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SELECTION FOR EARLY BEARING PAPAYAS IN THE VIRGIN ISLANDS

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ABSTRACT: Papaya production in the U.S. Virgin Islands is for the domestic market and has been plagued by the Papaya Ringspot Virus (PRSV) and seasonal hurricanes. This has resulted in papayas now being growing as an annual crop. The need exists in the U.S. Virgin Islands for papayas with early production to ensure a marketable crop within 9-10 months. The local demand is for papayas of the 1-1.5 kg size and this is considerably larger than the 0.25-0.5 kg solo varieties developed for export. Breeding and selection has been ongoing for 7 years to develop papayas with tolerance to PRSV and fruit production starting at or less than 1 m from the ground. The height at first fruit set, of papaya cultivars evaluated in the Virgin Islands, ranges from 60 cm to 253 cm. Generally, female plants start setting fruit lower on the stem than hermaphroditic plants. Through breeding and selection, 3 papaya lines have been developed which set fruit between 40 and 60 cm from the ground. These low bearing papaya lines produce fruit that are marketable one month earlier than other cultivars.

MATERIALS AND METHODS

The University of the Virgin Islands has been conducting papaya evaluations to determine cultivars for production in the USVI. To date, over 60 cultivars have been evaluated during the last seven years. The cultivars came from all parts of the tropical world. Cultivars were initially selected based on:

- Tolerance to high pH 8.5 calcareous soils
- Tolerance to papaya ringspot virus
- Fruit size greater than 0.5 kg
- Sweetness greater than 10% Brix

Cultivars with 2 years of good results were selected and maintained. Nine papaya cultivars have been selected for seed multiplication and distribution to farmers and backyard growers (Table 1). Due to the frequency of hurricanes, fruit production data was taken at the time of the first ripe fruit. The selected papaya cultivars also try to fulfill consumer demand for fruit size (Table 2), flesh thickness and flesh color (Table 3).

Papaya breeding has also been conducted to develop early bearing varieties within 60 cm from the ground. Three lines have been developed.

Development of early bearing papaya lines

Line UVI-1 was developed from a cross between '356-3' and 'Cariflora' with an F_2 selection backcrossed to '356-3'. The plants are carpellate or staminate having fruits with a 12 cm diameter and 13% brix. The first fruit is set 53 cm from the ground and has a yellow flesh color.

Line UVI-2 produces hermaphroditic plants and pear-shaped fruits. It originated from a 'PR-6-65 Dwarf' selection that was inbred and selected over 4 generations. The plants are hermaphrodites with 15 cm long yellow-fleshed 0.63 Kg fruits having 14% brix. The first fruit is set 40 cm from the ground.

Line UVI-3 was generated from in vitro somatic embryogenesis of 'Yuen Nong'. The R_1 was self pollinated and produced uniform dwarf early bearing large fruited plants. The plants are hermaphrodite, carpellate or staminate having yellow 1.98 Kg fruits that are 30 cm long, 12.5 cm wide and 12% brix. The first fruit is set 58 cm from the ground.

CONCLUSIONS

The three early bearing papaya lines have performed well under UVI field test with calcareous soils of pH 8.0-8.5. Being that they also have a medium to large size fruit, they should be desirable for the local consumers. The low bearing character will make them attractive to homeowners and backyard gardeners for fresh use or roadside sales. They have tolerance to PRSV and are vigorous enough to be productive for a year after infection. Future research will apply biotechnology to obtain resistance to locally endemic viruses.

Table 1. Papaya plant source and fruiting characteristics of selected papaya varieties.

Variety	Source	Sex[z]	Height at 1st Fruit (cm)	# Fruit/Plant[y]
356-3	Hawaii	M F	62	64
Cariflora	Florida	M F	79	82
Maradol	Cuba	B F	84	62
PR Dwarf	Puerto Rico	B F	60	74
Redonda	Africa	M F	102	67
Tainung 5	Taiwan	B F	107	40
Trini Red	Trinidad	B F	109	50
Washington 5	India	M F	71	65
Yuen Nong 1	Thailand	B F	104	41

[z]M=Male, F=Female, B=Bisexual/Hermaphrodite

[y]Number of fruit set at the time of the first ripe fruit

Table 2. Fruit size for the nine selected papaya varieties from UVI.

Variety	Weight (kg)	Length (cm)	Width (cm)
356-3	0.65	14.96	10.34
Cariflora	1.21	16.31	15.85
Maradol	1.48	21.92	15.98
PR Dwarf	0.54	12.26	9.78
Redonda	1.16	18.49	11.99
Tainung 5	1.65	22.00	12.27
Trini Red	1.37	21.18	8.41
Washington 5	0.84	15.44	11.53
Yuen Nong 1	1.81	24.43	11.71

Table 3. Papaya fruit quality characteristics of the UVI-AES selected varieties.

Variety	Sweetness (% Brix)	Flesh Thickness (cm)	Flesh Color
356-3	13.4	2.67	Yellow
Cariflora	11.3	2.92	Yellow
Maradol	10.7	3.02	Red
PR Dwarf	12.6	2.12	Yellow
Redonda	10.9	2.82	Yellow
Tainung 5	11.6	2.59	Red
Trini Red	10.0	2.26	Red
Washington 5	12.4	2.77	Yellow
Yuen Nong 1	11.0	2.83	Yellow