PRELIMINARY RESULTS OF A GUAVA (PSIDUM GUAJAVA) TRIAL AT THE JUANA DIAZ SUBSTATION OF THE UNIVERSITY OF PUERTO RICO

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For the last two hundred years, sugar cane has been grown extensively in Puerto Rico. It is still grown in some areas where mechanization is feasible, but due to high costs and small profits, its acreage has been diminishing consistently (1971). In the South coast, which is the driest region in Puerto Rico, much of the area formerly devoted to sugar cane now stands idle. Guavas are a good alternative for the South coast growers.

Psidium guajava has proven to be enduring, stress resistant and disease tolerant, except for Glomerella disease, mummification and blackening of the fruits. [Dhalival and Sarapán, 1971], caused by Glomerella cingulata (Stonem) Spauld. & Schenk., known in its amapicic or imperfect state as Colletotrichum gloeosporioides Penz. [Lim Tong Kwee and Khoo Khay Chong, 1990]. Yet, the small, colorless fruits produced by the wild types are not suitable for the food processing industry. The nectar prepared from wild fruits require the use of artificial color and have a short shelf life at room temperature (Rodríguez and Ignina, 1971). Nonetheless, the relative abundance of wild fruits and the lack of commercial orchards of selected varieties used to favor their almost exclusive use as raw material in the processing of guava products. Today, importation of guava is preferred. Varieties with pink or red color pulp, high acidity levels and high solid and pectin contents do exist and are available, many locally. They have been used commercially, both locally and abroad, for a long time (Booth, 1984a; Booth, 1984b; Booth and Alberts, 1984; Du Preer, 1986, Grech, 1985; University of Hawaii Miscellaneous Publication III). They deserve adequate management practices (Aponte, 1967; Grech, 1985; Shiing and Scullen 1966; and Long and Dib, 1976; Toro, 1993) to be recommended and supply them to local growers.

Psidium guajava originated in the American tropics. The Aztecs named it Xalxocotl. It is known as goyabe in French, guajava in German, goiaba in portuguese and aracá o guacú in Brazil (Toro, 1993). Wilson (1906) states that the guava originated in Haiti (Toro, 1993). It is commercially grown in California, Florida, Texas and other parts of the world.

In Puerto Rico, A. J. Rodríguez and L. M. Ignina (1971) recommend seven clones as able to produce lasting nectar (nine month storage period at 30˚C). These were 57-9-114 (Rico 18), 58-5-71 (Rico 13), 57-3-40 (Rico 21), 57-2-142 (Rico 19), 57-2-51 (Rico 20), D-13 (Rico 4) and Trujillo 2 (Rico 2). Clone 57-2-142 rated particularly high in flavor quality and nectar yield. Rodríguez and Ignina (1962) have studied other aspects of guava processing as well.

The guava is a small tree (up to 6 m high) with broad, spreading top, branching freely close to the ground. It has opposite, oblong leaves, with prominent veins below, 7 to 18 cms in length. The flowers are white, about 2.5 cms in diameter, borne in axils of leaves of recent growth. The fruit may range from round to pear shaped. It may be white in color. The flesh may range from white, yellow, pink to red. Flavor may range from sweet to highly acidic. It has a distinctive aroma, which may range from mild and pleasant to strong and penetrant (Le Bourdelles and Estanove, 1967; Toro, 1993). It may be susceptible to various pests and diseases (Vargas, 1974) throughout its range, which encompasses the whole tropical world.

Guavas may survive and even thrive in a variety of environments, although 26°C might be too cold for new shoots to survive. A wide range of climatic variation is possible; however, an excess of humidity may occur and affect the growth and development of the fruit. For this reason, in Puerto Rico it is advisable to plant this crop in the South coast, which is the driest region in the Island.

Depending mostly on the use of pruning practices, 6 x 6 m, 7.5 x 7.5 m or even 7.5 x 7.5 m are possible planting spacings (Grech, 1985; López and Pérez, 1977). Pruning may play an important role in promoting trees to bear early, as well as producing heavy crops, but intensive pruning regimes may contribute to shorten the life span of the orchard (Grech, 1985). Such practice, and the prevalence of diseases, are blamed for the short life spans of the Taiwanese orchards at the time of this study (only to twelve years, perhaps). In contrast, the South African orchards, which may last 20 or 25 years, or more. (It should be noted that an intensive pruning regime is necessary in Taiwan due, precisely, to the prevalence of diseases, particularly wilting, or leaf blight disease. However, this dreaded disease does exist in South Africa as well. Obviously, other factors are involved).

In Puerto Rico, T. Singh Dhalival (Dhalival and Sarapán, 1971) studied Glomerella disease (Glomerella cingulata). No resistant varieties have been found.

The environmental conditions at the Juana Diaz Experiment Substation (neighboring rainfall of approximately 800 cm, an elevation of 21 m above sea level, 31°C average maximum temperature, 21°C average minimum temperature) are ideal for the testing of management practices under our conditions.

The fourteen most important factors, chosen in consultation with a scientist of the Food Technology Laboratory, were selected and placed in an appropriate rootstock during 1997, and field planted in February 11, 1998. This is a selection from Albiton chosen for its vigor and the reddish color of its leaf, which make it easy to identify, and its resistance to diseases. Three replications were used, each containing four plants of every selection. The rest of the genotypes were planted around the new, replicated one as guard rows.

The chosen varieties were: 57-1-28, 57-3-40, R-258, 57-10-137, 57-7-19, 57-6-71, M-184, 57-2-55, R-264, G-864, 57-8-163, Q-R-4, G-447 and 57-1-42. They were planted in a San Antonio soil (Fine-loamy, mixed, isohyperthermic, Cumulic Haplustosolls) (USDA, 1979) with drip irrigation. The selections were chosen mostly on the basis of previous organoleptic tests (Vélez, Caloni, Parsi, Martínez and Caraballo, 1994). Selections that showed outstanding vigor as well as acceptable fruit quality for processing were also included.

All the selections have shown to be very resistant and fast growing. It is presumed that the high natural fertility of the soil and the constant supply of water have contributed to this. It is necessary to have a good drainage (with the exception of helichrysum).

The first fruits were harvested on December, 1998, barely ten months after field planting. This report includes twenty months of harvesting after this date.

Statistical analyses were performed for total fruit weight, number of fruits, and average fruit weight. There were significant differences. The seven heaviest fruits were produced by selections R-264, G-447, 57-3-40, 57-1-28, 57-10-137, 57-7-19, 57-6-71; however, the next seven heaviest selections are 57-1-42, 57-2-55, G-864 and 57-2-142. In that order, the eight heaviest selections which had the highest average weight (total weight divided by number of fruits), are R-264, G-447, 57-1-28, 57-3-40, G-864 and 57-2-142, in that order.

The average yield of the fruits selected as these most productive, which included selections R-264, G-447, 57-3-40, 57-7-19, 57-6-71, 57-1-42, 57-2-55, G-864 and 57-2-142, in that order, show that the six most productive selections, which had the highest average weight, have a tendency to produce many big, white fruits, while selections such as 57-1-42, which got the fifth place in total weight but was the most prolific selection in total number of fruits, and selection 57-7-163, which was the seventh in relation to total weight but the second in relation to number of fruits, have a tendency to produce smaller, lighter fruits.

This is a work in progress and should continue for at least three more years. The processing of these fruits is a subject that is currently in progress, it is presumed that farmers will be interested in high yield, regardless of fruit size. However, it is not known whether these preliminary results will remain unaltered through time. Furthermore, a study will be needed in the near future to determine economical feasibility.