



ACEROLA

Nutritive Value and Home Use

Carey D. Miller
Nao S. Wenkam
Katherine O. Fitting

Hawaii Agricultural Experiment Station, University of Hawaii
Circular 59

June 1961

CS9

COVER PHOTO: Acerola, natural size.

CONTENTS

	PAGE
INTRODUCTION	5
COMPOSITION AND NUTRITIVE VALUE	6
USES	8
Frozen Acerola	8
Hot-pressed Acerola Juice	9
Juice No. 1	9
Juice No. 2	9
Cold-pressed Acerola Juice No. 1	9
Cold-pressed Acerola Juice No. 2	10
Frozen Acerola Juice	10
Bottled Acerola Juice	10
To Enhance or Fortify Other Fruit Juices with Acerola Juice	11
Frozen Acerola and Passion Fruit Juices	11
Acerola Syrup	11
Acerola Jelly No. 1	11
Acerola Jelly No. 2 (with Liquid Pectin)	12
Acerola Jelly No. 3 (with Powdered Pectin)	12
Acerola-Guáva Jelly	13
Acerola-Passion Fruit Jelly	13
Acerola Mint Jelly	13
Acerola Sauce No. 1	14
Acerola Sauce No. 2	14
Acerola Spread	14
Frozen Acerola and Passion Fruit Topping	15
Acerola Gelatin Dessert	15
Ginger Ale Salad with Acerola	15
Baked Bananas with Acerola Juice	16
Banola	16
Baked Apple with Acerola Juice	16
Apple Crisp with Acerola	16
Banana-Acerola Nectar	17
Acerola Milk Shake	17
Acerola Sherbet	17
REFERENCES	18

ACKNOWLEDGMENTS

The authors are indebted to Dr. Henry Y. Nakasone, Assistant Horticulturist, Hawaii Agricultural Experiment Station, for providing the acerola needed for our experiments and for critical reading of the first few pages of the manuscript.

We also wish to thank Francis A. Bowers, Junior Horticulturist, Hawaii Agricultural Experiment Station, for supplying passion fruit and passion fruit juice.

THE AUTHORS

CAREY D. MILLER is Professor Emeritus of Foods and Nutrition, University of Hawaii.

NAO S. WENKAM is Junior Nutritionist at the Hawaii Agricultural Experiment Station.

KATHERINE O. FITTING was a graduate student in the Home Economics Department, University of Hawaii, from February 1957 to June 1958.

ACEROLA—Nutritive Value and Home Use

Carey D. Miller, Nao S. Wenkam, and Katherine O. Fitting¹

INTRODUCTION

Acerola is the most common name of Spanish origin for *Malpighia glabra* L., formerly called *Malpighia puniceifolia* L., which is native to tropical and subtropical America. It is a small cherrylike fruit and is often referred to as the Barbados, the West Indian, or the Puerto Rican cherry.

The fruit is borne on short stems on a shrublike tree which will grow to approximately 12 feet in height. The fruit varies in size from about ½ to 1 inch in diameter, and weighs from 2 to 10 grams (approximately 0.1 to 0.4 ounce). The thin skin may be light reddish-yellow or deep red when ripe. The flesh is usually of a reddish-yellow hue, although some types with dark red skins also have dark red flesh. Regardless of the size of the fruit, the three winged seeds (botanically, pyrenous carpels) are large in comparison to the flesh, but because of their light and pithy nature, they constitute only about 20 percent of the weight. The fruit is sweet to acid in taste (depending upon the genetic type), with no distinct or pronounced flavor. Some think the flavor of thoroughly ripe acerola and the fresh, raw juice made from it resembles that of tart strawberries.

Although commonly called a cherry, the odor and flavor of cooked acerola are more like that of tart apples or crab apples than cherries. Malic acid, the only organic acid (other than ascorbic acid) which acerola contains, is also the principal acid in apples (6).

So far as can be learned, this plant was probably first introduced into Hawaii in 1946 by the Hawaiian Sugar Planters' Experiment Station. Development is underway to produce the acerola on a commercial scale in Hawaii, and the Department of Horticulture at the Hawaii Agricultural Experiment Station, University of Hawaii, has a large testing program in progress to select well-shaped trees with fruit of good size and high nutritive value. Dr. Henry Y. Nakasone, Assistant Horticulturist, reports that within a few years good plants will be available for distribution.

¹ A small portion of the material in this circular has been taken from a thesis submitted by Katherine O. Fitting in partial fulfillment of the requirements for the degree of Master of Science in Nutrition. Present address: 659 East Seventh Street, Plainfield, New Jersey.

Acerola, with small shiny green leaves and red cherries, may be grown in home gardens in Hawaii and used as a decorative shrub. Since homemakers, teachers, and others have inquired about its use and nutritive value, this circular is designed especially to answer their questions. It should also be of use to those interested in the commercial production and processing of acerola.

COMPOSITION AND NUTRITIVE VALUE

A mixed lot of acerola weighing about 3½ pounds from the test plots of the University Farm was used to determine proximate composition, minerals, and vitamins. The edible portion of the acerola was analyzed by standard methods published elsewhere (5). The results are summarized in table 1.

TABLE 1
COMPOSITION OF ACEROLA
(Per 100 grams, edible portion)

Proximate composition	grams
Moisture.....	91.10
Protein.....	0.68
Ether extract.....	0.19
Crude fiber.....	0.60
Total ash.....	0.45
Carbohydrate (by difference).....	6.98
Minerals	milligrams
Calcium.....	8.7
Phosphorus.....	16.2
Iron.....	0.17
Vitamins	milligrams
Carotene.....	0.408 (408 I.U. vit. A)*
Thiamine.....	0.028
Riboflavin.....	0.079
Niacin.....	0.34
Ascorbic acid.....	2329

* 1 microgram yellow pigments equivalent to 1 International Unit of vitamin A.

The figures for proximate composition show that acerola contains less of all the nutrients than the true cherry as well as somewhat less of the three minerals—calcium, phosphorus, and iron.

Like most fruits, the acerola is a poor source of the three B vitamins—thiamine, riboflavin, and niacin, but a fair source of provitamin A, containing about as much as tomatoes. It is an exceptionally rich source of vitamin C.

The ascorbic acid (vitamin C) content of acerola is approximately 30 to 50 times that of good oranges, so that one to two cherries, depending on the size and on the concentration of ascorbic acid, will furnish sufficient vitamin C to supply the recommended daily allowance of this vitamin.

Asenjo and de Guzman (*I*) of Puerto Rico were the first to point out in 1946 the unusually large amount of ascorbic acid in this fruit and to prove by isolating the substance that it was pure l-ascorbic acid.

Since vitamin C is water-soluble, a large proportion of the ascorbic acid can be extracted by cooking the acerola with water. Care should be taken to use stainless steel, aluminum, or glass in the preparation and storage of acerola products. Do not allow the fruit or preparations to come in contact with copper, brass, or rusty utensils such as sieves or jar lids, because these catalyze the oxidation and destruction of vitamin C.

The juice and puree should be stored in the refrigerator for no longer than 1 week as there is slow destruction of the ascorbic acid, even though color and flavor may not change. Preliminary experiments indicate that juice stored at 45° F. in a good electric refrigerator will lose about 20 per cent of the ascorbic acid in 18 days.

It has been established that unripe cherries have a somewhat greater vitamin C content than those fully ripe, but since the color and flavor improve upon ripening, ripe or almost ripe cherries are recommended for general use in the home.

Juice prepared as directed on page 9 contains from 600 to 1500 mg. per 100 ml., or per 100 gm., depending upon the fruit from which it is made, the degree of ripeness, and the quantity of water used. (See pp. 9 and 10 for further discussion on the quantity of ascorbic acid obtainable from various amounts of juice in household measures.)

To help the layman interpret these values in terms of household measures, the following information may be helpful:

1 ml. (milliliter) = 1 cc. (cubic centimeter) = scant $\frac{1}{4}$ teaspoon

5 ml. = 1 level teaspoon

14 or 15 ml. or cc. = 1 level tablespoon

100 ml. or cc. = a scant $\frac{1}{2}$ cup

115 ml. or cc. = $\frac{1}{2}$ cup, or $\frac{1}{4}$ pint, or 4 fluid ounces

1 gm. (gram) = 1000 mg. (milligrams)

1 gm. = 0.035 ounce

28 gm. = 1 ounce or 2 tablespoons

USES

Because the fruit is small and the seeds are relatively large, use of the fruit in the raw state is limited, except to eat out of hand. Small pieces cut from the cherries (seeds removed) may be added to fruit cup and fruit salad for piquancy and vitamin C.

Fruits generally are our best sources of vitamin C, but they vary greatly in their content of this nutrient. Using acerola in combination with apples, bananas, passion fruit, pears, and other fruits poor in ascorbic acid is highly recommended.

Acerola juice, prepared as directed on page 9, may be used for jelly, for punch, for the fortification of juices low in ascorbic acid, and in prepared dishes such as gelatin desserts and salads. Sweetened or unsweetened acerola juice may be used to prevent darkening (oxidation) of fruit, such as bananas, for fruit salad and fruit cup and will at the same time enhance the vitamin C of the product.

The prepared juices from ripe and half-ripe cherries with which we have worked had a pH of 3.2 to 3.5. That is, acerola is more acid than oranges but not as acid as lemons. Lemon juice with a pH of 2.05 (2) has a more distinct flavor. It combines well with acerola.

The juices, from mixed lots of acerola from the test plots of the Station, used for our experiments contained sufficient acid but not enough pectin for good jelly.

The fruit makes an acceptable sauce or puree which may be used as such or in combination with other fruits. Puree may be made from the whole fruit including some juice, or from the residue remaining after the preparation of juice (p. 9).

As the quantity of fruit obtainable at one time from one or two shrubs in the home garden is likely to be limited, the recipes in this circular are for the use of relatively small portions of the fruit or juice. (However, Dr. Nakasone reports that one well-cultivated shrub, approximately 3 years old, can be expected to yield as high as 50 pounds in one season.) The best bearing period in Hawaii is approximately from May through November, varying somewhat from year to year.

The uses recommended in this circular are merely suggestive and the ingenious cook will devise many others.

Frozen Acerola

If the fruit cannot be utilized soon after picking, it may be frozen for future use. The frozen fruit is not suitable to use raw for fruit cup or fruit salad because it becomes flaccid and soft in texture, but it is good for juice, sauce, or puree, either raw or cooked.

Pick over the acerola and use only those with unbroken skins. (Cherries with broken skins or slight bruises should be used at once as fresh fruit, or for juice, or sauce.)

Wash the fruit lightly (*do not* remove stems and blossom ends), drain thoroughly, measure, and place in plastic bags. Label with the date and the quantity so it is ready for use and need not be measured again. Store in freezer at 0° F.

Hot-pressed Acerola Juice

Juice No. 1

YIELD: 2 cups

1 quart (4 cups) whole acerola 2 cups water

½ cup juice contains 1000 to 1500 mg. vitamin C

1 tablespoon contains 125 to 180 mg. vitamin C²

Juice No. 2

YIELD: about 4 cups

1 quart (4 cups) whole acerola 1 quart water

½ cup juice contains 700 to 800 mg. vitamin C

1 tablespoon contains 80 to 100 mg. vitamin C²

Pick over cherries and remove spoiled or decayed fruit. Stem and blossom ends need not be removed. (Fresh or frozen fruit may be used.) Measure fruit, then wash. Place the fruit in a sauce pan and crush with a potato masher or with the hand. According to our experiments, 20 to 25 percent more vitamin C may be extracted from crushed fruit than from whole fruit.

For Juice No. 1, use half as much water as fruit. For Juice No. 2, use an equal volume of water. Add water, bring to the boiling point, and cook until fruit is thoroughly soft (10 to 20 minutes). Strain in a jelly bag or two thicknesses of cheesecloth. If a clear juice is desired, do not squeeze the bag. The juice will be amber colored, or pink, or red according to the color and ripeness of the original cherries.

The residue is high in vitamin C, so do not discard it, but put through a food mill to make a puree and use for sauce or jam.

Cold-pressed Acerola Juice No. 1

YIELD: 1 cup

3 cups ripe acerola

Pick over acerola and remove spoiled or decayed fruit. Stem and blossom ends need not be removed. Wash and drain acerola. Crush the cherries with a potato masher, or a stainless steel or silver fork. (See p. 7 regarding destruction of vitamin C.) Squeeze the crushed acerola fruit in two thicknesses of cheesecloth. Use for fruit drinks or pour over fruit cocktail.

½ cup juice contains about 2000 mg. vitamin C

1 tablespoon juice contains about 250 mg. vitamin C

² The daily recommended allowance for an adult is 75 mg. ascorbic acid (vitamin C).

Cold-pressed Acerola Juice No. 2

YIELD: 2 cups

3 cups ripe acerola

$\frac{3}{4}$ cup water

Pick over acerola and remove spoiled or decayed fruit. Stem and blossom ends need not be removed. Wash and drain acerola. Crush fruit with stainless steel or wooden potato masher. (See p. 7 regarding destruction of vitamin C.) Add the water and allow to stand for 15 minutes, stirring occasionally. Squeeze the crushed fruit in two thicknesses of cheesecloth. Use as desired.

$\frac{1}{2}$ cup juice contains about 1500 mg. vitamin C

1 tablespoon juice contains about 190 mg. vitamin C

Frozen Acerola Juice

YIELD: 16 cubes

$3\frac{1}{2}$ cups Juice No. 2

$\frac{1}{2}$ to $\frac{3}{4}$ cup sugar

Use hot-pressed Juice No. 2 while still warm. Add sugar and stir thoroughly until it is completely dissolved. (The amount of sugar needed will depend upon the acidity of the juice.) Pour into ice cube trays and freeze until solid.

Remove cubes from pan and store in two thicknesses of plastic freezer bags, or place in waxed cartons with saran wrap between the layers. Store in freezer at 0° F. Use as desired.

Cold-pressed juice may be frozen in the same manner.

Each cube of frozen acerola juice will contain from 200 to 400 mg. of ascorbic acid.

Suggested uses: Use with ice cubes in a bowl of fruit punch. Add 1 cube of frozen juice to each glass of canned pineapple juice, passion fruit juice, or other juice.

NOTE: Both hot-pressed and cold-pressed frozen acerola juice retained about 85 percent of the original vitamin C after 8 months of freezer storage (0° F.) (3).

Bottled Acerola Juice

4 cups hot-pressed acerola juice

1 cup sugar

Use only hot-pressed acerola juice and add sugar while juice is still warm. Bring the mixture to the boiling point and pour into hot sterilized bottles, cap with metal, cork-lined bottle caps, or seal in sterilized jars. Store in a cool, dark place.

NOTE: Bottled hot-pressed acerola juice retained about 60 percent of the original vitamin C after 8 months' storage at room temperature (70°-85° F.) (3).

To Enhance or Fortify Other Fruit Juices with Acerola Juice

Passion fruit juice, pineapple juice, apple juice, grape juice, pear and apricot nectar, and some other fruit juices and nectars are relatively low in ascorbic acid.

Add 1 part of acerola Juice No. 1 (p. 9) to 10 parts of other fruit juice. The resulting product should contain from 80 to 100 mg. ascorbic acid per 100 cc. (Good orange juice contains about 50 mg. ascorbic acid per 100 cc.)

Guava juice may be an excellent source of vitamin C if made from guavas originally high in this vitamin. Common wild guavas vary greatly in their vitamin C content and the product is often greatly diluted with water. Add 1 part of acerola Juice No. 1 (p. 9) to 15 to 20 parts of guava juice to produce a product with approximately 100 mg. ascorbic acid per 100 cc.

NOTE: Pineapple juice, passion fruit juice, and guava juice fortified with acerola juice retained approximately 85 percent of the original ascorbic acid after 8 months of freezer storage (0° F.) (3). The acerola juice had little or no effect upon the color or flavor of the other juices when freshly prepared or after freezer storage (3).

These same juices fortified with acerola juice when bottled and stored at room temperature (70°–85° F.) for 8 months retained 65 to 75 percent of the ascorbic acid, 10 to 20 percent less than when frozen (3).

Frozen Acerola and Passion Fruit Juices

YIELD: 16 cubes

1½ cups hot-pressed acerola
Juice No. 2

½ cup sugar

1½ cups passion fruit juice

These proportions are for unsweetened juices. Mix all ingredients well and pour into freezer tray. Freeze until solid. Remove cubes from tray, place in two thicknesses of plastic bags, or put each cube in saran wrap. Store in freezer, 0° F.

Each cube will contain about 150 mg. of ascorbic acid.

Acerola Syrup

YIELD: 2½ cups

2 cups hot-pressed acerola
Juice No. 2

2 tablespoons lemon juice, if
desired

2 cups sugar

Mix ingredients and cook to a temperature of 216° to 218° F., or until thick. Use on pancakes or waffles.

Acerola Jelly No. 1

YIELD: 3½ cups

3 cups hot-pressed acerola
Juice No. 2

½ bottle liquid pectin (⅓ cup)

3 cups sugar

Put the measured juice in a large flat sauce pan (to allow for expansion during boiling and to permit rapid evaporation). Bring to the boiling point and boil for 2 to 3 minutes, then add sugar and pectin, stirring constantly. Return rapidly to the boiling point and cook to a temperature of 219° or 220° F., or until a good jelly test is obtained.³ Skim, pour into hot sterilized glasses, and cover with hot paraffin.

NOTE: 1 level tablespoon or 1 heaping teaspoon of acerola jelly No. 1 made as directed will provide 90 to 120 mg. of ascorbic acid.

Acerola Jelly No. 2

YIELD: 3 cups

1½ cups hot-pressed acerola
Juice No. 2
3½ cups sugar

½ bottle liquid pectin (⅓ cup)

Mix hot-pressed juice and sugar thoroughly. Place over high heat and bring to a boil, stirring constantly. At once stir in ½ bottle of liquid pectin. Bring to a *full rolling boil*⁴ and boil hard for 1 minute, stirring constantly. Remove from heat, skim, and pour into sterilized glasses. Cover with hot paraffin.

NOTE: 1 level tablespoon or 1 heaping teaspoon of acerola jelly No. 2 made as directed will provide 50 to 60 mg. of ascorbic acid.

If made with the more concentrated hot-pressed Juice No. 1 (p. 9), 1 level tablespoon or 1 heaping teaspoon of the jelly will contain from 90 to 100 mg. of ascorbic acid.

Acerola Jelly No. 3

YIELD: 5 cups

3 cups hot-pressed acerola
Juice No. 2
4 cups sugar

1 box powdered fruit pectin
(1¾ ounces)

Thoroughly mix dry powdered pectin with juice. Place sauce pan over high heat and stir until mixture comes to a hard boil. At once stir in sugar. Bring to a *full rolling boil*,⁴ then boil hard exactly 1 minute, stirring constantly. Remove jelly from heat, skim off foam, and pour at once into sterilized glasses. Cover with hot paraffin.

³ Refer to: (1) *Fruits of Hawaii*, University of Hawaii Press, for complete details on jelly making, pages 180-183. (2) *How to Make Jellies, Jams, and Preserves at Home*, Home and Garden Bulletin No. 56, United States Department of Agriculture.

⁴ A full rolling boil is a steaming, tumbling boil that cannot be stirred down.

NOTE: 1 level tablespoon or 1 heaping teaspoon of acerola jelly No. 3 made as directed will provide 85 to 95 mg. of ascorbic acid.

If made with the more concentrated hot-pressed Juice No. 1 (p. 9), 1 level tablespoon or 1 heaping teaspoon of the jelly will provide from 140 to 160 mg. of ascorbic acid.

Acerola—Guava Jelly

YIELD: 2½ cups

2 cups hot-pressed acerola
Juice No. 2
1 cup guava juice

2¼ cups sugar

Use a relatively strong extract of guava juice to provide the pectin lacking in the acerola. Slice guavas thinly, measure and add half the measure of water, cook for 10 to 15 minutes until guavas are very soft, drain.

Bring the mixed juices to the boiling point and boil for full 5 minutes, add the sugar. Cook to a temperature of 221° F. or until a good jelly test is obtained. Pour into sterilized glasses and cover with hot paraffin.

Acerola—Passion Fruit Jelly

YIELD: 2 cups

1 cup hot-pressed acerola
Juice No. 2
1 cup passion fruit juice

2 cups sugar
½ bottle liquid pectin (⅓ cup)

Bring acerola and sugar to the boiling point. Add pectin and passion fruit juice. Cook to 220° F. Pour into sterilized glasses and cover with hot paraffin. Avoid long cooking of the passion fruit juice as it tends to spoil the flavor.

Acerola Mint Jelly

YIELD: 4½ cups

3 cups hot-pressed acerola
Juice No. 2
3 cups sugar

½ bottle liquid pectin (⅓ cup)
¼ teaspoon peppermint extract
few drops green coloring

Bring acerola juice and sugar to the boiling point, add pectin, and cook to 220° F., or until it gives a good jelly test. Remove from the heat, add peppermint extract and green coloring. Pour into sterilized glasses and cover with hot paraffin.

Use acerola juice that is light in color for the mint jelly, as it will result in a better looking green product. If the juice is definitely red in color, omit the green coloring and use only the peppermint extract.

Acerola Sauce No. 1

YIELD: 2 cups

5 cups acerola
1¼ cups sugar

1 cup water

Put all ingredients into a sauce pan. Boil gently, stirring occasionally until cherries become soft (10–15 minutes). Put product through a coarse sieve or food mill to remove seeds. Season with cinnamon or nutmeg if desired.

Serve as sauce or over ice cream, sliced bananas, or other fruit.

Acerola Sauce No. 2

YIELD: 1½ cups

1 cup acerola puree
1 cup sugar

2 teaspoons lemon juice

Use puree from juice (p. 9). Mix puree and sugar in a sauce pan and cook, with constant stirring, until the product changes color and becomes glossy. Pour into sterilized jars and seal. This product will not keep indefinitely if covered only with paraffin. It should be frozen or canned under sterile conditions. It may be kept for a week or two, well covered in the refrigerator. Use as a topping for ice cream, or sliced ripe bananas, or as a jam.

Acerola Spread

YIELD: 2 cups

1½ cups acerola puree
1½ cups sugar
1 tablespoon finely chopped
candied ginger

1 teaspoon cinnamon
pinch of cloves
pinch of allspice

Mix the spices with ½ cup of the sugar. Mix the sugar and puree (p. 9) thoroughly and cook over low heat with constant stirring until the product is thick and glossy, 10 to 12 minutes. Add ginger and cook 1 minute more. Remove from heat, pour into sterilized glasses, and cover immediately with hot paraffin.

Use as jam or as a topping for ice cream.

NOTE: To prevent burning the hands, stir during cooking with a long-handled wooden spoon, because the product spatters badly.

If a spicier product is desired increase the cloves and allspice to ¼ teaspoon each.

Frozen Acerola and Passion Fruit Topping

YIELD: 1½ cups

1 cup acerola puree (p. 9) ½ cup sugar
½ cup passion fruit juice

Mix all ingredients thoroughly. Chill and use on vanilla ice cream or sliced bananas. A dash of nutmeg may be added if desired.

This mixture may be frozen for future use.

Acerola Gelatin Dessert

YIELD: 4 to 6 servings

1 package (3 ounces) sweetened, 1 cup acerola juice
prepared gelatin (any flavor, 1 cup boiling water
preferably colored red or pink)

Pour boiling water over contents of the package and stir over low heat until all gelatin is dissolved. Add acerola juice. Mix well and pour into 1 large or 4 to 6 small molds. Cool, place in refrigerator to set. Serve cold.

NOTE: For fruit gelatin, chill the product until it begins to gel, add 1 cup drained fruit, mix lightly, and pour into molds. Use as a salad, or for dessert.

NOTE: If unsweetened acerola juice is used, add ¼ cup sugar to the above recipe.

Ginger Ale Salad with Acerola

YIELD: 5 to 6 servings

1 tablespoon gelatin ¼ cup sugar
4 tablespoons acerola juice (or 1 tablespoon lemon juice
water) 1 cup ginger ale
½ cup acerola juice

Soften gelatin in 4 tablespoons of juice or water. Heat the ½ cup of acerola juice, add softened gelatin, and stir until thoroughly dissolved. Add sugar and lemon juice, and cool slightly. Add ginger ale, mix well, and cool in refrigerator.

When gelatin begins to set, stir in:

½ cup chopped celery ½ cup drained, chopped pine-
2 tablespoons finely chopped apple (canned or frozen)
candied ginger

Pour into 5 or 6 molds and return to the refrigerator. When firm, turn out on lettuce leaves and serve with mayonnaise or other salad dressing.

Baked Bananas with Acerola Juice

YIELD: 4 servings

4 cooking bananas
 ½ cup acerola juice
 1 tablespoon lemon juice

2 tablespoons sugar
 pinch of salt

Parboil bananas, or bake in skins in oven for 15 to 20 minutes. Remove bananas from skins, and place in baking dish. Mix juices and sugar and pour over the bananas. Baste once or twice during the baking period of 20 to 30 minutes at 350° F., or until centers are soft.

Serve as a vegetable or a dessert.

Banola

YIELD: 6 servings

¼ cup sugar
 1½ cups unsweetened acerola
 juice

6 medium-size or 4 large, fully
 ripe bananas
 ⅓ cup grated coconut, if desired

Mix sugar and acerola juice. Cut thin slices of bananas into juice. Chill. Serve garnished with coconut.

Baked Apple with Acerola Juice

YIELD: 4 servings

4 apples
 4 tablespoons brown sugar

½ cup unsweetened acerola
 juice

Peel the top fourth of the apple and remove core. Place apples in baking dish, and put 1 tablespoon of sugar in the center of each apple. Pour juice over the apples and baste 2 or 3 times during the baking period. Bake at 350° F. about 40 minutes or until apples are tender.

Apple Crisp with Acerola

YIELD: 3 to 4 servings

Juice Mixture

½ cup acerola juice
 3 tablespoons sugar

2 teaspoons quick-cooking
 tapioca

Mix well and allow to stand 10 minutes or while preparing the other ingredients.

Topping

⅓ cup flour
 ⅓ cup brown sugar

1 teaspoon cinnamon
 2 tablespoons margarine

Mix flour, sugar, and cinnamon, work in softened fat with fork, or fingers. Pare, core, and slice 3 apples. Place apples in a deep baking dish. Pour juice mixture over apples. Crumble topping over surface. Bake at 350°–375° F. until apples are tender and top is delicately brown, 30–40 minutes.

Banana–Acerola Nectar

YIELD: 6 servings ($\frac{3}{4}$ cup each)

4 medium-size ripe bananas
1 cup chilled unsweetened
acerola juice
1 cup ice water

$\frac{2}{3}$ cup sugar **OR**
6 tablespoons sugar and $\frac{1}{4}$ cup
honey

Peel bananas and slice. Put all ingredients in an electric food blender and mix for about 1 minute. Serve at once.

Acerola Milk Shake

YIELD: 2 cups

1 cup cold milk
1 cup acerola sauce or juice
1 tablespoon sugar

$\frac{1}{4}$ teaspoon vanilla
dash of salt

Put all ingredients into a blender and blend for about half a minute. Serve cold.

Acerola Sherbet

YIELD: 1 quart

1 tablespoon gelatin
2 tablespoons cold water
 $1\frac{1}{2}$ cups boiling water
3 tablespoons sugar
2 tablespoons lemon juice

$1\frac{1}{2}$ cups acerola sauce **OR**
 $1\frac{1}{2}$ cups sweetened hot-pressed
acerola juice (p. 9)
1 egg white stiffly beaten

Soften gelatin in cold water. Stir gelatin into boiling water, add remaining ingredients, except egg white, and mix thoroughly. Pour into freezing tray and freeze to a mush. Fold into stiffly beaten egg white. Return to freezer, stir occasionally.

NOTE: Other juices, such as passion fruit, may be used to replace $\frac{1}{2}$ to $\frac{1}{3}$ of the acerola juice.

REFERENCES

- (1) ASENJO, CONRADO F., and ANA ROSA FREIRE DE GUZMAN. 1946. THE HIGH ASCORBIC ACID CONTENT OF THE WEST INDIAN CHERRY. *Science* 103: 219.
- (2) BRIDGES, MILTON A., and MARJORIE R. MATTICE. 1939. OVER TWO THOUSAND ESTIMATIONS OF THE pH OF REPRESENTATIVE FOODS. *Amer. Jour. Digestive Diseases* 6: 440-449.
- (3) FITTING, KATHERINE O., and CAREY D. MILLER. 1960. THE STABILITY OF ASCORBIC ACID IN FROZEN AND BOTTLED ACEROLA JUICE ALONE AND COMBINED WITH OTHER FRUIT JUICES. *Food Res.* 25: 203-210.
- (4) LEDIN, R. BRUCE. 1958. THE BARBADOS OR WEST INDIAN CHERRY. *Fla. Agr. Expt. Sta. Bul.* 594. 28 pp.
- (5) MURAI, MARY, FLORENCE PEN, and CAREY D. MILLER. 1958. SOME TROPICAL SOUTH PACIFIC ISLAND FOODS—COMPOSITION AND NUTRITIVE VALUE. University of Hawaii Press, Honolulu. 159 pp.
- (6) SANTINI, RAFAEL, JR. 1953. IDENTIFICATION AND DETERMINATION OF POLY-BASIC ORGANIC ACIDS PRESENT IN WEST INDIAN CHERRIES (*Malpighia puniceifolia* L.) AND IN THREE VARIETIES OF GUAVA (*Psidium guajava*). *Jour. Agr. Univ. Puerto Rico* 37: 195-198.
- (7) U. S. DEPARTMENT OF AGRICULTURE. 1957. HOW TO MAKE JELLIES, JAMS, AND PRESERVES AT HOME. *Home and Garden Bul.* 56. 30 pp.

**UNIVERSITY OF HAWAII
COLLEGE OF TROPICAL AGRICULTURE
HAWAII AGRICULTURAL EXPERIMENT STATION
HONOLULU, HAWAII**

LAURENCE H. SNYDER
President of the University

MORTON M. ROSENBERG
Dean of the College
and
Director of the Experiment Station