remain from 3 to 8 feet high and have few branches.

The root may be ground and used as a substitute for horse radish, but it is rarely utilized in this way by the Filipinos. They prize the tips, tender leaves, and flowers as a vegetable in salads and soups and as flavoring in fish and meat dishes. The leaflets are always stripped from the tougher stems before being used, but the very tender stems at the ends of the branches are retained. The young pods, if very tender, are used entire; when slightly more mature, the hard outer covering and fibrous tissue are removed, and only the pulpy portion and soft seeds are used.



Figure 8. Horse-radish tree—leaves, flowers, and mature and immature pods.

Large malung-gay pods a foot or more in length are often sold tied in bundles of 10. They are cooked with dry codfish, or as dinengdeng. (See p. 59.)

The pods are rarely used alone, probably because not enough are available at one time. More often they are added to a mixed vegetable stew, and some of the leaves and flowers are also used. In India the pods, called "drumsticks," are considered a great delicacy and are used especially in a spiced dish which the foreigner refers to as a vegetable curry.

The leaflets are thin and small and have a lower moisture content (75.5 percent) than most green leaves. Their crude protein content of more than 9 per-

cent is unusually high for a green leafy vegetable.

On the percentage basis (table 8) the leaves appear to be an excellent source of calcium and a good source of phosphorus and iron. However, the leaflets are so small and light that even when a family uses them fairly generously, the weight of the leaves consumed is slight; therefore, the quantity of calcium and other minerals obtained is small.

From information gained from a number of Filipino families regarding the quantity of malung-gay leaves used in the diet and the weights of branches and leaflets determined in the laboratory, it was calculated that the average tripinnate leaf has only about 2.5 grams, or less than one-tenth ounce, of edible tender tips and leaflets. Since not more than two and often less than one of these leaves is used per person per day in prepared dishes, malung-gay is likely to furnish not more than one-eightieth of the daily standard for calcium, 0.69 gram. Even more generous use of malung-gay would result in its furnishing only one-fortieth of the daily adult calcium standard. The use of malung-gay should be encouraged, but one should not be deluded into thinking that those who use it daily may thus be satisfying an important part of their calcium needs.

On the weight basis, the cooked leaves and tips appear to be an excellent source of vitamin A (approximately 35,000 International Units per 100 grams) and a good source of thiamine and ascorbic acid. In the raw state they were found to be an excellent source of vitamin C (134 milligrams per 100 grams), but when analyzed after cooking (p. 68) more than 70 percent of their original ascorbic acid was found to have been lost.

Although malung-gay contains a large amount of vitamin A per unit of weight, the quantity obtained may not be as great as that from vegetables with a lower value, because the amount eaten daily is small. However, the leaflets from one tri-pinnate leaf (2.5 grams) may furnish about one-seventh of the day's requirement of vitamin A but only negligible amounts of thiamine and ascorbic acid. If two such leaves or a little more are consumed daily, malunggay may supply about one-third of the day's need for vitamin A.

In contrast to the leaves, the pods have a protein content of only about 2 percent and very small quantities of calcium, phosphorus, and iron.

No assays of the pods for vitamin A and thiamine were made, but a report from India shows them to be a poor source of vitamin A (7). We found both the raw and cooked tender pods to be an excellent source of ascorbic acid. Despite a loss of 27 percent of the ascorbic acid as a result of cooking, they contained more ascorbic acid than most fruits (126 milligrams per 100 grams)

¹⁶ The National Research Council increased the daily adult allowance for calcium to 0.80 gram in 1942.

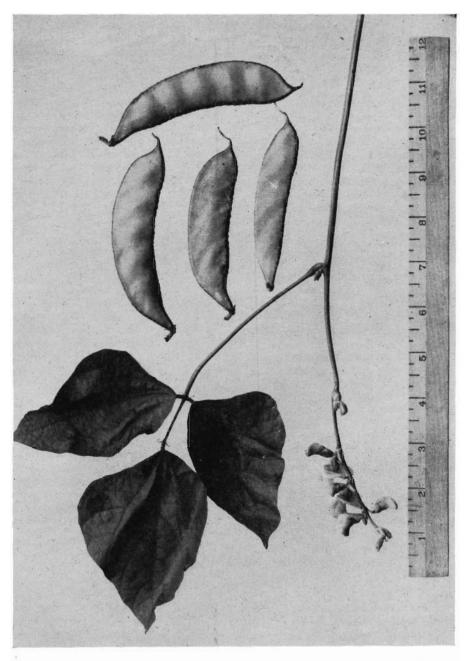


Figure 9. Hyacinth beans.

and greatly exceeded the ascorbic acid value of any of the other Filipino foods analyzed.

HYACINTH BEAN

Parda (I.), Bataw (T.), Bat-ao (V.)

The hyacinth bean is an annual climbing vine which bears large flat pods containing small beans. Two varieties are common. In one the pod is entirely green; in the other it is green with lavender edges. The whole pod with the beans is eaten. At the tender stage considered most palatable, the seeds are only about one-eighth inch in diameter. When mature, the pods are discarded and only the seeds are used.

Analyses of the tender pods with small beans showed them to contain only 2 percent of protein. Parda are a fair source of calcium, iron, vitamin A, and thiamine and a poor source of phosphorus. A fair source of ascorbic acid when raw, they lose half of this vitamin when cooked; consequently they have negli-

gible quantities of it in the cooked state.

JUTE (FILIPINO SPINACH)

Saluyot (I.), Togabang (V.)

The jute plant was introduced into Hawaii by the Filipinos. It may grow to a height of 5 to 6 feet but is usually harvested in the young stage when only 6 to 9 inches high. For the market the plants, including roots, are tied into bunches, each weighing about half a pound. The tender tips (about 3 to 4 inches of each plant) are favorite greens of the Ilocanos. Other Filipino groups rarely eat them. Saluyot is usually mixed with other greens and cooked with fish or bagoong.

When cooked, jute has a slimy quality to which some persons object. The slimy quality of this vegetable and of Malabar nightshade (p. 41) is believed to be due to their content of plant mucilages—complex carbohydrate substances which swell enormously in water but are not completely soluble. Very little is known about the biochemistry of plant mucilages. They are usually associated

with succulent plants.¹⁷

Young jute plants are an excellent source of calcium, having 0.170 percent, which is an unusually large quantity for green vegetables. They are a good source of iron and a fair source of phosphorus. Cooked saluyot was found to be an excellent source of vitamin A and a fair source of thiamine. Although saluyot is a good source of ascorbic acid in the raw state, it contains practically none after cooking.

MALABAR NIGHTSHADE

Libato (T.), Alugbati (V.)

Malabar nightshade, which originally came from Asia, is a trailing vine with small black or dark purple berries. It grows readily with little cultivation in Hawaii and may reach a length of 10 feet. The Filipinos prefer the plant in

¹⁷ Personal communication from Dr. H. F. Clements, Botany Department, University of Hawaii.

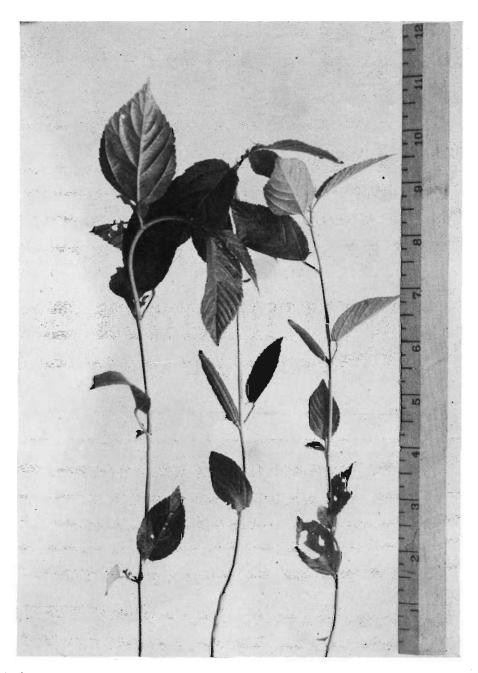


Figure 10. Jute (Filipino spinach).

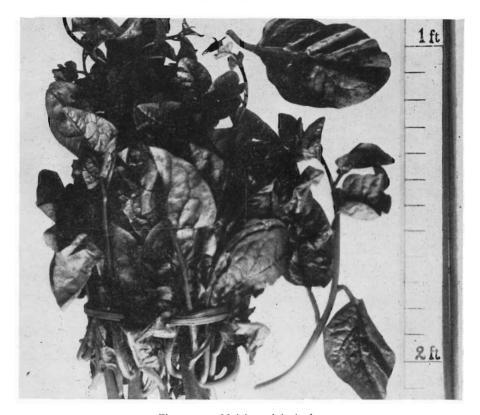


Figure 11. Malabar nightshade.

the young stage, before it begins to vine. It is also used by the Japanese and Chinese in Hawaii. The young plants are often pulled up by the roots, tied in bundles, and sold on the market.

When cooked, Malabar nightshade has a slippery quality that is disliked by some. (See p. 39, plant mucilages.)

The Filipinos use libato in soup, as a vegetable, and combined with fish or meat.

Our analyses show Malabar nightshade to be a good source of calcium, a poor source of phosphorus, and a good source of iron.

It is an excellent source of vitamin A, a fair source of thiamine, and even after cooking it is an excellent source of ascorbic acid.

PIGEONPEA

Cardis (I.), Kadios (T.), Cadios (V.)

The pigeonpea, a shrub that attains a height of 5 or 6 feet, is grown in many sections of Hawaii as a cattle food but is not generally used for human food. It originally came from India, where its value as a human food is well appreciated and where it is extensively used in the fresh as well as the dry form.

In Hawaii, Filipinos eat pigeonpeas mainly in the young green stage after shelling them from the pods. Occasionally they eat the very tender pods. In either form they are used as a vegetable seasoned with bagoong, and also in soups and stews.

Even in the young stage pigeonpeas are a good source of vegetable protein, containing 7 to 8 percent of this nutrient. The tender green pigeonpeas which we analyzed contained little calcium but were a good source of phosphorus and iron.

After being steamed for 15 minutes, the shelled peas were found to be a fair source of vitamin A, an excellent source of thiamine, and a good source of ascorbic acid. The green pigeonpeas were the only Filipino vegetable analyzed that showed a greater ascorbic acid content after cooking than in the raw state. The increase probably resulted from reduction of the dehydroascorbic acid.

PUMPKIN (SQUASH)18

Carabasa (I.), Kalabasa (T.), Calabasa (V.)

Several varieties of pumpkin and squash are important food plants in the Philippines. In Hawaii many Filipino families grow the vines in their yards or gardens, and use as food not only the large orange-colored fruits but also the surplus blossoms and tender young tips of the vines. The blossoms are not ordinarily seen on the market, but bunches of the squash or pumpkin vine tips, about 12 inches in length (each bunch weighing a pound or more) are sold by vegetable vendors and stores catering to Filipinos. Only 3 to 6 inches of the very tender tip that breaks off readily are commonly used, but more may be utilized according to the taste and economic status of the housewife.

The squash flowers are cooked with a little pork, tomato, and seasoning. The tips are cooked and used as a salad or in combination with other vegetables, seasoning, and fish or bagoong. The squash fruit is cooked alone and seasoned with bagoong, or combined in cooked dishes with other vegetables, fish, or meat. Combined with coconut milk and sweetened, the fruit is used as a dessert.

Squash or pumpkin flowers are a fair source of calcium and iron and a poor source of phosphorus. They are fair sources of vitamin A but after cooking retain negligible quantities of ascorbic acid. Preliminary tests showed the flowers to have little or no thiamine.

Squash vine tips and young leaves are a fair source of calcium and thiamine and a good source of phosphorus, iron, and vitamin A, but contain practically no ascorbic acid after cooking.

The squash sample analyzed contained about 15 percent carbohydrate, a value greater than is usually reported for winter-type squash. Squash fruit is a poor source of calcium and iron and a fair source of phosphorus.

Pumpkin and squash with deep yellow flesh are excellent sources of vitamin A. They are only fair sources of thiamine and ascorbic acid on the weight basis, but they may constitute good sources of these two vitamins because they are usually eaten in relatively large quantities.

¹⁸ The terms pumpkin and squash are often used interchangeably. Horticulturists state that one species of pumpkin (*Cucurbita moschata*) and the true squashes (*Cucurbita maxima*) will readily cross (13). Some of the varieties used by Filipinos in Hawaii are doubtless crosses of these two, while some are true pumpkins and some true squashes.



Figure 12. Pumpkin (squash) fruit, flowers, tender tips, and leaves of the vine.

PURSLANE

Ngalog (I.), Kulasiman (T.), Alusiman (V.)

Purslane, a wayside plant growing in neglected gardens and uncultivated spots, is used to a limited extent by the Ilocanos. They like its tart flavor when cooked for a short period with salt or with bagoong or, after cooking, combined in a salad with other vegetables such as tomatoes. Wester reports that in the Philippines it is boiled with meat and eaten as a vegetable (58).

The tart flavor of purslane is probably due to the oxalic acid which it contains. The calcium content, though relatively great, is probably not well utilized because it is in the form of calcium oxalate, which the body cannot absorb. Purslane is a poor source of phosphorus but a good source of iron.

Purslane is a good source of vitamin A, a poor source of thiamine, and a fair source of ascorbic acid.

SEAWEEDS

The Filipinos use a number of seaweeds or algae in their homeland, and in Hawaii they rapidly discovered those that suited their tastes. A report of the Department of Agriculture and Commerce of the Philippines (44) states that "twenty-one species of edible seaweeds are found around the small islands north of Luzon and also along the coastal region of northern Luzon." The Ilocanos from this region make the greatest use of seaweeds in Hawaii. They do not relish all of those liked by the Hawaiians. They like neither limu kohu, considered by most Hawaiians to be the finest and most delectable of all limu, nor limu lipoa, an algae widely distributed in the Islands and a great favorite of the Hawaiians. However, the Filipinos use the Hawaiian marine algae shown in figure 14 (nos. 2, 3, and 5), and they probably use others of which the authors have not learned.

The seaweeds are gathered direct from the rocks on which they grow and, at certain times of the year when the waves break them from their holdfasts and wash them near the shore, they are gathered in great quantities in the shallow water.

No chemical analyses of the Hawaiian seaweeds eaten by the Filipinos were made. A study of the nutritive value of all commonly used edible Hawaiian marine algae may be undertaken in the future. Three commonly used Hawaiian limu—eleele, lipoa (35), and kohu¹⁹—have already been analyzed, and analyses of dried seaweeds, especially of several species of laver or *Porphyra*, are available in the literature (37, 48). In the fresh state these three Hawaiian limu were found to contain about 90 percent of water, $2\pm$ percent of crude protein, less than 0.1 percent of fatty substances extracted by ether, and 1.5 to 2.5 percent of ash. The carbohydrates of algae are not utilizable by man as food but give bulk to the intestinal contents and thus stimulate the normal movements of the digestive tract.

These three Hawaiian algae showed variable amounts of calcium (0.089 to 0.584 percent) and much smaller proportions of phosphorus. There are no reports in the literature which tell how well the minerals (except iodine) of seaweeds are utilized.

¹⁹ Unpublished analyses, Nutrition Department, Hawaii Agricultural Experiment Station.

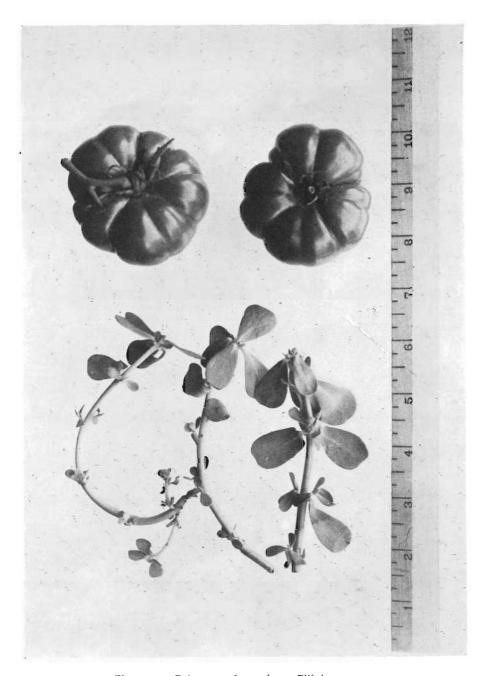


Figure 13. Below, purslane; above, Filipino tomato.

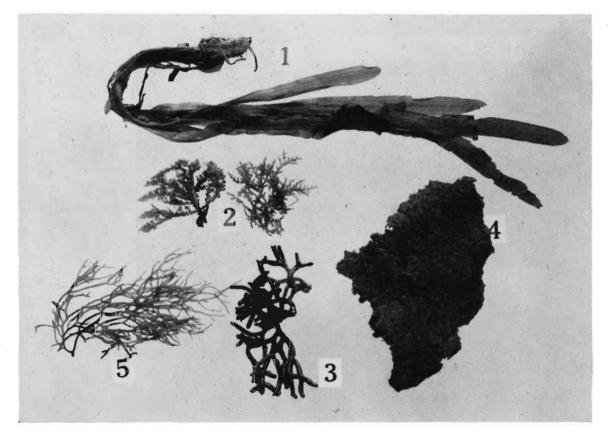


Figure 14. Fresh and salt water plants: no. 1—tapegrass; nos. 2, 3, 5—fresh Hawaiian marine algae (in no. 2, the species on the left is Laurencia papillosa [Forssk.] Grev.; the one on the right has not been identified); no. 4—dried Porphyra from the Philippines.

Various reports in the literature (35, 37, 48) indicate that green seaweeds are fair to good sources of vitamins A and B. A number of surface marine algae taken from the Pacific Ocean off the coast of Washington have been reported to contain, in the fresh state, as much ascorbic acid as market oranges and lemons. However, an equal number of algae from the same locality showed low values of 1 to 9 milligrams of ascorbic acid per 100 grams of fresh material (42). The few tests we made on edible marine algae in Hawaii showed very low values for ascorbic acid.

LIMU AALAULA (HAWAIIAN)
Popoklo (I.), Silingsiling (V.), (Codium Mülleri Kütz.)

Popoklo, a dark green algae liked by both Hawaiians and Filipinos (fig. 14, no. 3), usually grows rather far out on coral reefs and on exposed rocks where it gets at least mild surf. After being thoroughly washed in fresh water, it is eaten raw, usually with tomatoes. It is never cooked or blanched, for it becomes soft and disintegrates quickly with heat.

The ascorbic acid content of a specimen which had been kept in sea water in a refrigerator for 2 days after gathering was found to be low—only 5 milli-

grams of ascorbic acid per 100 grams.

LIMU MANAUEA (HAWAHAN)
Guraman (I.), Gulaman (V.), (Gracilaria corolopifolia [J. Ag.])

Limu manauea (fig. 14, no. 5), a smooth, branching seaweed of firm texture, varies in color from a brownish-pink or red to almost white, apparently according to the amount of sunlight it receives. It is eaten both raw and cooked. The Filipinos eat it with salt and tomatoes, either fresh or after dipping it into boiling water. They also combine it with tomatoes, onions, and vinegar.

Large quantities of limu manauea are gathered at certain seasons of the year. The seaweed, without being washed in fresh water, is dried in the sun and stored away for future use. When needed, the seaweed is soaked for a day, cleaned, chopped into small pieces, and eaten with tomatoes and salt or with

vinegar.

An assay by the chemical method showed a sample of this species to be devoid of ascorbic acid in both the raw and cooked states.

LIMU MANEONEO (HAWAIIAN)

LIMU LIPEEPEE (HAWAIIAN)

Tartariptip (I.), Layalaya (V.), (Laurencia—two species)

Two species of *Laurencia* (fig. 14, no. 2) are liked by both Hawaiians and Filipinos. These seaweeds are eaten raw with tomatoes, or, after hot water has been poured over them, they are combined with mashed tomatoes and eaten cold.

GAMET (I.)

A dried product called gamet (fig. 14, no. 4) is used by some Filipinos in Hawaii. In normal times it is sent directly from the Philippines. It cannot be purchased at retail stores in Hawaii.

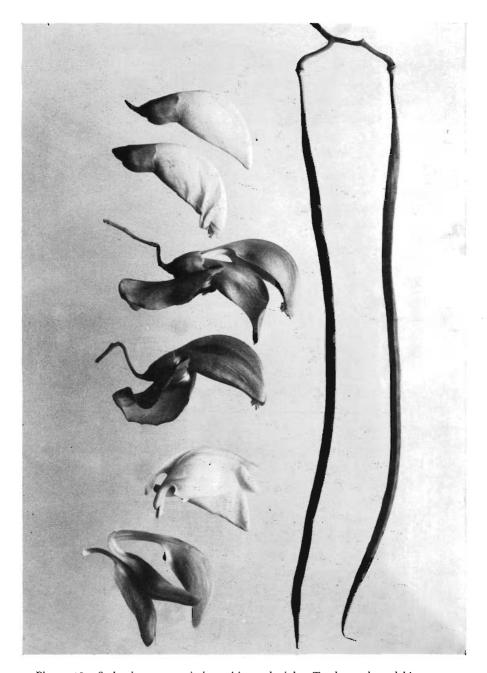


Figure 15. Sesbania—two varieties, white and pink. Tender pods and blossoms.

Gamet is a species of Porphyra similar to the algae nori (37). Nori, much favored by the Japanese, is also used by some Filipinos in Hawaii. The Filipino product is composed of pieces of the seaweed pressed into flat round cakes about 7 inches in diameter.

Gamet may be served in several ways. It is added to hot soups containing vegetables, fish, shrimp, or chicken. It may be cut into small pieces or strips, softened in a small amount of water, and served with salad vegetables, especially, sliced or mashed tomatoes. It is sometimes fried dry and crisp in a very small amount of fat and served with rice or vegetables.

TAPEGRASS

Baláiba (I.), Sabotan-buáia (T.)

Tapegrass, a fresh water plant (fig. 14, no. 1), grows in slow-moving streams in Hawaii. It is used as a food by the Filipinos and others during the cooler months, from January to May. It is an introduced plant, and the species used was not fully identified because specimens with flowers were not available. The American species (Vallisneria americana Michx.) is commonly used in goldfish bowls (23). In the Philippines there is another species, Vallisneria gigantea Graebner, a common plant used for food (34); Filipinos may have introduced this species into Hawaii.

Tapegrass usually is obtained direct from streams but may sometimes be found at Honolulu stores catering to the Filipinos, where it is sold by the

bunch, each bunch weighing from $1\frac{1}{2}$ to 2 pounds.

Merrill reports that in the Philippines the size of the plant varies greatly, apparently in proportion to the depth of the water in which it grows (34). The leaves of the balaiba, used by the Filipinos in Hawaii, vary from 1/4 to 1/2 inch in width and from 6 to 15 inches in length.

No analyses were made, but a chemical test for ascorbic acid showed baláiba

to be devoid of this vitamin.

SESBANIA

Catuday (I.), Katuray (T.), Gaway gaway (V.)

Sesbania is a fast-growing, short-lived tree with either deep pink or white blossoms, sometimes used as an ornamental plant in Hawaii. Filipinos use the

flowers and the tender pods as vegetables.

After the stems and calyx and sometimes the pistils have been removed, the petals are immersed in boiling water for not more than 1 minute and then drained. They may then be used in a salad made with fish or with vegetables, especially tomatoes, or added to a cooked meat or fish dish just before serving. They are said to taste like mushrooms.

Filipinos in Hawaii prefer the white blossoms. Ochse reports that the Javanese prefer the white to the pink flowers because the pink are bitter and the white are not (43).

Although low in calcium and phosphorus, the sample of flowers which we analyzed had a much higher percentage of iron than most vegetables.

Due to the difficulty of obtaining a continuous supply of the blossoms, no

assays were made for vitamin A and thiamine. In the raw state the white sesbania flowers were found to be an excellent source of ascorbic acid, containing 73 milligrams per 100 grams. Half of this value was lost when the flowers were immersed in boiling water for a minute.

The very tender pods may also be prepared as a vegetable, but they do not seem to be utilized very generally by the Filipinos in Hawaii.



Figure 16. Swamp cabbage.

SWAMP CABBAGE

Balangeg (I.), Kangkong (T.), Tangkong (V.)

Swamp cabbage is an aquatic plant used in Hawaii by the Filipinos, especially the Tagalogs, and other groups of oriental ancestry. According to Hillebrand, the Chinese probably introduced the plant into Hawaii (27).

Chung and Ripperton state that it is an aquatic, herbaceous, creeping or floating vine which thrives in ponds (15).

The Filipinos use only the terminal shoots. They use them as a salad, as a

vegetable seasoned with bagoong, or combine them with fish or meat in soups and other dishes.

Swamp cabbage is a fair source of calcium and phosphorus and a good source of iron. Chung and Ripperton report a calcium content of 0.077 percent in the samples which they analyzed, whereas our sample had 0.047 percent calcium.

Swamp cabbage is an excellent source of vitamin A, a fair source of thiamine,

and, after cooking, a poor source of ascorbic acid.

SWEETPOTATO AND SWEETPOTATO TOPS

Camotit (I.), Kamote (T.), Camoti (V.)

Wester reports sweetpotatoes to be the most important root crop in the Philippines, where they are widely used (58). All of the numerous varieties grown in Hawaii are used to some extent by Filipinos. However, white rice has largely displaced sweetpotatoes in Filipino diets in Hawaii. Since sweetpotatoes are superior to white rice in every important constituent except protein, this change has resulted in a less nutritious diet. In Hawaii, sweetpotatoes are used as often in desserts as in other dishes.

Silayan, in the Philippine Yearbook for 1936-37 (55), reports that sweet-potato tops (or, as they say, kamote shoots) were at that time the most widely

used green vegetable in the Philippine Islands.

Sweetpotato tops are perhaps more generally used than the tubers by Filipinos in Hawaii. Varieties with widely differing types of leaves (fig. 17) grow in Filipino gardens here. The tender tips are cooked and used as a salad, in soups, as a vegetable seasoned with bagoong, and in combination with meat or fish.

The protein content of sweetpotato tops is high (4 percent) for a green vegetable. The greens are a fair source of calcium and phosphorus and a good source of iron. Cooked sweetpotato tops are a good source of vitamin A and a fair source of thiamine, but have negligible quantities of ascorbic acid.

Unfortunately many Filipinos look upon the sweetpotato as an inferior food, because it has been associated in some sections of the Philippines with the lowest economic class. Santos and Demeterio report that the expression "sweetpotato and guinamos" is sometimes used to indicate the financial standing of a family and that when it is used to describe the daily meals it denotes extreme poverty (50).

Much education will be necessary to convince the Filipinos that the sweetpotato has a high nutritive value and that it should be given a prominent place

in the family diet.

TARO

Aba (I.), Gabi (T., V.)

Filipinos in Hawaii use all parts of the taro plant as food, but it is not utilized so extensively as many other vegetables discussed in this bulletin. Wester reports taro to be the third most important root crop in the Philippines; sweet-potatoes are first and yams second (58).

The authors describe "guinamos" as a small dried and salted fish, but a Department of Agriculture and Commerce bulletin (44) states that guinamos is a salted fermented product made of oyster meat, especially sisi.



Figure 17. Sweetpotato leaves—two varieties.

Taro shoots analyzed by Chung and Ripperton are described as "the tender delicious growth from the taro corm which is grown in moist sandy soil or in sphagnum moss in a darkened place" (15). Their analyses show taro shoots to be a poor source of calcium and phosphorus. No vitamin assays of taro shoots have been made. The common Filipino method of preparing taro shoots is to cook them in boiling water containing bagoong for about a half hour.

The stems or leaf stalks of all varieties of taro are used as a vegetable. Chung and Ripperton's analyses show them to be a good source of calcium and a poor source of phosphorus. No tests were made to determine their vitamin content. They may be cooked with bagoong for seasoning or with dried fish,

meat, or coconut milk.

Filipinos use taro leaves as a green, often in combination with the leaf stalks or stems, especially if the taro is grown in home gardens. (See p. 60.) Taro leaves were found by Miller to be a good source of calcium and a fair source of phosphorus (36). Unpublished results from the Station laboratory show cooked taro leaves to be a good source of iron (0.0014 percent).

Taro leaves are an excellent source of vitamin A, a fair source of thiamine,

and even after cooking a good source of ascorbic acid (39a).

Taro corms have been analyzed by this Station (15) and by Miller (35), and for that reason no new analyses were made for this bulletin. The corms appear on the percentage basis to be a poor source of calcium, but, because the corms are relatively heavy in relation to their bulk and often are eaten in large quantities, they may constitute an important source of calcium in the diet. Taro corms are a fair source of phosphorus and of iron (43a). Potgieter has shown that the calcium and phosphorus of taro are well utilized by growing rats and adult human beings (46, 47).

Taro corms in the form of commercial paiai have been tested for their vitamin value and found to be a poor source of vitamin A and ascorbic acid (39a). Although taro and poi are only fair sources of thiamine, when they are eaten in generous quantities, they may furnish a large part of the day's quota for this

vitamin.

Filipinos use taro corms both in vegetable dishes and in desserts. In desserts they sometimes combine them with sweetpotatoes, but more often with coconut milk. When they use them as vegetables, they combine cooked taro with coconut milk, salt, and dried shrimps, or they boil the taro in water containing bagoong. (See p. 57.) The latter is the common Ilocano method.

TOMATO

Camatis (I.), Kamatis (T.), Camatis (V.)

Filipinos are very fond of tomatoes and use them extensively in cooking. They combine them with almost any other vegetable in hot dishes and also use them in salads. All varieties are used, but a type with deep creases (fig. 13) is much favored and is said by some Filipinos to be more acid in taste than other tomatoes grown here. However, members of the laboratory staff did not find them unusually acid.

Chemical analysis showed this type to have a composition similar to that reported in the literature for tomatoes, except that the amount of ether extract was less than half that usually given. The peeled sample analyzed was found

to be a poor source of calcium and a very poor source of phosphorus and iron. Filipino tomatoes allowed to remain on the vine until almost ripe and then to complete ripening in the laboratory contained 30 milligrams of ascorbic acid per 100 grams of edible tomato, a value similar to that reported by others for vine-ripened tomatoes.

YAM BEAN

Sinkamas (all dialects)

The yam bean is grown in some Filipino gardens especially for its turnip-like root, called yam bean root.

The immature pods are eaten occasionally, but, according to our Filipino informants, before cooking they must be rubbed with salt or with a dry cloth

to remove hairs which are irritating to the mouth.

The root, which is more generally used, is white and crisp and has a slightly sweet and pleasant flavor. It is often eaten raw, especially between meals by children. The root is peeled and fresh slices are given to children, or it is soaked in a little vinegar and salt and eaten raw. It is sometimes cooked for a short time in combination with other vegetables, meat, or fish.

The sample analyzed by Chung and Ripperton was a poor source of calcium and phosphorus (15). Yam bean root doubtless contains little or no vitamin A because it has no yellow pigments; therefore, no vitamin A assay was made. Preliminary tests indicate that it is a fair source of thiamine and a poor source of ascorbic acid.

Recommendations for Improving the Diets of Filipinos

Although many of the Filipinos who came to Hawaii undoubtedly bettered their standard of living, few of them improved their diet. In some respects the typical Filipino diet in Hawaii is less nutritious than that in the Philippines. In Hawaii, food has many competitors for the family money. Better clothing, enlarged family portraits, radios, and automobiles can be seen and admired by friends and therefore often claim much too large a share of the family income. Large expenditures often are made for entertainment and festivals of various sorts. Increased family incomes do not insure better health and better food, if the additional money is spent for less essential items.

In some families there are too many children or too many children of about the same age. Adequate quantities of good food could be provided and the health of both mothers and children would be improved if such families spaced their children better or had fewer of them.

Since modern science has shown a good diet to be such an essential factor in promoting health, and since money spent for good food to promote good health is one of the best forms of health insurance that a family can have, all people concerned with the welfare of the Filipinos in Hawaii should urge them to retain the best food habits of the Philippines and to adopt the best food habits of America rather than the worst ones.

When there is a choice between giving a Filipino child music lessons and finer clothes or giving him nutritious food, first attention should be given to food—if the health and happiness of the child and the future adult are to be considered. Health once lost, or never achieved, because of inadequate and improper food in childhood, cannot be compensated for in adult life.

Many things can be done to improve the diet of Filipinos in Hawaii with little or no increase in expenditure of money. Specific recommendations follow:

1. Replace part or all of the white rice used with brown or partially polished rice. (See p. 63 for methods of cooking.) Such a change would do more than any other one thing to increase the B vitamins of the diet.

2. Increase the use of whole-wheat bread and reduce the use of white bread.

3. For breakfast, instead of white rice, use cooked whole-grain cereals such as rolled oats and rolled wheat. These cereals served with milk are especially recommended for children.

4. Increase the use of sweetpotatoes, a good source of calcium, iron, vitamin A. and thiamine.

5. Increase the use of taro and poi, both of which are good sources of thi-

6. Increase the use of bananas, but use them only when well ripened. They can be grown in home gardens and are excellent for eating between meals—better than candy or concentrated sweets.

7. Increase the use of ripe papayas. Filipinos tend to use green papayas more often than ripe papayas. Ripe papayas are a better source of vitamin C than green papayas. In most localities papayas can be grown in home gardens.

8. Continue the use, and for some families increase the use, of familiar Filipino vegetables such as sweetpotato tops, bitter melon tips, malung-gay, Malabar nightshade, pigeonpea, yellow pumpkin (fruit, flowers, and tender tips), swamp cabbage, and tomatoes. The small plum-shaped tomato can more readily be grown in most localities than can other varieties, because it is more resistant to disease and to melonfly infestation. Its nutritive value is equivalent to that of other types of tomatoes. When allowed to remain on the vine until ripe, or nearly so, it is high in ascorbic acid content (30 milligrams per 100 grams).

9. Continue the use of bagoong as a flavoring material because it helps to vary an otherwise monotonous diet and makes some contribution to calcium

needs.

10. Continue the use of seaweeds (marine algae) and other sea foods.

11. Increase the use of milk, especially for children from 9 months to 6 years old. As a source of all nutrients except thiamine, evaporated unsweetened milk is as satisfactory as fresh, pasteurized milk. In homes without iceboxes it is safer to use cannel milk and open a can when needed, because cannel milk keeps better than fresh.

12. Increase the use of legumes (beans and peas of all varieties), especially green lima beans and green soybeans, which can be grown in home gardens. Legumes are good sources of the B vitamins and of calcium, phosphorus, and iron.

13. Reduce the use of white sugar and use more molasses and "raw sugar."

14. Increase the use of eggs, especially for children. Eggs, particularly the yolks, are an excellent source of good quality protein and a good source of minerals and vitamins.

- 15. Increase the use of inexpensive fats such as cottonseed products—oil or hardened fats—and pork fat.
 - 16. Buy fruit for children instead of soft drinks and candy.

Most of the foregoing recommendations apply as well to the family diets of other racial groups in Hawaii as they do to the diets of the Filipinos.

Preparation of Filipino Foods

Many thrifty Filipino housewives get on well with very simple cooking equipment and no icebox. Dry staples such as rice, sugar, and canned goods require no special storage facilities, and other foods are purchased or obtained as needed. Bagoong does not require refrigeration. Fresh vegetables are obtained from the family garden. If there is a surplus, the vegetables are shared with other families. In return, gifts of vegetables and fruits are received from the gardens of friends and neighbors. Canned milk, consumed the day it is opened, is the rule rather than fresh milk. Butter is rarely used. Surplus pork is made into sausages that will keep from several days to a week or more without refrigeration. Extra fish are broiled, semidried, or preserved with ginger and vinegar so that they will keep for several days.

When striving to raise the standard of household procedures, the teacher should take care to avoid emphasis on standards of equipment beyond the purchasing power of the family. An automatic refrigerator containing nothing but a few bananas and a leftover vegetable may be viewed with satisfaction and pride by the owner, but it does not improve the family's nutritive condition nor

teach wise expenditure of family income.

The Ilocanos are accustomed to using many vegetables and often state that they "have taught other Filipinos to eat and appreciate vegetables." The Ilocanos eat many vegetables dishes without special seasoning (except bagoong), but the Tagalogs prefer their vegetables cooked with garlic, onions, tomatoes, or tamarind, or mixed in dishes prepared with some kind of fat.²¹ The Tagalogs also use more coconut milk than the other groups. Many of the more elaborate dishes of the Tagalogs and some of their food habits show a Spanish influence.

Filipinos often combine small quantities of several vegetables in one dish for two reasons. First, they relish a combination of vegetable flavors and textures, and, secondly, their small gardens do not always yield enough of one vegetable to make a dish by itself. The vegetables that require the longest cooking are put into the pot first and cooked with water and a little bagoong or dried shrimp. When they are partially cooked, the vegetables requiring less cooking are added. Finally, those like malung-gay and tender ampalaya shoots, which should be cooked for only a few minutes, are placed on top. Many Filipino cooks believe that a better flavor results if the ingredients are not stirred. No water is discarded and all the juices are eaten with the mixture. The Filipino housewife is wise when she cooks vegetables only as long as is necessary to make them edible, for some of the vitamins may be lost by overcooking.

²¹ The term "guinisa" or "ginisa" is used as an adjective to describe a dish cooked with fat.

The usual Ilocano method of cooking is to start with boiling water and to add salt, bagoong, shrimps, or fish, and, last, the vegetables. Fat is not commonly added, but if it is, the food is *not fried* in the fat. The common Tagalog method of cooking is to start with some fat, to fry the meat or fish, if used, and then to fry the vegetables slightly, before adding any water.

Many dishes prepared by the Filipinos are in the nature of a thick soup or a stew with varying proportions of liquid. Such a mixture is poured over or mixed with rice on the serving plate. One of the most important dishes is

dinengdeng.

Dinengdeng (an Ilocano word, pronounced di-neng'deng') is the term used to designate a stew of one or more vegetables seasoned only with bagoong (sometimes only salt) or with fresh or dried shrimps, fish, or pork, added according to what is available and the economic status of the family. A dinengdeng may also contain some kind of cooked dried legume, such as mungo or azuki. The Tagalog term for such a dish is "ginisang." Although it may contain the same ingredients as a dinengdeng, ginisang is cooked in a different manner; that is, the ingredients, or some of them, are fried in fat before water is added.

Rice and some kind of dinengdeng constitute the noon and evening meals and sometimes the three meals of the typical Filipino workingman's family in Hawaii. Breakfast often consists of bread and coffee or cocoa made with water and sugar and varying quantities of evaporated milk. Jam or jelly is sometimes eaten with the bread. Butter is very rarely used.

When money and food are limited, the evening meal may consist only of rice, bagoong, and a little fat. A little oil or pork fat is put in the pot and heated, some of the liquid portion of the bagoong is mixed in, and then the mixture is poured over rice.

On the plantations men who work in the fields have breakfast at home at 5 a.m. At 8 a.m. and again at about 11:30 a.m. they eat in the fields a lunch which they have brought from home. These two meals consist of rice and a thick dinengdeng that can be carried in a lunch pail. At 5 or 6 p.m. they eat their evening meal at home.

Many Filipinos in Hawaii have adopted typical American dishes and foods, and many are fond of Chinese and Japanese foods.

Filipino foods are sold in a number of Honolulu retail food stores that cater especially to Filipinos. In 1940 four stores were operated by Filipinos themselves, but a larger number (at least eight) operated by non-Filipinos carried a few or a good many foods especially for their Filipino trade. In addition, most of the plantation stores carried at least a few Filipino foods.

RECIPES FOR FILIPINO DISHES

Recipes are given here (pp. 58-62) especially to illustrate the use of foods for which analyses are given in this bulletin. These are for simple and relatively inexpensive dishes. Typical menus, recipes for more elaborate and more expensive dishes, and notes on Filipino hospitality and table etiquette may be found in *Hawaiian and Pacific Foods* by Katherine Bazore (9).

Most of the recipes given in this bulletin were collected and tested by Mrs.

Helen Yonge Lind of the Home Economics Department of the University of Hawaii, at the request of the senior author.

PREPARATION OF BAGOONG

Buggoong a monamon, or any other type of bagoong containing bones, is always used in one of two ways.

In the first, boiling or hot water from the cooking pot is added to the bagoong. About 2 tablespoons of bagoong are used to $\frac{1}{4}$ to $\frac{1}{2}$ cup of water. The mixture is stirred and the pieces of fish mashed with a spoon. After it has been allowed to settle for a couple of minutes, the thin portion is poured into the cooking pot, more hot water is added, and the process is repeated. Only the bones and some coarse particles remain to be discarded.

The second method is to add hot water to the bagoong, in the proportion of about 2 tablespoons of water to 1 tablespoon of bagoong, to stir the mixture, and to put it through a fine strainer. Sometimes the process is repeated.

DINENGDENG (basic recipe)

1 pound vegetables

1/4 pound purslane, if desired

11/2 cups water

YIELD: 4 to 6 servings

YIELD: 4 to 6 servings

11/4 cups sliced tomatoes

2 teaspoons salt or 2 tablespoons

bagoong

If a green leafy vegetable is used, wash, and break off tender tips and leaves. Discard tough stems. Cut or break tips and leaves into 1-inch lengths. Heat water to boiling, add tomato and salt. Use bagoong as directed above. Add vegetables and boil until tender.

One vegetable may be used alone, or two or more vegetables may be combined. In combination, cook tougher vegetables like cowpeas or eggplant for several minutes before adding tender leafy vegetables.

Fewer tomatoes or none at all may be used.

SALUYOT DINENGDENG

 $\frac{1}{2}$ bunch (3 cups cut) saluyot (jute)

1 cup tiny fresh shrimps (may be

2 cups water

2 to 3 tablespoons bagoong

omitted)

Wash saluyot and cut off about 4 or 5 inches of the tough stems. Cut the leaves and tender tips into pieces about 1 inch long. Wash shrimps. Boil water and add bagoong (above) and saluyot, cover, and cook 2 minutes. Add shrimps and cook about 5 minutes, or until shrimps turn red.

DINENGDENG WITH MARONG-GAY LEAVES YIELD: 4 to 6 servings

4 cups marong-gay (horse-radish tree) leaves, flowers, and very young pods 2 tablespoons bagoong 1/4 cup dried shrimps (may be omitted)

1½ cups water

Strip marong-gay leaves from the stems. Break off all flowers and buds and cut very tiny pods into 1-inch lengths. Boil water and add bagoong as directed above. Add shrimps and cook 3 minutes. Add marong-gay and cook uncovered for 6 or 8 minutes. Serve immediately.

DINENGDENG WITH MARONG-GAY PODS AND CARDIS

YIELD: 5 servings

1½ cups shelled cardis (pigeonpeas should be mature but still green) or 1½ cups very young pigeonpea pods

1/2 cup dried monamon, chirimen iriko,²²

or dried shrimps

6 to 8 mature marong-gay pods

3 cups water

2 to 3 tablespoons bagoong

2 green onions, finely cut

1/2 large tomato, sliced

Shell mature pigeonpeas or string young pods. Rinse dried fish or shrimps in cold water. Peel or cut the tough green skin from the marong-gay pods, and cut the pods in 2-inch lengths. Heat water and add bagoong as directed on page 00. Add pigeonpeas and marong-gay, and boil 10 minutes. Add onion, tomato, and dried fish or shrimps, and boil 5 minutes longer, or until vegetables are tender.

BEANS WITH FISH

1 pound parda (hyacinth beans) or other beans

1/2 tablespoon fat

1/4 pound fish

YIELD: 4 to 6 servings

 $\frac{1}{2}$ cup water

2 tablespoons bagoong

½ teaspoon salt

1 large tomato, sliced

String the beans and open the pods. Heat fat and fry the fish. Remove bones and flake the flesh. Heat water and add bagoong as directed (see p. 58). Add salt, tomato, and extracted bagoong to the fish. Cook 3 minutes, stirring once or twice. Add beans, cover, and simmer until pods are tender.

Cowpeas, long beans, Goa, or any other type of beans—any one of them or a combination of several—may be used in this recipe. The pods need not be opened, but the beans should be cut into 1-inch lengths.

SQUASH OR PUMPKIN FLOWERS

2 tablespoons fat

2 cloves garlic, crushed

1 large tomato, sliced 1/4 pound pork, finely sliced

1/2 cup water

3 cups squash flowers (17 large)

1/2 teaspoon salt

Heat fat, add garlic, cook until brown, and then add the tomato. Add pork and cook about 15 minutes, or until tender. Add water. When it begins to boil, add squash flowers (stem and calyx removed) and salt. Cook 5 minutes. Serve hot.

DINENGDENG WITH MARONG-GAY PODS AND CAMOTIT LEAVES

YIELD: 5 servings

YIELD: 4 servings

6 to 8 mature marong-gay pods

1 bunch camotit leaves

3 cups water

3/4 teaspoon salt

1/2 cup chirimen iriko,23 washed

1/2 large tomato, sliced

2 to 3 tablespoons bagoong Split the marong-gay pods lengthwise. If seeds are tender, use them; otherwise discard.

Split the marong-gay pods lengthwise. If seeds are tender, use them; otherwise discard. Cut the tender white inside portion from the sections of the pods and then cut into 1-inch lengths. Discard tough green shells. Wash camotit leaves, break off leaves and tender

²³ See footnote above.

²² Small dried fish used by Japanese and Filipinos.

tips from stems, and discard stems. Heat water; add bagoong (see p. 00), then all other ingredients except camotit leaves, and boil 7 minutes. Add camotit leaves, cover pot, and cook 5 minutes longer, or until leaves are tender.

GABI LEAVES AND STEMS

3 cups gabi (taro) leaves and stems 1/2 cup water

3 tablespoons lard 1 tablespoon bagoong

1 tablespoon finely chopped ginger root

Use only tender leaves and stems of gabi. Wash leaves and stems, and break or cut into pieces. Heat fat and sauté the ginger. Add the gabi, then the water and strained bagoong (see p. 58). Simmer until vegetable is soft and there is no "sting" (30 to 45 minutes).

BALAIBA WITH PORK

1/3 bunch or 1/2 pound baláiba (tape-1/2 teaspoon salt grass) 1/2 cup sliced onion

1/4 pound lean pork 2 tablespoons fat pork, cut up

1 clove garlic, mashed

YIELD: 4 to 5 servings

YIELD: 4 to 5 servings

12/3 cups water 2 to 3 tablespoons bagoong

Wash baláiba, remove roots and old leaves, and cut into 11/2-inch lengths (1/2 pound yields 3 cups cut). Cut the lean pork into small pieces as for chop suey. Fry fat pork to extract fat, add lean pork and garlic, and fry until brown. Discard garlic, add salt and onion, cover, and cook 1 minute. Add water and bring to boil. Add bagoong as directed

on page 58. Bring contents of kettle to boil again, and add the baláiba. Cover and cook about 5 minutes.

SITAW, PUMPKIN, AND DRIED SHRIMPS YIELD: 5 servings

1 bunch or ½ pound sitaw (cowpeas) 21/2 cups water 1/2 pound pumpkin 3 tablespoons bagoong 2 green onions, finely cut 1/3 cup dried shrimps

Remove the ends and strings from the cowpeas and break into 11/2-inch lengths. Peel pumpkin, remove seeds, and cut into 1/2-inch cubes. Add shrimps to water and simmer about 2 minutes. Add bagoong as directed on page 58. Add pumpkin and cook about 6 minutes or until almost tender. Add cowpeas and green onions and cook 5 minutes longer, or until cowpeas and pumpkin are tender.

One pound of cowpeas may be used in this recipe and the pumpkin omitted, or 1 pound of pumpkin may be used and the cowpeas omitted.

GINISANG (Tagalog)

YIELD: 6 servings 1/2 cup dried shrimps (or dried mona-1/2 teaspoon salt

1/3 cup cold water 1-inch cube pork fat or 1 tablespoon fat

1 teaspoon finely cut garlic

1/3 cup finely cut onion 1 cup sliced tomato

31/2 cups sliced long eggplant 11/2 cups sliced dishcloth gourd 23/4 cups sliced bitter melon

11/2 tablespoons boiling water

1 tablespoon bagoong

Wash the dried fish or shrimps and soak in the cold water. Heat fat and brown garlic. Add onion, tomato, shrimp with water, and salt. Simmer 5 minutes. Cut eggplant diagonally into 1/2-inch slices without removing skin. Remove tough ridges from dishcloth gourd and bitter melon. Remove seeds if they are not tender. Cut vegetables into ½inch slices and add to onion and tomato mixture. Add 1½ tablespoons boiling water to
bagoong, strain, and add liquid to vegetables; repeat to extract more flavor from bagoong
(see p. 58). Cook until vegetables are tender. But they should still be crisp and retain
their original color.

PINACBET (a favorite Ilocano dish)

The ingredients are the same as those for the Tagalog recipe for Ginisang, except that garlic is omitted, the quantity of bagoong increased to 3 tablespoons and the boiling water to 1 cup. The mixture is cooked in Ilocano fashion (p. 57) by adding the bagoong to the hot water as previously directed (p. 58). Next add the other ingredients.

ALUGBATI WITH SHRIMPS (VISAYAN)24

YIELD: 6 servings

¹/₂ pound fresh shrimps or ¹/₂ cup dried shrimps

shrimps
1 pound alughati (Malahar nightshade).

leaves and stems

2 tablespoons fat

11/4 cups sliced tomatoes

 $1\frac{1}{2}$ cups water $2\frac{1}{2}$ teaspoons salt

Clean the shrimps by removing the shell and black line running along the back. If dried shrimps are used, soak them in a small amount of water for half an hour. Wash the alugbati and remove the undesirable leaves. Separate the leaves and stems, and cut the stems into 2-inch pieces. Brown the shrimps in the hot fat, add the tomatoes and water, and bring the liquid to the boiling point. Add the alugbati stems and salt, cook until the stems are partially tender, then add the leaves. Boil until all are tender. Serve hot.

Chopped meat may be substituted for the shrimps.

PUSO KILAWIN (Tagalog)

3 puso (banana bud),²⁵ preferably butuan (banana with seeds)

1 tablespoon salt

½ cup dried shrimps or ¼ pound frozen shrimps

3 tablespoons water

YIELD: 3 to 4 servings

1/4 teaspoon salt dissolved in 1 tablespoon vinegar

2 tablespoons finely cut pork fat

1 clove garlic, crushed

1/3 cup sliced onion

Remove outer petals of the banana buds, leaving only the innermost portion, which is cream-colored. Slice thin, crosswise. Three buds yield about 1½ cups sliced. Sprinkle with salt, mix well, and allow to stand about 1 hour. Soak dried shrimps in 3 tablespoons water about 15 minutes. If frozen shrimps are used, remove shells, and cut down the back to remove black line. Cut in half lengthwise. Knead the sliced banana bud 2 or 3 minutes to remove most of the sap. Rinse once in warm water and drain. To prevent darkening, sprinkle with vinegar in which salt has been dissolved. Drain shrimps and save liquid. Heat skillet and fry pork fat until brown. Add garlic and onion, and fry until transparent but not brown. Add shrimps and drained banana bud. Cook 1 or 2 minutes, stirring constantly. Add liquid drained from shrimps, cover, and cook about 10 minutes, or until bud is tender.

²⁴ Recipe supplied by Katherine Bazore, Home Economics Department, University of Hawaii.
²⁵ Sometimes called banana heart.

SALAD OF SITAW TIPS (basic recipe for salads)

YIELD: 5 servings

1 bunch or 1 pound sitaw (cowpea) tips 2 green onions, finely sliced or shoots 2 tablespoons patis

2 cups water 1 teaspoon finely chopped ginger root

1 large tomato

Wash cowpea shoots and break off leaves and tender tips (about 2 or 3 inches long). Boil water and add shoots; boil until tender. Drain and cool. Mash or break up tomato with the fingers. Combine all ingredients.

Variation: In the basic recipe for salads (above) substitute for the sitaw tips $\frac{1}{2}$ to 1 pound of any one of the following vegetables: Sweetpotato tips (kamote), swamp cabbage (balangeg), squash tips (kalabasa), or hyacinth beans (parda).

SALAD OF AMPALAYA TIPS

YIELD: 4 servings

- 1. Substitute one bunch ampalaya (bitter melon) tips for sitaw tips in the recipe for sitaw tip salad; or—
- 2. Boil vegetable. Drain and cool, pressing out as much of the water as possible. Toss with 1 tablespoon lemon juice and 1 teaspoon salt. More or less lemon juice may be used as preferred.

BALAIBA SALAD

YIELD: 4 servings

1 pound baláiba (tapegrass)

21/2 tablespoons vinegar

1/4 cup salt

Wash baláiba, remove roots and old leaves, and cut into 2-inch lengths (1 pound when cut yields 4 to 6 cups). Add salt, mix well, and allow to stand about $\frac{1}{2}$ hour. Wash in fresh water several times to remove excess salt. Squeeze dry with the hands. Sprinkle with vinegar and mix well. Serve cold.

Variation: Instead of adding vinegar, mix with one large, uncooked, mashed tomato.

Note: Because this grass frequently grows in slow-moving streams in which soil accumulates, it has a muddy taste disliked by some Filipinos. The salt makes the grass very limp but removes what they call the "river" taste.

KATURAY SALAD (Tagalog)

4 cups white katuray blossoms (½ pound)
1½ cups water
⅓ cup sliced onion (1 small)

6 small plum tomatoes or 1 large tomato (1/4 pound)

YIELD: 3 to 4 servings

1½ tablespoons vinegar
2 teaspoons brown sugar
½ teaspoon salt

Remove the calyx (the outer green covering) and the pistils from the blossoms. Boil the water, pour it over the blossoms, and allow to stand about 1 minute. Drain, squeeze water from the blossoms, and lay aside to cool. This amount should yield about 1½ cups of wilted blossoms. Slice onion thin, crosswise. Slice tomatoes or cut into fourths, and then mash slightly. Prepare salad dressing by stirring sugar and salt into vinegar until they are dissolved. Combine blossoms, tomato, and dressing, and mix well. Arrange on serving plate and cover with sliced onions. Serve cold.

If desired, an artistic arrangement may be made by placing a layer of wilted blossoms on the serving plate and arranging sliced tomatoes (unmashed) and onion on top. Pour the dressing over the salad. Leftover cooked fish may be shredded and arranged on top of the salad with the tomatoes and onions.

Two tablespoons patis may be substituted for the vinegar and sugar dressing.

HOW TO COOK BROWN (UNPOLISHED) AND PARTIALLY POLISHED RICE

The use of brown (unpolished) and partially polished rice is recommended as the best and the most economical way to increase the vitamin B content of the Filipino diet.

To retain the maximum nutritive value and to obtain a palatable product, care should be taken to observe the following points when cooking brown or partially polished rice:

Washing.—The rice should not be washed in four or five changes of water, as is customary with white rice, because such thorough washing results in the loss of some of the water-soluble B vitamins. If brown rice is soaked before cooking, never discard the water in which it has been soaked.

Amount of water for cooking.—Brown and partially polished rice require more water for cooking than white rice.

Length of cooking period.—Brown and partially polished rice require a longer cooking period than white rice. The increased time depends upon the quantity cooked.

Saucepan or pot.—The cooking vessel must be large enough (1) to prevent the water from boiling over and (2) to allow for the swelling of the rice. A thick-walled, heavy pot is preferred by some to a thin saucepan. The lid should be tight-fitting in order to reduce the loss of moisture and to steam the product.

STEAMED BROWN RICE

YIELD: 6 cups

2 cups rice

11/2- or 2-quart saucepan with tight-fit-

3 cups hot water

ting lid

Pick over rice. If desired, wash once and discard water. Add 3 cups water and soak 1 to 2 hours. Cover and cook over high heat until the steam escapes from under the edge of the cover—5 to 8 minutes. Lower the heat as much as possible and let rice steam 55 to 60 minutes.

Note: If partially polished rice is used, the rice need not be soaked and the period of steaming may be reduced. If a product that is more moist is desired, increase the water slightly.

Table 5

Names of foods studied—English, Filipino dialect, and scientific

Common or English		Scientific name			
NAME OF FOOD	Ilocano	Tagalog	Visayan	SCIENTIFIC NAME	
Anchovies, dried	Monamon*	Dilis	Bulinao	Anchovia spp.	
Anchovy sauce	Buggoong a Monamon	Bagoong na Dilis	Ginamos Bulinao		
Banana bud	Sabunganay or Susop	Puso ng saging	Puso sa sab-a	Musa paradisiaca ssp. sapientum	
Bitter melon	Paria	Ampalaya	Palia	Momordica Charantia	
Cowpea	Utong	Sitaw	Balatong	Vigna sinensis	
Goa or winged bean	Pal-lang	Sigarillas or Kabay	Segidillas or Cigarillas	Psophocarpus tetragonolobus	
Horse-radish tree	Marong-gay	Malung-gay	Camung-gay or Balung-gay	Moringa oleifera	
Hyacinth bean	Parda	Bataw	Bat-ao	Dolichos Lablab	
Jute (Filipino spinach)	Saluyot		Togabang	Corchorus olitorius	
Malabar nightshade		Libato	Alugbati	Basella rubra	
Pigeonpea	Cardis	Kadios	Cadios	Cajanus Cajan	
Pumpkin or squash	Carabasa	Kalabasa	Calabasa	Cucurbita moschata	
Purslane	Ngalog	Kulasiman	Alusiman	Portulaca oleracea	
Sesbania (grandiflora)	Catuday	Katuray	Gaway gaway	Sesbania grandiflora	
Swamp cabbage	Balangeg	Kangkong	Tangkong	Ipomoea aquatica	
Sweetpotato	Camotit or Camotig	Kamote	Camoti	Ipomoea Batatas	
Tomato, Filipino	Camatis	Kamatis	Camatis	Lycopersicon esculentum	

^{* &}quot;Munamon" is the correct spelling, but "Monamon" appears on almost all labels in Hawaii.

TABLE 6
Edible portions of foods analyzed and percentage of refuse

COMMON NAME	PERCENTAGE OF REFUSE	Edible portion of food analyzed
Anchovies, dried	0	Entire fish, including head and bones
Anchovy sauce	ŏ	Sauce and fish
Anchovy sauce, extracted and strained	12	All material soluble in hot water that would pass through a 20-mesh sieve
Banana bud	55	Flower heads and inner, light-colored bracts
Bitter melon, leafy tender tips	70	4 to 5 inches of tips and other tender leaves
Cowpeas, green pods	9	Immature pods and seeds
Cowpeas, tender tips	75	4 to 5 inches of tips and other tender tips
Goa or winged bean	7	Immature pods and seeds
Horse-radish tree, leaflets and tips	36	Tender leaflets and tender tips with 3 to 5 leaf- lets
Horse-radish tree, pods	46	Flesh and seeds of immature pods 10 to 12 inches long and $\frac{3}{8}$ to $\frac{3}{4}$ inch in diameter
Hyacinth bean	4	Immature pods and seeds
Jute (Filipino spinach)	39	3 to 4 inches of tips and all tender leaves
Malabar nightshade	26	3 to 6 inches of tender tips of young plants (see p. 71)
Pigeonpea, green, shelled	55	Immature green seeds
Pumpkin (or squash), flowers	26	Petals and stamens
Pumpkin (or squash), fruit	43	Flesh
Pumpkin (or squash), tender tips	75	3 to 5 inches of tender tips and other tender leaves
Purslane	4	About 4 inches of tender tips
Sesbania	39	Petals, pistils, and stamens
Swamp cabbage	60	6 to 10 inches of tender tips
Sweetpotato tops	60	2 to 4 inches of tender tips and other tender leaves
Tomato, Filipino	13	Flesh and seeds

TABLE 7
Proximate composition of the edible portion of some Filipino foods

Name of food	WATER	PROTEIN (N×6.25)	ETHER EXTRACT (fat)	CRUDE FIBER	CARBO- HYDRATE (by dif- ference)	Total ash
	Percent	Percent	Percent	Percent	Percent	Percent
Anchovies, dried	19.4	62.4	3.3	l —	_	14.7
Anchovy sauce	59.3	11.0	0.6	_	_	27.5
Banana bud	91.6	1.4	0.4	1.0	4.6	1.05
Bitter melon, leafy tender						
tips	83.1	6.5	0.7	1.2	6.8	1.66
Cowpeas, fresh pods,						
green	89.0	3.0	0.1	1.5	5.7	0.71
Cowpeas, tender tips	92.2	3.4	0.2	1.3	1.8	1.05
Goa or winged bean	92.0	2.0	< 0.1	1.3	4.0	0.61
Horse-radish tree, leaflets						
and tender tips	75.5	9.4	1.4	1.5	9.9	2.26
Horse-radish tree, pods	89.4	1.9	0.2	1.3	6.2	0.97
Hyacinth beans	91.0	2.0	0.2	1.3	4.9	0.61
Jute (Filipino spinach)	89.5	3.8	0.2	1.2	3.7	1.58
Malabar nightshade	94.3	1.6	0.2	0.5	2.1	1.34
Pigeonpea, green, shelled	. 69.3	7.4	0.6	2.8	18.5	1.36
Pumpkin (or squash),						
flowers	94.1	1.3		_ (0.75
Pumpkin (or squash),						
fruit	82.3	0.8	< 0.1	0.9	14.9	1.06
Pumpkin (or squash),						
leafy tender tips	91.9	3.3	0.4	1.0	2.3	1.07
Purslane	93.6	1.1	0.1	0.8	3.2	1.25
Sesbania, pink	89.5	1.8	0.1	1.6	6.4	0.63
Swamp cabbage	92.0	2.8	0.3	1.2	2.5	1.16
Sweetpotato tops	87.8	4.0	0.3	1.2	5.5	1.22
Tomato, Filipino	94.6	0.7	0.1	0.6	3.5	0.50

TABLE 8
Mineral composition of some Filipino foods

Name of food	Total ash	CALCIUM (Ca)	PHOS- PHORUS (P)	Iron (Fe)
	Percent	Percent	Percent	Percent
Anchovies, dried	14.7*	2.913	2.067	0.00756
Anchovy sauce	27.5†	0.870	0.427	0.00859
Banana bud	1.05	0.030	0.038	0.00029
Bitter melon, leafy tender tips	1.66	0.098	0.116	0.00238
Cowpeas, fresh pods, green	0.71	0.033	0.064	0.00087
Cowpeas, tender tips	1.05	0.052	0.076	0.00163
Goa or winged bean	0.61	0.063	0.041	0.00059
Horse-radish tree, leaflets and tender tips	2.26	0.364	0.112	0.00399
Horse-radish tree, pods	0.97	0.027	0.046	0.00031
Hyacinth beans	0.61	0.047	0.046	0.00068
Jute (Filipino spinach)	1.58	0.170	0.068	0.00393
Malabar nightshade	1.34	0.054	0.033	0.00105
Pigeonpea, green, shelled	1.36	0.029	0.133	0.00134
Pumpkin (or squash), flowers	0.75	0.039	0.049	0.00070
Pumpkin (or squash), fruit	1.06	0.011	0.072	0.00031
Pumpkin (or squash), leafy tender tips	1.07	0.041	0.108	0.00234
Purslane	1.25	0.055	0.037	0.00168
Sesbania, pink	0.63	0.024	0.039	0.00338
Swamp cabbage	1.16	0.047	0.052	0.00158
Sweetpotato tops	1.22	0.037	0.094	0.00102
Tomato, Filipino	0.50	0.008	0.026	0.00026

^{* 4.7} percent NaCl. † 25.2 percent NaCl.

TABLE 9 Vitamin values of some Filipino foods

Name of food	VITAMIN A PER	THIAMINE (VITAMIN B ₁)	Ascorbic acid (vitamin C) per 100 grams		
	100 grams	100 GRAMS	Raw	Cooked	
	I. U.*	Micrograms	Milligrams	Milligrams	
Anchovies, dried	0	0	0	0	
Banana bud		_ _	<1	<1	
Bitter melon, fruit	166	40	63	33	
Bitter melon, leafy tender tips	20,800	112	88	20	
Cowpeas, fresh pods (green with	,	ļ			
red flecks)	4,000	150	20	15	
Cowpeas, tender tips		_	36	25	
Goa or winged bean	700	174	<1	0	
Horse-radish tree, leaflets and					
tender tips	35,000	227	134	36	
Horse-radish tree, pods	600	_	172	126	
Hyacinth beans	560	118	13	7	
Jute (Filipino spinach)	6,200	73	36	1	
Malabar nightshade	13,000	115	166	86	
Pigeonpea, green, shelled	1,700	486	33	49	
Pumpkin (or squash), flowers	1,700	0	28	5	
Pumpkin (or squash), fruit	33,750	140	14	12	
Pumpkin (or squash), leafy ten-	,				
der tips	2,700	162	11	1	
Purslane	3,500	42	21	12	
Sesbania, white	·	_	73	37	
Swamp cabbage	10,600	80	44	10	
Sweetpotato tops	8,500	176	11	<2	
Tomato, Filipino	_		30		

^{*} I. U. means International Units.

Criteria for Rating Filipino Foods as Sources of Minerals and Vitamins

Minerals.—Foods contain a large number of minerals (15 to 20), and it is commonly assumed that special care need not be given to provide most of them in the daily diet. However, scientific studies have shown that three minerals—calcium, phosphorus, and iron—are not always supplied in amounts adequate for health and growth. Consequently, it is of value to know whether foods are good or poor sources of these minerals. It is recommended that the daily diet of the average adult should supply 0.8 gram of calcium, 1.32 grams of phosphorus, and 12 milligrams (0.012 gram) of iron.

For purposes of comparison in this bulletin, the arbitrary scale given below has been used for rating foods as good, fair, and poor sources of calcium, phos-

phorus, and iron.

	RATING						
Minerals	Excellent	Good	Fair	Poor			
	(Gm. per 100 gm. edible food)	(Gm. per 100 gm. edible food)	(Gm. per 100 gm. edible food)	(Gm. per 100 gm. edible food)			
Calcium	>0.100	0.10 to 0.05	0.05 to 0.03	< 0.03			
Phosphorus	_	0.100	0.10 to 0.05	< 0.05			
Iron	_	>0.0010	0.0010 to 0.0005	< 0.0005			

Vitamins.—Scientists are constantly expanding our knowledge of the number of vitamins that occur in foods and that are essential for health and growth. However, if adequate quantities of vitamin A, thiamine, and ascorbic acid are provided in the food eaten, all others needed by human beings are also usually supplied. It may be noted that a number of Filipino foods are excellent sources of vitamin A and ascorbic acid but only one—pigeonpeas—is an excellent source of thiamine.

The National Research Council recommends that the daily diet of the average adult should supply 5,000 International Units of vitamin A, 1,800 micrograms of thiamine, and 75 milligrams of ascorbic acid.

For purposes of comparison in this bulletin, the arbitrary scale given below has been used for rating foods as excellent, good, fair, and poor sources of these three vitamins.

	Rating						
VITAMINS	Excellent	Good	Fair	Poor			
	(Per 100 gm. edible food)	(Per 100 gm. edible food)	(Per 100 gm. edible food)	(Per 100 gm. edible food)			
Vitamin A, International Units	More than 5,000	2,500 to 5,000	500 to 2,500	Less than 500			
Thiamine (vitamin B ₁), micrograms	More than 400	200 to 400	50 to 200	Less than 50			
Ascorbic acid (vitamin C), milligrams	More than 60	30 to 60	10 to 30	Less than 10			

Technical Section

PREPARATION OF FOOD SAMPLES FOR ANALYSIS

All vegetables were analyzed in the raw state without drying them. Those that could be washed were thoroughly cleaned in tap water, care being taken not to bruise the tender leaves. They were rinsed twice in distilled water and were then laid out on enamel pans to dry partially but were not allowed to become wilted. All remaining water was then gently wiped off with cheese-cloth. Vegetables too delicate to be washed were wiped first with cheese-cloth dampened in distilled water and then with a dry cloth. The portions considered refuse were removed and the remaining edible portions were finely chopped with a stainless steel knife on a bakelite board. All samples, unless otherwise specified, were taken from about $2\frac{1}{2}$ to $3\frac{1}{2}$ pounds of a finely cut, thoroughly mixed, representative sample of the vegetable.

Anchovies, dried.—The average weight of each fish was about 0.7 gram. The fish were cut into small pieces. Chromium-plated scissors were used to cut all samples except those for iron determination, which were cut with a stainless

steel knife on a bakelite board.

Anchovy sauce.—Two 22-ounce bottles of a popular brand were used. The sauce contained whole fish from 1 to 5 inches long. All solid material was ground in a porcelain mortar with a porcelain pestle. The ground material was thoroughly mixed with the sauce to give a thick paste from which samples for analysis were taken.

Anchovy sauce, extracted.—Two hundred grams of well-mixed buggoong a monamon were stirred with an equal portion of almost boiling tap water. The mixture was allowed to settle 1 to 2 minutes and the liquid portion decanted into a tared beaker.

Three more portions of water were added successively to the residue, decanted, then put through a strainer (of about 20 mesh to the inch), and added to the first liquid portion. The whole was weighed and thoroughly mixed, and duplicate samples were taken for ash analyses. The residue after extraction was weighed and the refuse calculated. The procedure was repeated on a seconsample of the same lot of buggoong a monamon. Results on the two lots were similar, and the figures given on page 26 are averages of the two sets of analyses.

Banana bud.—One bud from a Bluefield banana plant and one from an apple banana plant were used. The buds weighed 3 and $3\frac{1}{3}$ pounds, respectively. Outer bracts were removed until the tender, light-colored bracts were disclosed. The flower heads adhering to the outer bracts were removed and kept for analysis. The inner bracts were then separated from the remaining flower heads. The tender bracts and flowers were soaked 5 minutes in a 4 percent solution of C.P. NaCl, washed in tap water, rinsed twice in distilled water, drained, and wiped dry. They were then cut into fine pieces.

Bitter melon, tips.—Portions of a vine about 16 months old were used. About 4 to 5 inches of the tender tips and other small tender leaves were taken for analysis. After the fibers were removed from the stems, these portions were finely chopped and mixed.

Cowpeas, green pods.—The tender immature pods—including the seeds—of the all-green variety were analyzed. The ends and strings were removed and the pods cut into small cross sections.

Cowpeas, tips.—The stems were broken at the point where they snap easily, leaving tender tips 4 to 5 inches long. These tips and all small tender leaves were used. The fibers were removed and the material was cut into small pieces.

Goa beans.—Immature pods 4 to 7 inches long and 3/4 to 11/4 inches wide were used. The ends and strings were removed and the entire pods, including the seeds, were split longitudinally into quarters, then into small pieces.

Horse-radish tree, leaflets and tips.—The tender leaflets were stripped off by running the fingers down the stems. The tender tips, which include about 3 to 5 leaflets and which usually snap off in the stripping process, were also used. The leaflets and tips were thoroughly mixed and the samples taken for analysis without chopping.

Horse-radish tree pods.—Immature green pods 10 to 12 inches long and 3/8 to 3/4 inch in diameter were picked. Only those pods containing soft seeds were used. All of the hard outer covering and the fibers were removed. The inner

white fleshy tissue and seeds were chopped and mixed.

Hyacinth beans.—The tender immature pods of the all-green variety, with the seeds intact, were analyzed. After the ends of the pods and the strings were removed, the beans were cut into narrow cross sections and mixed.

Jute (Filipino spinach).—The entire young plant, measuring 6 to 9 inches in length, is uprooted and sold in bunches weighing about 1/2 pound each. About 3 to 4 inches of the tender tips were taken for analysis. In most cases, the leaves below this section were too mature to be palatable. After the fibers were removed from the stems, the edible portions were cut into very small pieces and thoroughly mixed.

Malabar nightshade.—The sample analyzed was made up of very young plants, measuring from 4 to 7 inches above the roots. The roots, about 11/2 inches of the stem above the roots, and the bruised and overmature leaves were discarded. The remainder of the plant was cut into small pieces. The young tender tips of matured vines are also frequently harvested and sold.

Pigeonpea, shelled.—Immature but full pods were picked and shelled. The ods were discarded and only the green-colored peas were used. These were cut

into three or four parts and mixed.

Pumpkin (or squash), flowers.—The staminate blossoms from six vines growing in one locality were used. The average weight of each flower, including the stem and calyx, was 5 grams. The flowers were collected over a period of 9 days and were kept fresh by storing them at 35° F. in a large airtight can lined with damp paper towels. Only those flowers that remained fresh were used. The flowers were carefully wiped with damp cheesecloth to remove dirt and dust and then wiped with a dry cloth. The stems and calyx were discarded, and only the petals and stamens were taken for analysis. These were cut into small pieces and mixed.

Pumpkin (or squash), fruit.—Three squashes, weighing from 33/4 to 43/4 pounds each, taken from two vines grown on one plot, were used. About a quarter of each squash was taken. The skin and all green tissues, seeds, and membranous tissues were discarded, and the flesh was cut into small pieces for

analysis.

Pumpkin (or squash), shoots.—About 3 to 5 inches of the tips and other tender leaves, including their petioles, were used. The fibers were removed from the stems and petioles, and the remaining edible portions were cut into small pieces.

Purslane.—About 4 inches of the tender tips were taken for analysis. The fibers were removed from the stems, and the remaining edible portions were

cut and mixed.

Sesbania.—Flowers of the pink variety, taken from several trees, were analyzed. Only the petals, pistils, and stamens were used. These were carefully wiped, first with a damp cloth and then with a dry one, to remove all dust particles. Then they were cut into small pieces.

Swamp cabbage.—About 6 to 10 inches of the tender tips were taken for

analysis. The material was cut into small pieces.

Sweetpotato tops.—About 2 to 4 inches of the tips and other tender leaves

were cut into small pieces for analysis.

Tomato, Filipino.—Representative one-eighth- to one-fourth-inch longitudinal sections extending from stem scar to flower scar and from the center to the skin were taken from 22 tomatoes. The skin was removed. Samples for ether extract, total ash, and mineral analyses were each made up of 22 sections, one from each tomato. Samples for other analyses were made up of seven to eight sections.

METHODS OF CHEMICAL ANALYSIS

Water.—Five to 10 grams of the finely chopped fresh material were dried in shallow 2-inch weighing bottles at about 65° C. Leafy materials were dried 24 hours, fleshy vegetables 48 hours. After the oven drying, the samples were dried in vacuo over concentrated H₂SO₄ for another 24 hours.

Protein.—The official Gunning method of the A.O.A.C. (5, p. 24) was used for nitrogen determination of the fresh material. Samples weighing 10 to 20 grams were taken. The percentage of nitrogen was multiplied by 6.25 to give

crude protein.

Ether extract.—A large sample of the fresh material was dried as for moisture. The dried product was ground in a porcelain mortar when necessary before sampling. The official A.O.A.C. direct method was used (5, p. 339).

Crude fiber.—The official A.O.A.C. method was used on the residue from the

ether extract determination (5, p. 340).

Total ash.—Large 200-milliliter silica dishes were used for ashing. For each sample 150 to 200 grams of fresh material usually were taken and ashed in a closed electric muffle. Ashing was started in a cold muffle and the temperature increased very slowly until charring was completed. The temperature was then raised to 450° C. and held there until a light gray ash was obtained. The amount of carbon remaining was usually negligible, and corrections for the carbon remaining after the first ashing were made only for samples that contained appreciable amounts.

Ash constituents.—After being weighed, the ash was taken up with 25 to 30 milliliters of (1+4) HCl and allowed to stand several hours. It was then filtered through Whatman Number 44 paper and thoroughly washed, and the filtrate and washings were collected in a 250-milliliter volumetric flask. The

filter paper was then returned to the dish and ashed at 450° C. This second ash was dissolved in 10 milliliters of (1+4) HCl, and the filtrate and washings were added to the first and made to volume at constant temperature. Aliquots of the ash solution were taken for calcium, phosphorus, and iron determinations.

- Calcium.—The McCrudden (33) method for calcium determinations was used.
- 2. Phosphorus.—The official A.O.A.C. phosphomolybdate volumetric method was used (5, p. 21).
- 3. Iron.—The Saywell-Cunningham (53) method of color development with ortho-phenanthroline was followed. A Klett-Summerson photoelectric colorimeter was used for reading the solutions.

Ascorbic acid.—A stainless steel knife was used for samples that required cutting. All other samples were broken into small pieces to make representative samples of the food and to facilitate grinding. The extraction procedure used was that outlined by Bessey and King in 1933 (11). Ten- to 30-gram samples were taken. Fine, acid-washed26 quartz sand and glass mortars and pestles were used. Four extractions were made, each with enough acid to give a total of 90 to 100 milliliters of extract. Usually 20 milliliters of acid were used for the first extraction. A mixture of 2 percent HPO3 and 8 percent HAc was used (40). A fresh 10 percent solution of HPO₃ was made up at least once in 2 weeks and kept in the refrigerator when not in use. The samples were centrifuged for 10 to 15 minutes at 2,000 r.p.m. The total volume of four extracts was made up to 100 milliliters, and aliquots were titrated against 2,6-dichlorophenolindophenol solution which was prepared at least once in 5 days and was standardized daily against ascorbic acid. A 5-milliliter microburette was used, and aliquots of the extract were taken so that 1.5 to 3 milliliters of dye were required to reduce the ascorbic acid completely.

BIOLOGICAL METHODS OF VITAMIN DETERMINATIONS

All experimental rats were raised in the Station laboratory. When used for testing the vitamin content of foods, the rats were kept in individual cages with raised screen bottoms and were allowed water and the basal diets ad libitum. Wherever it is stated that animals were fed daily, the word "daily" is to be understood to mean every day except Sunday.

PREPARATION OF VEGETABLES FOR VITAMIN ASSAYS

The portions of the vegetables indicated under parts for chemical analysis and vitamin assays were washed and freed of excess water by shaking or patting between clean towels and then cooked as follows: The vegetables were put into aluminum pans, 3 inches deep and 9 inches in diameter, which were placed on a wire rack 1 inch above the bottom of an 11-quart pressure cooker containing hot water to a depth of one-half inch. Sometimes a single pan was used;

 $^{^{26}}$ Sand was refluxed twice in (1+4) HCl, washed thoroughly in tap water, and then rinsed three times in redistilled water.

if two pans were used, one was placed above the other. The lid was placed on top but was not screwed in place. The vegetables were not cooked under pressure at any time. The cooking period was reckoned from the time steam began to issue from the pet cock. This procedure afforded a uniform method that could be readily duplicated. Fresh vegetables were cooked twice each week, on mondays and Thursdays. After being cooked they were chopped or finely cut to make a uniform sample and stored in the refrigerator in glass jars with tight-fitting covers. Each sample was used 3 days for feeding.

The following vegetables were cooked by steam (no pressure) in a pressure cooker:

For 10 minutes: hyacinth beans, purslane, jute, swamp cabbage, squash tips, bitter melon green leafy tips.

For 15 minutes: Horse-radish tree leaflets and tender tips, sweetpotato tops, pigeonpeas, Goa beans, Malabar nightshade, cowpeas.

For 20 minutes: Bitter melon fruit (25 minutes if old), squash.

Bitter melons were cut in half lengthwise and the seeds and membranes discarded. Squash was cut in slices 1 inch by 2 inches.

Squash flowers were prepared daily for feeding by dipping in boiling water for 1 minute and drying on a paper towel.

VITAMIN ASSAYS OF FILIPINO FOODS

The values for the vitamin A content of Filipino foods given in table 9 were obtained by using the weight gains in table 10 in conjunction with a curve of response established in this laboratory by the use of the United States Pharmacopeia reference cod liver oil.

Statistical analyses of the data for the curve of response showed that smaller groups of rats could be used for vitamin A assays than for thiamine assays. Because the gains for males were much greater than those for females, separate curves were used for each.

Negative controls fed the basal diet only and positive controls fed the reference cod liver oil were used for each series. For the first tests both males and females were fed 1 International Unit of vitamin A per day, or 6 units per week (2 International Units three times per week). Later the quantity for the males was increased to 1.5 units daily, or 9 units per week, because their growth response was more uniform at that level.

To save space, the results of many preliminary tests for the vitamin A content of the foods are not included in this report. In practically all preliminary tests, the animals, though fed very small quantities of the supplements, grew so much that the average gains in weight fell beyond the most sensitive part of the curve of response. The average gains in weight obtained in the final tests, as shown in table 10, were in some cases smaller than is desirable for accurate assays, but, in the light of the gains obtained when larger quantities were fed, it was deemed inadvisable to carry on third trials.

TABLE 10
Results of feeding rats various Filipino foods as the sole source of vitamin A

	RATS,	Average weights			Mean
WEEKLY SUPPLEMENT	NUM- BER AND SEX	At wean- ing	At deple- tion	Final	GAINS IN 3 WEEKS
Negative control Negative control Ref. C.L.O. 6 I.U.* Ref. C.L.O. 6 I.U. Sweetpotato tops, 0.15 gram Sweetpotato tops, 0.3 gram	6 M 4 F 9 F 9 M 4 F 4 M	Grams 40 35 37 37 35 36	Grams 75 63 64 70 67 66	Grams 64 58 97 98 115 156	Grams
Negative control Negative control Ref. C.L.O. 6 1.U. Ref. C.L.O. 6 I.U. Malabar nightshade, 0.05 gram Pigeonpeas, green, shelled, 0.5 gram Purslane, 0.1 gram Sweetpotato tops, 0.05 gram	2 M 4 F 6 M 6 F 5 M 4 M 4 M 5 F	38 35 37 35 37 36 36 36 34	68 56 58 59 60 56 59	65 45 92 83 96 99 77 85	34 24 36 43 18 28
Negative control Ref. C.L.O. 6 I.U. Goa or winged bean, 0.25 gram.	3 M 3 F 4 F	39 35 34	53 53 51	44 85 67	32 16
Negative control Ref. C.L.O. 6 I.U. Ref. C.L.O. 6 I.U. Ref. C.L.O. 12 I.U. Ref. C.L.O. 12 I.U. Bitter melon, fruit, 3 grams. Horse-radish tree, leaflets and tender tips,	4 M \ 3 F \ 5 9 M 8 F 9 M 8 F 6 M	42 41 39 40 39 39	71 70 56 74 57 67	59 98 92 136 110 89	28 36 62 53 22
0.025 gram	6 F	41 41	64 63	108 114	44 51
Negative control Ref. C.L.O. 9 I.U. Ref. C.L.O. 6 I.U. Hyacinth beans, 0.5 gram Jute (Filipino spinach), 0.06 gram Pumpkin (or squash), leafy tender tips,	4 M } 2 F \$ 5 M 6 F 5 F 5 M	35 36 34 36 38	48 56 51 54 55	42 105 83 76 79	49 32 22 24
0.06 gram	4 F	36 35	52	68	16
Negative control Ref. C.L.O. 9 I.U. Ref. C.L.O. 6 I.U. Bitter melon, leafy tender tips, 0.07 gram Cowpeas, fresh pods, green, 0.8 gram Monamon, 3 grams. Pumpkin (or squash), fruit, 0.1 gram Swamp cabbage, 0.1 gram	2 M } 4 F \$ 5 M 7 F 6 F 6 M 6 M 7 F	41 42 40 42 37 42 42 39	89 87 78 79 79 93 91 79	74 118 101 113 126 77 159 109	31 23 34 47 16 68 30

^{*} International Units of United States Pharmacopeia reference cod liver oil.

The values for the thiamine content of Filipino foods given in table 9 were obtained by using the weight gains in table 11 in conjunction with a curve of response to pure crystalline thiamine established for this laboratory (39). Negative controls fed the basal diet only and positive controls fed thiamine as the only source of vitamin B_1 were used for each series. Data on preliminary tests are omitted, and only the results of final tests are given in table 11.

The vitamin D content of monamon (dried anchovies) was determined from the ratings of the "line test" given in table 12 in conjunction with a curve of

Table 11

Results of feeding rats various Filipino foods as the sole source of thiamine (vitamin B₁)

	NT	Average weights			MEAN
Daily supplements	Num- ber of rats	At wean- ing	At deple- tion	Final	GAINS IN 3 WEEKS
		Grams	Grams	Grams	Grams
Negative control	7	42	72	51	l —
Thiamine, 3 micrograms	14	40	69	89	20
1 gram	10	39	67	79	12
Pigeonpeas, green, shelled, 0.5 gram	12	40	69	83	14
Sweetpotato tops, 3 grams	12	39	69	104	35
Negative control	9	40	72	51	
Thiamine, 3 micrograms	14	40	75	96	21
Goa or winged bean, 3 grams	13	40	74	110	36
Malabar nightshade, 3 grams	13	41	74	99	25
Negative control	7	44	68	48	
Thiamine, 3 micrograms	11	45	68	95	27
Bitter melon, leafy tender tips, 3 grams.	12	42	69	99	30
Jute (Filipino spinach), 3 grams	12	45	69	87	. 18
Swamp cabbage, 3 grams	12	42	68	89	21
Negative control	7	40	64	44	
Thiamine, 3 micrograms	13	41	69	91	22
Hyacinth beans, 3 grams Pumpkin (or squash), leafy tender tips, 3	12	40	68	94	26
grams	12	40	65	100	35
Pumpkin (or squash), flowers, 3 grams	6	39	67	55	-12
Purslane, 5 grams	12	39	67	79	12

response to the vitamin D content of United States Pharmacopeia reference cod liver oil determined in this laboratory (unpublished data).

Monamon was found to contain 366 International Units of vitamin D per 100 grams.

Since the percentage of calcium is greater than that of phosphorus in monamon, it is not likely that the results of the line tests were affected by the quantities of these two minerals in the supplements fed.

Whether the antirachitic properties of monamon are retained when it is made

TABLE 12
Summary of observed healing in rachitic rats

SUPPLEMENTS	Number	"Line test"		
Kind	Quantity	OF RATS	RATING	
Negative controls, 21-day	0 0	7 7		
U. S. Pharmacopeia reference cod liver oil	0.5 unit 1.0 unit	7 6	2.3* 3.3	
Monamon (dried anchovies)	0.5 gram 0.3 gram 0.2 gram 0.1 gram	7 4 5 5	4 4 3 1.6	

^{*} Figures obtained by adding the total number of plus signs for all the rats in each group and dividing by the total number of rats in the group.

into bagoong was not determined because the product is so salty that rats will not readily eat it. Long and tedious extraction processes would have been required to prepare suitable test material. The small quantity of bagoong used daily and the probable vitamin D value, even if no destruction took place, did not seem to warrant such an investigation.

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