THE JOURNAL OF AGRICULTURE
OF THE UNIVERSITY OF PUERTO RICO

Issued quarterly by the Agricultural Experiment Station of the University of Puerto Rico, for the publication of articles by members of its personnel, or others, dealing with any of the more technical aspects of scientific agriculture in Puerto Rico or the Caribbean Area.

Vol. XXXIX April 1955 No. 2

Observations and Data on a Promising Selection of the West Indian Cherry, *Malpighia Punicifolia L.*

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INTRODUCTION

Fieldwork on the West Indian cherry, (*Malpighia punicifolia* L.) was started at the Agricultural Experiment Station in 1947. Since then two plantings comprising 400 trees have been under study at the Main Station in Río Piedras. During the years 1951, 1952, and 1953, 238 trees were planted at the Isabela Substation on a Coto clay soil.

The West Indian cherry or "acerola," as it is commonly called in Puerto Rico, has become a potential economic crop because of studies made by Asenjo and coworkers in 1945, which led to the discovery of the high ascorbic acid content of the juice of these cherries (1)[2] (4). Further work done by this group on cherries harvested at the Agricultural Experiment Station has confirmed their original observations (2), (3).

Santini (5) has recently reported that, besides ascorbic and dehydroascorbic acids, the only other acid present in the West Indian cherry in appreciable quantities is l-malic acid, which is not biologically active. He also has published a method for the determination of reducing and total sugars in the juice of this cherry (6).

DESCRIPTION OF THE GENUS *Malphigia*

The botanical literature on the genus *Malpighia* is rather limited. There are over 30 species in tropical and subtropical America. The genus was named in honor of Marcello Malpighi, an Italian botanist (1628–93).

Apparently some confusion has arisen in the description of two of the species namely, *M. punicifolia* and *M. glabra*. Similarity of botanical charac-

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The authors wish to express their appreciation to A. Riollano, R. Gandía-Caro, and R. García-Lugo for their assistance in this work at the Isabela Substation.

[2] Numbers in parentheses refer to Literature Cited, p. 56.

ters exists between the *M. punicifolia* of Linnaeus and *M. glabra* of Millspaugh, this probably being why two names are ascribed to the same species.

A good botanical description of *M. punicifolia* L. is given by Britton and Percy (7) and is repeated here for purposes of clarification. Our West Indian cherry selections correspond closely to this description, hence we believe our species to be *M. punicifolia* L.

Malpighia punicifolia, L. Sp. Pl. ed. 2,609. 1762.
M. punicifolia lancifolia Nds. Gen. Malp. 8. 1899,
M. punicifolia vulgaris Nds. Gen. Malp. 8. 1899,
M. punicifolia obovata Nds. Gen. Malp. 8. 1899.

A shrub or small tree. Leaves elliptic, oblong, or obovate, or narrowly oblanceolate, 2–7 cm. long, 0.8–4 cm. broad, obtuse, or rounded and often emarginate at the apex, acute or cuneate at the base, glabrous when mature, the petioles 1.5–4 mm. long; cymes sessile or short-peduncled, the branches usually pubescent; sepals ovate, 2.8–3 mm. long; pubescent; petals pink or violet, the larger ones up to 9 mm. long; drupes globose, ovoid, or subglobose, 1–1.6 cm. in diameter, scarlet. (*M. glabra* of Millspaugh, not of Linnaeus.)

Occasionally spontaneous after cultivation in Puerto Rico for its fruit; St. Croix; St. Thomas—St. Martin to Trinidad, Margarita, and Curacao, northern South America. *Cereza Colorada.* West Indian cherry, chereese.

VITAMIN C IN THE RIPE CHERRIES OF SELECTION B-17

Among the selections under study at our Station, No. B-17 seems to be a very promising one when such factors are considered as yield of fruit per acre, fruit size, yield of juice per fruit, and vitamin C content of juice.

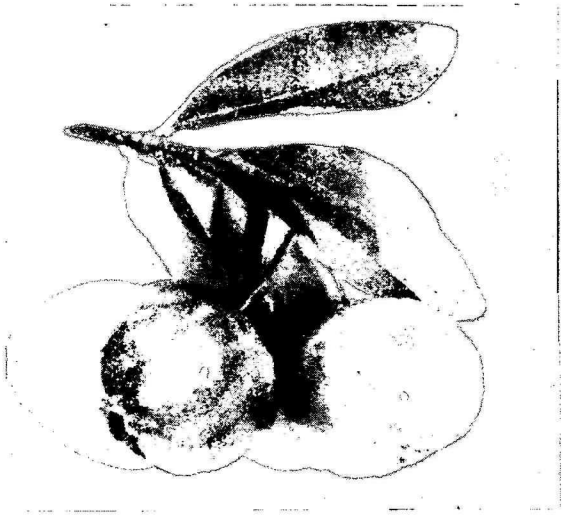

FIG 1.—Two fruits of clone B-17, West Indian cherry, *Malpighia punicifolia* L.

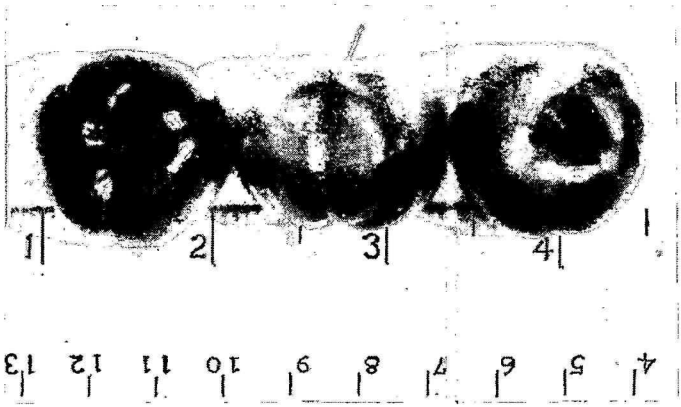

FIG. 2.—Ripe fruits of clone B-17, West Indian cherry, *Malpighia punicifolia* L. Note especially the shape and large size of these fruits.

The yield of fruit per acre can be estimated from the available data to range from 3 to 6 tons of cherries harvested from 4-year-old trees. The average weight of the fruit ranges from 9 to 12 gm. and the average diameter of this particular selection is about 1.25 inches. (See figs. 1 and 2). In table 1 are recorded the yields of juice obtained by squeezing the fruits by hand through a piece of cloth, and also the vitamin C content per 100 ml. of juice, and the juice yielded per fruit.

Table 1 presents data on fruits of nine trees belonging to Selection B-17. The fruits were brought to the laboratory in polyethylene bags and placed in a freezer as soon as they were harvested. The analyses were performed within the following 48 hours.

Ten fruits were taken at random from each bag. Juice from 10 fruits was obtained as indicated above. The content of ascorbic and dehydroascorbic acids was determined by the method of Roe and Oesterlin (8) using 2,4-dinitrophenylhydrazine reagent. Ascorbic and dehydroascorbic acids are known to have equal vitamin C activity.

The B-17 selection, as can be judged from the data in table 1, is a high yielder of juice as well as of vitamin C in the juice per fruit. The yield of juice was as high as 73 percent of the weight of the fruit, while the vitamin C per 100 ml. of juice ranged from a minimum of 1,325 to a maximum of 2,250 mg.

It is also interesting to note the difference in vitamin C content of the cherries harvested in May and those harvested in June and August. This matter should be further investigated, as climatic conditions may be responsible for the observed variations.

According to the recommended dietary allowance of the National Research Council the vitamin C requirement for an average man is 75 mg.

TABLE 1.—*Average weight of 1 fruit, the yield of juice of 1 fruit, and the vitamin C in the juice of ripe cherries of West Indian cherry selection B-17*

Sample identification	Date harvested	Average weight of 1 fruit[1]	Yield of juice per fruit[2]	Vitamin C (ascorbic and dehydroascorbic acids) per 100 ml. of juice	Vitamin C (ascorbic and dehydroascorbic acids) in squeezed[2] juice, per fruit
		Grams	*Milliliters*	*Milligrams*	*Milligrams*
119 B-17	June 8, 1954	7.8	5.3	1,375	72.9
	Aug. 3, 1954	11.6	7.6	1,950	148.2
120 B-17	June 8, 1954	9.1	6.2	1,400	86.8
	Aug. 3, 1954	8.9	6.2	2,125	131.8
121 B-17	June 8, 1954	8.7	6.0	1,400	84.0
	Aug. 3, 1954	9.5	6.2	1,950	120.9
122 B-17	May 4, 1954	10.8	7.4	1,675	123.9
	Aug. 3, 1954	9.8	6.2	2,125	125.6
123 B-17	June 8, 1954	7.2	4.6	1,450	66.7
	Aug. 3, 1954	9.1	6.1	2,200	134.2
124 B-17	June 8, 1954	7.0	4.0	1,325	53.0
	Aug. 3, 1954	10.1	7.1	2,250	159.8
127 B-17	June 8, 1954	8.3	5.6	1,400	78.4
	Aug. 10, 1954	12.1	8.9	1,900	169.1
128 B-17	May 4, 1954	8.1	5.4	1,600	86.4
	Aug. 10, 1954	11.8	8.8	1,850	162.8
130 B-17	May 4, 1954	9.8	6.8	1,600	108.8
	Aug. 10, 1954	11.4	8.1	2,200	176.4

[1] 10 fruits averaged.

[2] Squeezed by hand through a piece of cloth.

per day. As can be seen in the last column of table 1, in the large majority of the cases a single cherry would provide this recommended dietary allowance.

ECONOMIC IMPORTANCE AND COMMERCIAL POSSIBILITIES OF WEST INDIAN CHERRY JUICE

Because of its perishable nature and acid taste we do not feel that the West Indian cherry will become of much value as a fresh fruit for the market. School children are fond of the brightly red-colored cherries and every school in the Island should have several trees planted in its yard. Several thousands have already been distributed by our Station.

It is as a source of natural vitamin C that the West Indian cherry has a promising economic future. As many pediatricians are of the opinion that baby foods should not be enriched with synthetic products, the use of small quantities of this juice will permit enrichment with natural vitamin C without resort to the synthetic vitamin.

SUMMARY

Six hundred and thirty-eight trees of "acerola", the West Indian cherry (*Malpighia punicifolia* L.) are under study at present.

The discovery made, in 1945, that the juice of this fruit had a high vitamin C content has given the "acerola" a potential economic importance since the juice can be extracted without loss of its nutritional value.

A selection of the fruit (B-17) at present under study has proved to be a high yielder of juice as well as of vitamin C. The fruit is also large.

The vitamin C content of the juice of 18 fruit samples from 9 trees of this selection ranged from 1,325 to 2,250 mgm. per 100 cc. of juice.

The vitamin C content of the juice of a single fruit of the analyzed samples ranged from 53 to 176 mg. Based on these values, the juice of one fruit of this selection will supply the minimum daily requirement of vitamin C for child or adult.

An apparent relationship between certain climatic factors and the vitamin C content of the fruit has been observed. Differences between values of the vitamin C content of the fruit harvested at different times during the year are so high that their cause should be investigated further.

RESUMEN

La acerola ha tomado importancia económica en Puerto Rico después del descubrimiento hecho en la Escuela de Medicina de la Universidad de Puerto Rico sobre el alto contenido de ácido ascórbico (vitamina C) que se encuentra en el jugo de esta fruta.

Los estudios hechos demuestran que la selección B-17 reune los requisitos adecuados en cuanto a tamaño y diámetro de la fruta y el contenido de vitamina C.

El contenido de vitamina C en el jugo de 18 muestras de frutas procedentes de 9 árboles de la Selección B-17 (dos de cada árbol) fluctuó entre 1325 y 2250 milígramos por cada 100 ml. de jugo.

El contenido de vitamina C en el jugo de cada fruta de las 18 muestras analizadas fluctuó entre 53 y 176 milígramos. A base de estos valores, el jugo de una acerola puede suplir, la mayoría de las veces, los requisitos diarios de vitamina C para un niño o adulto.

El alto contenido de vitamina C en el jugo de la acerola ofrece posibilidades comerciales en Puerto Rico.

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