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INTRODUCTION of NEW TOMATO VARIETIES into AMERICAN SAMOA for the 1990s Part 2

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Plant breeders are continuously developing new vegetable varieties in the hope of increasing genetic limits to yield and quality. This holds true for tomatoes, too. For example, none of the tomato varieties recommended for America Samoa in 1974 (Swan, 1974) are currently recommended. This is because improved varieties have since been developed. Several experimental tomato varieties from the Asian Vegetable Research and Development Center (AVRDC), Taiwan, R.O.C., were tested against two current favorite tomato varieties in American Samoa: King Kong and Vanguard, both from Known-You Seed Co., Taiwan (Kuo, et al., 1990). From that study, five self-pollinating varieties from AVRDC were selected for this subsequent study. For comparison, King Kong and Vanguard varieties will again be planted, as well as five other tomato varieties recommended for neighboring Western Samoa (Finlay, et al., 1983).

MATERIALS AND METHODS

Seeds of five self-pollinating bush-type tomato varieties from the Asian Vegetable Research and Development Center (AVRDC), P.O. Box 42, Shanhua, Tainan 741, Taiwan, R.O.C. (CLN65-349D_4-2-0, CL143-0-10-3-0-1-10, CLN657BC_1F_2-274-0-15-4, CLN657BC_1F_2-267-0-3-12-7, and CL5915-206D_4-2-5-0); two vine-type varieties from Known-You Seed Co., 26 Chung Cheng Road, Kohsiung, Taiwan, R.O.C. (King Kong and Vanguard); three recent varieties from the University of the South Pacific, Alafua Campus, Apia, Western Samoa (Alafua Early--bush, Alafua Winner--bush, and Alafua Large--vine); two varieties from Watkins Seeds Ltd., P.O. Box 468, New Plymouth, New Zealand (Super Bush--bush and Grosse Lisse--vine); and BWN-21, a vine-type variety from the University of Hawaii, College of Tropical Agriculture and Resources, Department of Horticulture, St. John Plant Science Building, 3190 Maile Way, Room 112, Honolulu, HI 96822, were sown in 10 x 10 x 10 cm peat pots filled with Jiffy Mix (a 1:1 mix of peat and vermiculite) on 20-FEB-90. Beginning 5 days after germination, 50 ml of a 1% 10-52-8 fertilizer solution

were applied to each plant at weekly intervals. The 18-day-old seedlings were then transplanted to a 15 x 15 m field into which 30 kg of fresh chicken manure had been plowed 7 days earlier. Immediately before transplanting, 4 g of 9-12-13 fertilizer were placed in each planting hole, and 4 g were again added around each plant as side-dressing 14, 28, 42, and 56 days later. Dry coconut leaves were placed up to 30 cm around each plant as mulch. Rain water was sufficient throughout the growing season, and drainage was adequate.

The tomatoes were planted in paired rows with 60 cm within rows, 150 cm between rows, and 45 cm between plants in a row. A replicate comprised 4 plants of each variety grouped in a rectangle. There were three replicates for each variety.

Fruit production was rated as good, fair, or poor; fruit size as small, medium, or large; and time from transplant to harvest as early, medium, or late, based on the green-fruit stage. Heat tolerance ability was evaluated using the fruit-to-flower ratio (Fr/Fl).

Weekly temperatures ranged from 21 to 32 °C, averaging between 24 to 26 °C.

RESULTS AND DISCUSSION

Unlike the earlier study (Kuo, et al., 1990), none of the varieties succumbed to Bacterial wilt disease. But Super Bush, Grosse Lisse, and most of the BWN-21 variety plants were destroyed by Spot wilt, a viral disease for which there are no resistant varieties.

High night temperatures throughout this trial were probably responsible for the observed low fruit set. Alafua Early and Vanguard had very low Fr/Fl ratios (Table 1) and, consequently, poor fruit productivity (Table 2). They apparently require night temperatures below 23 °C for good fruit set.

Alafua Winner, Alafua Large, and King Kong, which had high Fr/Fl ratios and good fruit productivity, are good varieties for the cooler, drier season from March to September. However, they

should not be recommended for other times of the year until further studies of their heat tolerance.

CL143-0-10-3-0-1-10 and CLN657BC$_1$F$_2$-274-0-15-4 had good Fr/Fl ratios and fruit productivity throughout the former and the current trial and should be suitable for year-round cultivation. How these two varieties would compare against Alafua Winner, Alafua Large, and King Kong during the cooler season remains to be answered.

CLN65-349D$_4$-2-0, CL5915-206D$_4$-2-5-0, and Alafua Winner have similar plant and fruit characteristics, but CLN65-349D$_4$-2-0 had a lower heat tolerance and CL5915-206D$_4$-2-5-0 was not as vigorous as Alafua Winner.

CONCLUSIONS

CL143-0-10-3-0-1-10, CLN657BC$_1$F$_2$-274-0-15-4, Alafua Winner, Alafua Large, and King Kong are good varieties to grow between March to September in American Samoa, while the first two varieties may also be suitable between October to February. Because this variety trial spans only a single rainy season, more research is needed to properly assess these varieties, particularly the heat tolerance of Alafua Winner and Alafua Large.

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Table 1. Variety name, percent mortality rate, fruit-to-flower ratio (Fr/Fl), and suggested growing season for the tomato varieties.

Variety	Mortality[a] Rate (%)	Fr/Fl[b] Part 1	Fr/Fl[b] Part 2	Growing Season
Alafua Early	17	--	20	MAY-AUG
Alafua Large	33	--	60	FEB-OCT
Alafua Winner	0	--	53	FEB-OCT
BWN-21	68	--	--	---
CL143-0-10-3-0-1-10	33	43	90	ANY TIME
CL5915-206D_4-2-5-0	50	35	55	FEB-OCT
CLN65-349D_4-2-0	33	30	45	FEB-SEP
CLN657BC_1F_2-267-0-3-12-7	50	41	50	ANY TIME
CLN657BC_1F_2-274-0-15-4	17	46	70	ANY TIME
Grosse Lisse	100	--	--	---
King Kong	9	30	60	MAR-SEP
Super Bush	100	--	--	---
Vanguard	0	15	30	MAY-AUG

[a] Due to Spot wilt or Tobacco Mosaic Virus
[b] Fruit-to-flower ratio for Part 1 (Kuo, et al., 1990) and Part 2 (i.e., this study)

Table 2. Fruit productivity and size, period between transplant and harvest, and suggested managing practices for the tomato varieties.

Variety	Fruit productivity	Fruit size	Time to Harvest	Management Practices
Alafua Early	poor	small	early	---
Alafua Large	good	large	medium	stake/prune
Alafua Winner	good	medium	medium	1 m stake
BWN-21	--	--	--	---
CL143-0-10-3-0-1-10	good	small	early	1 m stake
CL5915-206D_4-2-5-0	good	large	medium	1.5 m stake
CLN65-349D_4-2-0	good	medium	late	1 m stake
CLN657BC_1F_2-267-0-3-12-7	bad	large	early	1 m stake
CLN657BC_1F_2-274-0-15-4	good	large	medium	stake/prune
Grosse Lisse	--	--	--	---
King Kong	good	large	late	stake/prune
Super Bush	--	--	--	---
Vanguard	poor	large	late	stake/prune