TARC Report

Evaluation of Local Varieties of Oriental Pickling Melon as a Useful Vegetable in Summer Season in Okinawa

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Introduction

Remarkable reduction of vegetable production during the summer season is a serious problem in Okinawa located in the subtropical region of Japan. Actually, only a few kinds of leafy vegetable such as water spinach and Santosai (a cultivar of Chinese cabbage), and cucurbits such as bitter gourd, wax gourd, or smooth loofah, are grown there, showing the small amount of production, in the summer season. Production of other vegetables is also very few. This situation is caused mainly by serious attack of frequent typhoons and adverse effects of high temperature, and diseases and insect pests. It is urgent, therefore, to find out some vegetables which are tolerant to such a severe condition and able to give high yield.

Recently introduced vegetables e.g. cucumber and watermelon, which were improved in mainland Japan, are not suitable to be grown in Okinawa. On the contrary, the above-mentioned local vegetables and local varieties of other vegetables seem to be more adapted to Okinawa. Oriental pickling melon[2,5] is one of the traditional vegetables, but is seldom grown and not popular in Okinawa.

Evaluation of oriental pickling melon, particularly its local varieties, was carried out in an attempt to find out ways to increase vegetable production in Okinawa.

Materials and methods

Seven varieties of oriental pickling melon, *Cucumis melo* L. var. *conomon* Makino, were used as materials; two local varieties in Okinawa, "Hateruma" and "Ōhama", were collected at Hateruma Island and Ishigaki Island, respectively. In addition, "Katsura", "Numame", "Awa-midori" and "Ao-ōnaga shima-uri" were introduced from mainland Japan, and "Ō-aokawa shima-uri" was introduced from the continent of China. Thirty two varieties from eight species of *Cucurbitaceae* were also examined to compare with oriental pickling melon.

The seeds were sown on July 7, 1983 in plastic pots at Ishigaki Island (lat. 24°N) and transplanted two weeks after sowing to rows 2.5 m apart, plants 1 m apart in the row. NPK and disulfoton (pesticide) were applied to the field before transplanting, but no other

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chemicals were applied.

The mean and maximum temperatures, average of July, are 29.1 and 32.0°C, respectively, and those for August are 28.6 and 31.5°C at Ishigaki Island.

Since cucumber is competitive with oriental pickling melon for consumption, growth performances of oriental pickling melon were particularly compared with cucumber. Three typical summer-sown cultivars of cucumber, "Tokiwa-natsufushinari", "Aonaga-sūyo" and "Shimoshirazu", introduced from mainland Japan, were used.

Results

The growth of oriental pickling melon was more vigorous and rapid than that of cucum-

Table 1. Growth characteristics of oriental pickling melon and cucumber

Vegetable	Variety	Length of main vine[b]	No. of lateral shoots[a] (>30cm)	Plant height[c]	Degree of field-covering[b,d]	Compactness of plant[d]	Plant vigor[c]	Petiole length[b]
		cm		cm				cm
Oriental pickling melon	Katsura	162	4.1	30	5	better	4	18
	Numame	121	4.8	25	5	good	3	14
	Awa-midori	127	4.5	35	4	better	4	19
	Ao-ōnaga s.u.[g]	140	4.3	36	5	better	5	20
	Ō-aokawa s.u.	139	3.8	30	5	better	4	18
	Hateruma	141	4.9	39	5	better	5	17
	Ōhama	165	4.9	26	5	better	4	18
Cucumber	Tokiwa-natsu fushinari	102	0.1	30	3	good	1	21
	Aonaga-sūyo	114	0.3	27	3	good	1	19
	Shimoshirazu	118	3.1	30	3	good	1	22

(continued)

Vegetable	Variety	Leaf size[b]		Days to bloom after sowing	Days to harvest after sowing	Incidence of pests and diseases[e]	
		Width	Length			Leaf-footed plant bug	Downy mildew[f]
		cm	cm				
Oriental pickling melon	Katsura	18	14	33	40	rare	2
	Numame	19	14	28	34	rare	2
	Awa-midori	19	13	33	42	middle	1
	Ao-ōnaga s.u.	18	13	28	42	rare	2
	Ō-aokawa s.u.	19	14	28	42	middle	1
	Hateruma	17	13	32	40	rare	0
	Ōhama	17	12	29	34	rare	1
Cucumber	Tokiwa-natsu fushinari	22	16	36	42	much	3
	Aonaga-sūyo	20	16	34	42	much	3
	Shimoshirazu	21	16	33	39	much	3

a, b, c) Observed on August 4, August 10–11, August 23, respectively.
d) Degree of field covering by leaves. Rated from 1 (thin) to 5 (intense).
e) Rated from 0 (poor) to 5 (very vigorous).
f) Rated from 0 (unattacked) to 5 (severe).
g) s.u. means "shima-uri".

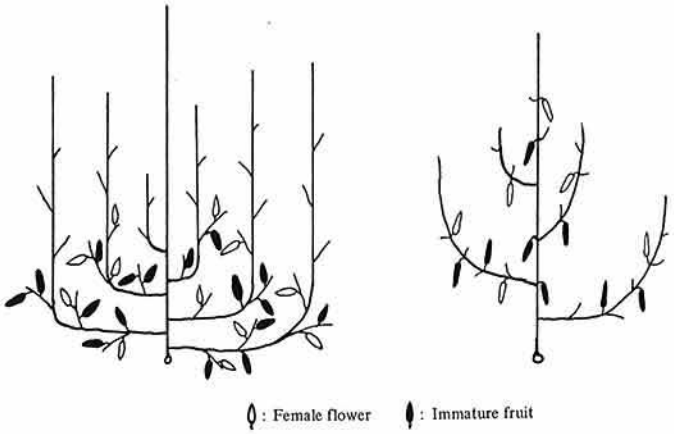

Fig. 1. Schematic illustration of plant type of oriental pickling melon (left) and cucumber (right) at about 45 days after sowing

Plate 1. A local variety "Ōhama" of oriental pickling melon at harvest time

ber (Table 1). As shown in Fig. 1 and Plate 1, more lateral shoots were observed in plants of oriental pickling melon than in cucumber. Furthermore, lateral shoots in the former developed from lower nodes than in the latter. The length of lateral shoots attained almost the same length as the main shoot, i.e. about 1.5 m. In contrast to cucumber, oriental pickling melon showed shorter petioles, smaller leaves, compact plant type and creeping

Table 2. Fruit characteristics of oriental pickling melon[a)]

Variety	Fruit weight	Fruit size			Fruit color	Thickness of pericarp		Texture of pericarp	
		Length (A)	Diameter (B)	A/B		Thin portion	Thick portion	Hardness	Remark
	g	cm	cm			cm	cm		
Katsura	880	25.2	7.2	3.50	light green	1.8	2.2	soft	
Numame	670	18.8	7.7	2.44	light green	1.9	2.4	middle	control
Awa-midori	607	23.9	5.9	4.05	light green	1.7	1.9	hard	
Ao-ōnaga shima-uri	686	20.6	7.6	2.71	green	1.9	2.3	hard	fibrous
Ō-aokawa shima-uri	435	16.1	6.9	2.33	green	1.6	2.0	hard	fibrous
Hateruma	492	15.8	7.3	2.16	mottled green	1.6	1.8	hard	good texture
Ōhama	534	19.1	7.0	2.73	dark green	1.4	1.7	slightly soft	good taste

a) Immature fruits were examined.

growth habit.

Female flowers of oriental pickling melon began to bloom from 28–33 days after sowing, while that of cucumber was from 32–34 days. Oriental pickling melon showed high fruit setting ability in all cultivars examined. Their fruit grew rapidly up to 15 cm in length within a week after flowering, and began to be harvested 34 days after sowing in early cultivars. More fruits were harvested from oriental pickling melon than from cucumber until mid-August.

The growth rate of cucumber was apparently declined earlier than that of oriental pickling melon. Symptoms of diseases, e.g. downy mildew, were observed on cucumber in the middle of August, while no symptoms observed on oriental pickling melon. Furthermore, leaf-footed plant bug, a serious and widespread pest in Okinawa, attacked cucumber more severely than oriental pickling melon.

Since no typhoon came during the period of the study, varietal differences in tolerance to strong wind were not observed.

On the other hand, among the cultivars of oriental pickling melon, "Ōhama" and "Katsura" showed more vigorous and rapid growth. The beginning of blooming of female flowers and harvesting of fruit of "Ōhama" and "Numame" were earlier than those of other cultivars. The growth rate of "Ao-ōnaga shima-uri", "Numame" and "Awamidori", which were introduced from mainland Japan, began to slow down in the middle of August when a considerable amount of fruit had already been harvested, but "Hateruma" and "Ōhama", local varieties, still grew actively even in late August. Furthermore, "Hateruma" showed the highest resistance to downy mildew among the varieties examined.

The characteristics of fruit are shown in Table 2. The fruit of "Ōhama" had no stripes or lengthwise streak on the surface and was dark green. The fruit of "Hateruma" had mottles on fruit surface, and they were similar to fruit of "Hoepoechin", a widely distributed variety in Taiwan.[1,3)] The pericarp of these local varieties was slightly thinner than those of introduced ones. Fruit texture of "Hateruma" was harder and that of "Ōhama" was slightly softer than "Numame" used as a control. The taste of raw fruit of oriental pickling melon was good, particularly the taste of "Ōhama" was very excellent.

Discussion

The results obtained in this study indicate that oriental pickling melon is adapted to the severe climatic conditions of summer in Okinawa, and its adaptability is higher than that of cucumber. This conclusion is consistent with the reports published in Taiwan, near to Okinawa. The reports show that oriental pickling melon is highly tolerant to high temperature, diseases, drought and high moisture,

and well adapted to a wide range of soil types, from clay to sandy soil with a pH range of 5.5–7.0.[1,3] Oriental pickling melon is also supposed to be protected against wind damage by its smaller leaves and compact plant type with high creeping ability.

Furthermore, as compared with other 8 species of *Cucurbitaceae* examined, the fact that the beginning of fruit harvest in oriental pickling melon starts earliest, i.e. within 5 weeks after sowing, is one of the most desirable ecological characters required by summer-sown vegetables in Okinawa. When vegetables are seriously damaged by typhoon and farmers try to get a crop by re-sowing after typhoon, the crop should be harvested within 35 days after a disaster.

Net-covering cultivation which is effective in protecting leafy vegetables from typhoons and pests has made the vegetable production in the area near Naha City in Okinawa very stable.[4] Oriental pickling melon is suitable to the net-covering cultivation, due to its short and compact plant-type.

"Ōhama" and "Hateruma", local varieties of oriental pickling melon, collected in Ishigaki and Hateruma Island respectively, showed more vigorous and rapid growth than any cultivar introduced from mainland Japan or China. It seems that these local varieties which are highly tolerant to high temperature, drought, pests and diseases in summer, must have been selected and settled in Okinawa. On the contrary, any local variety of cucumber has not been known in Okinawa.

The local varieties of oriental pickling melon were previously grown in a large area in Okinawa, but their planted area has been much reduced due to the competition with cucumber for consumption. As the consumption of cucumber is very popular everywhere in the whole year in Japan, even in summer in Okinawa, farmers grow cucumber to fetch a good market and price, but its production is very unstable.

The fruit of oriental pickling melon tastes better than cucumber in the hot season in Okinawa, and can be used for more diverse purpose than cucumber. For example, the fruit is pickled with salt, *sake*-lees and other materials, and also stewed or dressed. The salted pickle is said to stimulate our appetite in summer season in Okinawa.

These findings on oriental pickling melon indicate the importance of re-evaluating of collected local varieties for increasing steady self-supply of vegetables, even in areas where severe climatic conditions caused the dependence of vegetable on import. Moreover, the local varieties are important as breeding materials to improve adaptability to the severe climatic conditions.

Summary

During the summer season in Okinawa, vegetable production is used to be reduced to a low level, due to typhoons, high temperature, pests, and diseases. A large quantity of vegetables are imported from the highlands in mainland Japan, and consumed at considerably high expense.

On the other hand, however, some local vegetables can be grown well in this area. As these vegetables and their varieties seem to have tolerance and adaptability to the severe conditions, characteristics of local varieties of oriental pickling melon was compared with cucumber.

Growth of oriental pickling melon was more vigorous and rapid. The plants were characterized by more lateral shoots and smaller leaves as compared to cucumber, compact plant-type, high creeping vines, earliness of harvest and high yield ability. The quality and taste of fruit were also good.

These characteristics are better than those of several cucurbits introduced from mainland Japan or continental China. The fruit can be harvested earliest among the cucurbits examined. Especially, "Ōhama", collected in Ishigaki Island, was found to be the best variety as for yield and quality, and can be used as a better vegetable than cucumber. It can also be employed as a useful breeding material. This result indicates the importance of re-evaluation of local varieties.

References

1) Chung-Hsiung Yu et al.: How to cultivate melons, squashes, cucumbers..... Ed. Ned N. Liang, Harvest Farm Magazine, Taipei. Revived third edition, 16–17, 103–106 (1982) [In Chinese].
2) Herklots, G. A. C.: Vegetables in South-East Asia. George Allen and Unwin Ltd., London. 303–305 (1972).
3) Mei-Kuei Liao: Oriental pickling melon. Farmers Guide. Harvest Farm Magazine, Taipei. 959–986 (1980 [In Chinese].
4) Noguchi, M. & Nakamura, H.: Effects of cultural treatments on growth of vegetables under subtropical climate. *JARQ*, 18, 233–240 (1985).
5) Tindall, H. D.: Vegetables in the tropics. Macmillan Press, London. 159 (1983).

(Received for publication, February 15, 1985)