YIELD AND FRUIT QUALITY OF RAMBUTAN CULTIVARS GROWN AT TWO LOCATIONS IN PUERTO RICO

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INTRODUCTION

Rambutan (*Nephelium lappaceum*) is native to Malaysia and Indonesia and is a member of the Sapindaceae family. The edible portion of the fruit is a fleshy, translucent white sarcotesta which arises from an integument surrounding a single oblong seed. In "freestone" cultivars, the sarcotesta and integument come freely away from the seed, a desired characteristic; in "clingstone" cultivars they are more difficult to separate. Rambutan flourishes from sea level to 700 m in elevation on well-drained heavy clay soils and under a rainfall distribution of about 2000 mm per year.

There is little information available on the total area and production of rambutan worlwide. Thailand and Indonesia are the largest producers of rambuatn with estimated production ranging from 150,000 to 430,000 tons. Some of the most popular cultivars are Binjai, Jitlee, Lebak-bulus, Gula Batus (R3), Muar Gading (R156), Daun Hijau (R162), Rongrien, Khaw Tow Bah (R160), R134 and R167. The expected yield during the first fruiting year is 1.2 t/ha, and for a 10-year-old orchard is 12 to 16 t/ha. However, formal experimentation to evaluate yield and fruit quality traits of rambutan cultivars is lacking.

We report herein preliminary data on yield, fruit quality traits and adaptability of various rambutan cultivars grown at two locations in Puerto Rico. This work is part of USDA-ARS National Program 305, Crop Production.

MATERIALS AND METHODS

The study was conducted in Puerto Rico at the USDA-ARS Research Farm in Isabela (Coto clay; clayey, kaolinitic isohyperthermic Typic Hapludox) and at the Corozal Agricultural Experiment Substation of the University of Puerto Rico (Corozal clay; clayey, mixed, isohyperthermic Aquic Haplohumults). Soil and climatic characteristics are described below.

Average preplant soil characteristics at two test sites in Puerto Rico, measured to a depth of 30.5 cm.

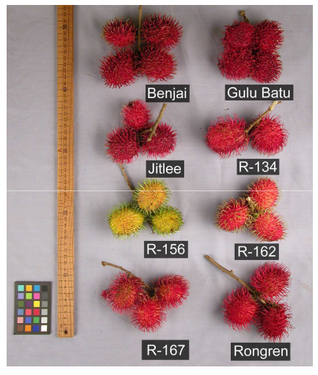
Soil characteristic	Location: Corozal (Ultisol)	Location: Isabela (Oxisol)
pH (H_20)	4.75	6.62
pH ($CaCl_2$)	4.11	6.06
NH_4-N (mg/kg)	23.01	11.05
NO_3-N (mg/kg)	9.17	6.60
Organic C (%)	1.19	1.20
Phosphorous (mg/kg)	5.88	15.79
Potassium (mg/kg)	53.67	469.80
Calcium (mg/kg)	1550.66	1654.20
Magnesium (mg/kg)	62.00	67.80

Historical weather data at two test sites in Puerto Rico (n = 58 yr)

Soil characteristic	Location: Corozal (Ultisol)	Location: Isabela (Oxisol)
Rainfall (mm)	1863	1649
Evaporation (mm)	1391	1672
T°max. (℃)	29.7	29.8
T°min. (℃)	19.8	19.9
T°Mean (℃)	24.7	24.9
Elevation (m)	195	126

Trees of varieties Benjai, Gula Batus, Jitlee, R-134, R-156 (Y), R-162, R-167 and Rongrien grafted onto R-167 rootstocks were transplanted to the field 21 July 1999 (Isabela) and 2 September 1999 (Corozal) and arranged in a randomized complete block design with five replications at each location. Within a replication, plots for each cultivar contained three trees spaced 6.1 m apart and 6.1 m between adjacent rows forming a triangular array. The experiments were surrounded by two rows of guard trees. Plots were irrigated as necessary with spinner jets (Maxijet, Inc.) providing 13.5 gph (51 lph) at 20 psi (.14 MPa) and spaced 3.6 m apart. Fertilization was provided every 3 months using a 15-2.2-16.3-3% (N-P-K-Mg) commercial mixture at a rate of 498 kg/ha. Herbicide was applied only in strips within the planting row.

Rambutan Field Harvest



Representative fruit of each cultivar

Fruit weighing in field

At each harvest, number of fruit was recorded and weighed. Representative fruits totaling about 10% of those harvested were used to determine rind weight, seed weight and pulp weight. Fruit soluble solids (Brix) were also taken from ripened fruit with a digital sugar refractometer. Results are reported for harvests made in 2005, 2006 and 2007.

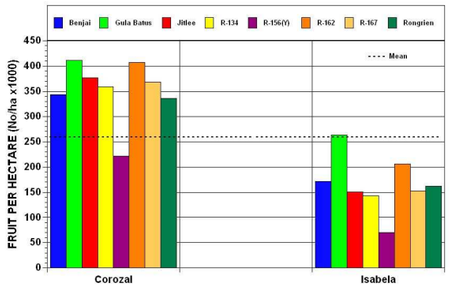
Counting Fruit

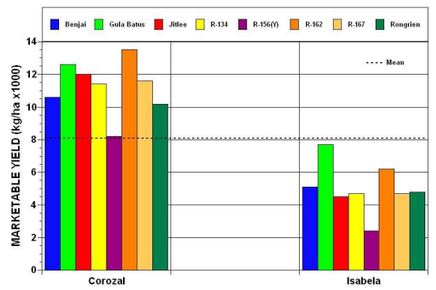
Fruit weight determination

Dividing fruit in pulp, seed, and rind components.

Fruit soluble solids determination

RESULTS AND DISCUSSION





The combined analysis of variance showed that total number of fruit was significantly higher at Corozal (357,004 fruit/hectare) than at Isabela (168,083 fruit/hectare). Consequently, fruit yield was significantly higher at Corozal (11,357 kg/ha) than at Isabela (5,111 kg/ha). Average soluble solids concentration was higher at Isabela (21.6) than at Corozal (19.9). Overall, cultivars exhibited a significant increase in the number of fruit and yield during the first 3 years of production. In 2005, average number of fruit and yield were 122,847 fruit/ha and 4,075 kg/ha, respectively. By 2007, these values had increased to 355,463 fruit/ha and 11,430 kg/ha. This response was expected as trees increased in age.

At Corozal, there were no significant differences among varieties for number of fruit and yield which averaged 352,922 fruit/ha and 11,270 kg/ha, respectively. At Isabela, cultivars Gula Batus and R-162 produced significantly more fruit and had higher yield than the rest of the cultivars averaging 234,153 fruit/ha and 6,979 kg/ha, respectively. Cultivar R-156 yellow produced the least number of fruit (69,858 fruit/ha) and had the lowest yield (2,378 kg/ha) among cultivars grown at Isabela. Cultivars R-156 yellow and Rongrien had fruit with significantly more pulp (58%) than other cultivars (47%).

Significantly higher soluble solids concentration averaging 20.2% was obtained at Corozal on fruit of cultivars R-167, Rongrien, Jitlee and R-162 whereas lower values were obtained for fruit of cultivars R-156 yellow and Gula Batus which averaged 19.1%. A similar response was observed at Isabela.

Preliminary data from this experiment suggest that an agroenvironment similar to that found in Corozal (acid soil, +1800 mm rainfall, rainfall > Epan, less windy) is more favorable for rambutan production than that found in Isabela.

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