Table 1. Incidence of bacterial soft rot of tomatoes after 2 weeks at 21°C as influenced by bacterial contamination and chlorination of simulated packinghouse and dump-tank waters.

Treatment	% Soft rot Packinghouse 1	2	Avg
Washer and dump-tank water, uncontaminated	0.7	2.0	1.3
Dump-tank water, contaminated[z]	16.0	13.3	14.6
Washer water, contaminated	28.6	38.1	33.3
Dump-tank and washer water, contaminated	26.0	49.3	37.6
Dump-tank water, contaminated then chlorinated[y]	1.3	2.0	1.6
Washer water, contaminated then chlorinated	1.7	2.1	1.0
Dump-tank water and washer water, contaminated then chlorinated	0.0	0.7	0.3
Dump-tank water, contaminated; washer water, chlorinated	15.3	21.3	18.3
Washer water, contaminated; dump-tank water, chlorinated	23.3	25.3	24.0

[z]Cells *Erwinia carotovora* 1 x 10^3/ml.
[y]Chlorine gas 100 ppm.

Chlorination to reduce or eliminate bacterial contamination was then attempted. Chlorination of the dump-tank water eliminated contamination, and tomatoes treated in this chlorinated water developed less than 2% decay, about the same as for fruit washed in noncontaminated and nonchlorinated water (Table 1). Reductions in decay were similar when contaminated wash water or contaminated dump-tank and washer water were chlorinated. Application of chlorine in the wash water following exposure of tomatoes to bacterial contamination in the dump-tank had little effect on decay control as shown by the 24% soft rot incidence. Similarly, decay incidence was high, 15%, when chlorine was applied in the dump-tank before exposure of tomatoes to contamination in the washer.

When chlorine was added to water at the site of bacterial contamination, it was found very effective in preventing the development of bacterial soft rot. The decay incidence of tomatoes exposed to chlorine-treated, contaminated water was less than 2%, approximately the same incidence as tomatoes washed in noncontaminated water (Table 1). Chlorine was found ineffective in controlling this postharvest decay when it was applied before or after exposure of tomatoes to the causal bacteria. When these tomatoes were subjected to bacterial contamination before or after chlorine treatment, the decay incidence ranged from 18-24%. This decay range differs little from the incidence of decayed fruit exposed to bacterial contamination without chlorine, 14-37%. These data emphasize that chlorine is effective in preventing bacterial soft rot when applied at the site of bacterial contamination, but is ineffective as a protectant when applied before contamination or when applied after contamination of the tomatoes.

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SAMPLING METHODS FOR CONSUMER EVALUATION OF SWEET CORN AND WATERMELON CULTIVARS[1]

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Abstract. **Consumer evaluations of sweet corn and watermelon eating quality were made to assist in determining suitable cultivars for release. Since the characteristic flavors in these vegetables are rather constantly associated with maturity and location in the edible portions, these factors were considered in preparing paired samples for large numbers of consumers in supermarkets, restaurants and other public locations. Consumers were presented with 2 small sections of cooked corn-on-the-cob or slices of watermelons representing a new breeding line and a commercial cultivar, respectively. When samples of known differences in sugar content or soluble solids were evaluated, preferences for the sweeter samples were very high. However, preferences were equally divided for watermelons with similar soluble solids levels.**

Breeding and producing vegetables with good consumer acceptance is very critical, but external appearance at the shipping point largely determines the degree of acceptability and value to the buyer. Florida leads the nation in production of fresh sweet corn and watermelons, but per capita consumption in the U.S. has declined during the last 15 years despite many advancements in production technology (5). Eating qualities in vegetables are affected by many factors which are difficult to measure in terms of consumer acceptance. The Florida breeding programs for sweet corn and watermelons have emphasized consumer quality and particularly sweetness in the recently released cultivars, 'Florida Sweet' (10) and 'Smokylee' (2) which have exceptionally high sugar levels, but have other characteristics that limit production. Additional breeding lines of these crops are currently being evaluated for release, and progress in evaluation methods will be reported in this paper.

Analyses of Florida-grown sweet corn after arrival in

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out-of-state retail stores have shown a decline in sugars and other quality factors (9). In the 'Florida Sweet' cultivar the normal sugary 1 factor in 'Iobelle' was replaced with the shrunken 2 factor which resulted not only in a 3-fold increase in sugars at harvest, but outstanding retention of sugars and moisture after harvest and a lower polysaccharide content than 'Iobelle'. Eating quality in sweet corn is influenced not only by composition at harvest but maturity at harvest and handling practices after harvest.

Taste testing procedures recommend that the product be tasted in the condition in which it is normally consumed. Only when the conditions of sample selection and preparation are carefully controlled, can the differences in eating quality be attributed to known variables (3). In order to evaluate sweet corn cultivars in market channels it is desirable to have samples harvested at comparable stages of maturity, held under the same conditions and cooked before eating.

Sweet Corn

In a previous consumer preference study (8) 6,600 ears of a high-sugar sweet corn cultivar were distributed to supermarket customers with a questionnaire to be filled out at home after the corn was cooked and evaluated, but only 20% of the questionnaires were returned. In a later study (1) 11,427 questionnaires were distributed with sweet corn purchased in Philadelphia area stores and with a 15¢ payment for each reply, 50% of the customers responded. Disadvantages found in these tests included low percentages of questionnaires returned, variations in time and conditions under which the corn was held before cooking, and lack of opportunity for critical sorting of husked ears for maturity and defects. Since the eating qualities of present sweet corn cultivars are highly perishable and flavor losses occur under present marketing conditions, these commercial practices were used in evaluating a breeding line with superior quality retention characteristics.

Consumer Tests for 'Florida Sweet'

Consumer evaluations of the breeding line leading to 'Florida Sweet' were conducted in supermarket produce departments rather than in homes because:

1. Researchers maintained control over the corn handling, preparation, serving, and questioning of the consumer.
2. By selecting 3 stores in Miami, Florida and 3 stores in Muncie, Indiana that were located in low, medium and high income areas, consumers from wide geographical areas and economic levels were included.
3. Store coolers were used to keep the corn refrigerated until just before cooking; thus preventing variable periods without refrigeration.
4. Only the characteristics under study could influence the consumer.
5. Chances of incorrect entries on questionnaires were eliminated.

Sample Preparation

A small deep fat fryer was chosen as most suitable for cooking corn in the produce departments of the stores where customers would be readily available. When the basket was partitioned into 2 parts, many small ear sections of both lots could be boiled under identical conditions. Both ends of the ears were discarded before the center sections were cut crosswise into 1 to 1-1/2 inch pieces. Each of these cross sections was split into thirds with a chisel to form samples with at least 3 bites for each customer. Cutting the ears into small pieces shortened cooking time and simplified identification of the 2 yellow sweet corns by fitting single pieces into 2 colors of paper baking cups. Two samples in their small color-coded cups fit into a 3 inch diam foam plastic cup that was kept on an electric food warmer until served in order that all samples were equally warm when eaten. Customers in the stores were presented with the samples, the objectives of the test were briefly explained and their verbal responses were recorded. Results as previously published (10) from a total of 1563 customers in 6 stores showed a very decided preference for the high-sugar corn because of its sweetness.

Watermelon

Watermelon eating quality is influenced by cultivar, maturity and regions within melons. Taste panels (4) have found high correlations between flavor ratings and soluble solids, and the proposed revision of the U.S. Grade Standards (6) includes a soluble solids test as an index of eating quality. Variations in solids among different regions in individual melons requires special sampling if the entire melon is to be represented. Solids of 10 melons may average 11.1% at the heart and decrease to 7.7% at the stem end (7).

Breeding line 'Florida 75-1' was considered for release as a new cultivar and information on internal quality and other factors was obtained from small commercial plantings in many Florida counties. Several quality characteristics were included on a questionnaire for a paired comparison of 2 cultivars for sweetness, flavor other than sweetness, texture, color and overall preference. 'Charleston Gray' and '75-1' watermelons for preference testing were obtained from the ARC at Leesburg and commercial growers in Marion and Alachua counties. Each taster was asked to check which cultivar he liked best, or indicate no preference, and the reason for the choice.

Sample Preparation and Evaluation

Initial sample preparation involved slicing melons in half, lengthwise, and scooping out small sections at random locations with a spoon. A sample from each cultivar was placed on a paper plate with identifying codes A and B written on the plate. Plates of samples and accompanying questionnaires were distributed to personnel at the University of Florida within 15 minutes of preparation to minimize sample changes.

Due to lack of consistency among replies on initial questionnaires, sample preparation was modified by cutting pairs of samples from similar locations in the two watermelons being evaluated. To obtain a large number of evaluations in a short time after the watermelons were cut, samples were served to customers in a cafeteria during the lunch period. Melon samples were cut into rectangular pieces that fit into 3 oz. paper cups that had previously been coded with letters A and B. These were taped into pairs and carried on trays to customers' tables where they occupied a minimum amount of space. New customers were served as earlier ones completed their questionnaires and about 300 evaluations were obtained in a 2 hour period. An advantage of this location for testing was the good distribution of panel members by age, sex and economic level. Disadvantages of this sampling method included many consumers rating small samples from a small number of melons that may poorly represent the range in quality of cultivars being evaluated. It is unfortunate that the flesh from a number of melons cannot be combined and mixed into a homogeneous sample such as applesauce or mashed potatoes, but this procedure destroys the crispness and texture of watermelon flesh that are an essential part of its eating quality.

Additional tests were conducted at the Newberry, Florida watermelon festival where larger samples of 'Charleston Gray' and '75-1' were served on paper plates

from a booth visited by people generally interested in watermelons. Samples were prepared by cutting the melons into 1 inch thick, crosswise slices and then cutting each slice into about 15 wedge-shaped pieces, each of which included flesh extending from the heart to the rind. Several melons of each lot were cut in advance and solids were measured in an attempt to match known levels of sweetness in paired samples. Since there were no facilities for writing on questionnaires, tasters were merely asked which sample they preferred and their reason.

Among the melons available for testing, the solids ranged from 8.5 to 10.5% in the 'Charleston Grays' and 10.5 to 12.5% in the '75-1's. A high proportion of the 300 who tasted these melons preferred the '75-1' and said that it was sweeter or had a better flavor. This consumer response would be expected with the large difference in solids between cultivars provided there were no other outstanding characteristics such as off-flavors. To focus more attention on other factors a minimum difference in sweetness seemed desirable.

One 'Charleston Gray' and one '75-1' melon, each with 10.3% solids were sliced into wedges and served to 92 University of Florida personnel with a questionnaire. Overall preferences were identical for the 2 cultivars, 50% of the participants liked the flavor and 47% liked the sweetness of '75-1' best. For texture, only 35% liked '75-1' the best because it was too watery and granular. However, 77% liked the intense red color of '75-1' compared with the lighter red of 'Charleston Gray'. Very few comments regarding undesirable flavor components were received. These evaluations indicate that '75-1' has a very desirable sweet flavor and red flesh. Further consumer evaluations of watermelons should be made with relatively large wedge shaped pieces cut from 1 inch crosswise slices. Consumers consider sweetness as a very essential quality characteristic of both watermelons and sweet corn.

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INFRARED RADIATION CURING OF FLORIDA ONIONS[1]

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Abstract. **Field experiments were conducted on freshly harvested Florida-grown onions to determine the design parameters of an infrared radiation system for artificially curing onions. Effectiveness of 16 different time-intensity curing treatments was evaluated on the basis of salable weights after storage periods of 4, 8, and 12 weeks. Storage environments investigated were air conditioned and unconditioned storages.**

Results indicated that salabilities of about 85%, after 8 weeks of air conditioned storage, can be realized with optimal levels of infrared radiation curing. Onions in unconditioned storages had lower salabilities than onions in air conditioned storages. Large onions had higher salabilities than medium onions when both were in unconditioned storages.

Florida's winter climate and its soil conditions are favorable for producing onions. At this time, however, very few onions are grown commercially in Florida because of prevailing high humidities and high probabilities of rainfall in April at harvest time. These adverse climatic conditions make field curing of onions, as commonly practiced in large onion-producing states, unfeasible. If one attempted to field cure onions at harvest time in Florida, the results would likely be a severe rotting and deterioration of the onions. The most common rotting disease of onions is *Botrytis alli* Munn that causes neck rot (3). Infection of the onions can occur both in the field and in storage, but onions generally get infected in the field and the resulting damage shows up later in storage.

Thompson *et al.* (6) considered an onion to be cured when the neck was tight, the outer scales were dry and rustled when handled and 3-5% of the original weight was lost. Thompson's definition of curing in terms of the weight loss is rather arbitrary. It is difficult to define when an onion is cured, especially those onions that are artificially cured, unless the following factors are established: maturity of the onion at harvest, soil conditions during the growing season and at harvest time, degree of curing after harvest, and the criteria for a salable onion.

If onions are ever to be grown commercially in Florida, one must first develop a method of curing onions artificially. Studies by Sastry and Buffington (5), Buffington and Gustashaw (1), and Gull (2) have shown the feasibility of infrared radiation, forced heated air, vacuum cooling and cold storage as treatments for preserving the salability of Florida-grown onions. Curing of onions by any of the above methods has proved to be more beneficial, in terms of preserving salability, than no curing treatment whatsoever. It is a well-established conclusion that onions will begin to rot very quickly after harvest if not given some curing treat-

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