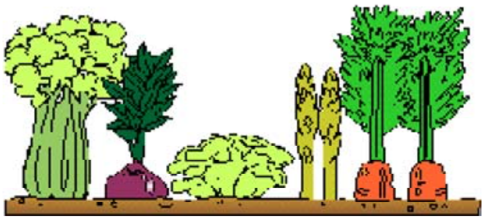

VEGETARIAN NEWSLETTER

A Vegetable Crops Extension Publication
Vegetarian 03-06
June 2003

University of Florida
Institute of Food and Agricultural Sciences
Cooperative Extension Service

Vegetarian Archive Vegetarian Index

Print Version

List of Extension Vegetable Crops Specialists

* * * * * * * UPCOMING EVENTS CALENDAR * * * * * * *

Various Extension Events in South Florida. Contact: Gene McAvoy at 674-4092

71st Annual Meeting and Convention of the Florida Seed Association. Don CeSar Resort and Spa, St. Petersburg, Fla. June 18-20, 2003. Contact: Jack Oswald at 850-482-8241, Hotel Reservations: 727-360-1881. http://www.floridaseed.org

Florida Tomato Institute. Ritz-Carlton Hotel. Naples. September 4, 2003. Contact Bill Stall at wms@ifas.ufl.edu

49th Conference of the InterAmerican Society for Tropical Horticulture. Fortaleza, Brazil, Aug. 31- Sept. 5, 2003.

ISHS International Symposium on Protected Culture in a Mild-Winter Climate. Renaissance WorldGate Hotel - Kissimmee, Fla. March 23-27, 2004. Contact: Daniel Cantliffe at djc@mail.ifas.ufl.edu

EVALUATION OF GROW CUBES FOR HYDROPONIC LETTUCE PRODUCTION

Hydroponic lettuce, in a float or nutrient film technique (NFT) production system, can be seeded directly into cubes of inert but absorbent material. The most commonly available materials are rockwool and Oasis™. Medius™ Horticultural Foam blocks were developed for rooting of cuttings and for hydroponic production, but have not been tested extensively in Florida. An evaluation of these three types of "grow cubes" in an NFT system was carried out at the Indian River Research and Education Center.

The test was run in a three channel NFT system (Fig. 1) with 3 lettuce varieties: Optima, a green butterhead; Marvel of Four Seasons, a red butterhead; and Green Forest, a green romaine. Variety was blocked across the three test rows. The cube types were randomized across the rows and varieties, although an error was made in assigning numbers of each cube type to variety.

The 1x1x1.5" cubes were wetted before planting with a standard lettuce nutrient solution, the same solution used for the NFT system. Single seeds were placed directly into the cubes in the NFT system. The experiment was run twice. Number of seeds germinating and development stage of seedlings (as a measure of rate of germination) were measured 6 days after planting. Development stages were: 1) evidence of germination, 2) expanded cotyledonary leaves, and 3) presence of true leaves.

Percent germination varied across the two tests, with seeds in medius foam cubes having the highest germination percent (71%) in the first test and those in oasis having the highest germination percent in the second test (87%). Percent germination in rockwool was 62 and 67 in test 1 and 2, respectively. However, seedlings developed more slowly in the Oasis cubes (Table 1). Differences in cube type x variety ratings were due primarily to the variation in germination of the 3 varieties.

While Oasis cubes are less expensive than rockwool cubes ($44.00 per case of 1,620 vs. $60.00 per case of 1,200, respectively, Growers Supply Center), they do become fragile and crumble over a relatively short period of time. Medius foam cubes cost approximately $24 for 1200 and remained intact in storage.

Further study is warranted to determine if there is a consistent benefit of one type of grow cube over the others and the effect of cube type on harvest date and lettuce head quality.

Figure 1. Experimental set up for evaluation of growcubes.

Table 1. Development stage rating of lettuce seedlings 6 days after planting.

	Development stage rating	
Cube type	Test 1	Test 2
Oasis	1.8	1.8
Rockwool	2.1	2.5
Medius foam	2.1	2.2

1-evidence of germination
2-expanded cotyledonary leaves
3-presence of true leaves

(Lamb - Vegetarian 03-06)

SWEET ONION VARIETY TRIAL, SPRING 2003

Sweet (short-day) onions are a relatively minor crop in Florida. Production exists as both dry bulbs (mature) and green tops (immature). Limited production has existed throughout the state. The biggest deterrent for increased production is competition from established growing areas in south Texas and middle Georgia. However, the potential exists for expanding production in Florida, especially in the areas of local sales and direct marketing.

The objective of this trial was to evaluate the performance of sweet onion varieties under northwest Florida conditions.

The transplants for this trial were produced from field beds at the NFREC, Quincy. Fourteen entries were seeded on 1 Oct 2002. Seed were planted at rate of about 30 seed per ft into rows spaced 12 inches apart. Preplant fertilization of seedbeds was 30-40-40lbs/a of N-P_2O_5-K_2O. Goal 2XL was applied over the top at 1 pt/a after seedlings reached the 2 true-leaf stage. Seedbeds were top dressed once with 34 lbs N/a. Entries were transplanted into the production field on 18 Dec 2002. Soil type was an Orangeburg loamy fine sand. Preplant fertilization was 60-80-80 lbs/a of N-P_2O_5-K_2O. Production scheme was 3 rows spaced 15 inches apart under a 6 ft tractor and in-row spacing was 4 inches (65,340 plants/a). Goal 2XL at 2 pts/a was applied on soil surface before transplanting and Dacthal 75 W at 12 lbs/a was applied over the top after transplanting. Nitrogen was applied twice during the season at 50 lbs N/a each time. A single top dressing of K_2O as KCl at 60 lbs/a was made during the season. Registered pesticides were applied as needed to control pests.

Entries were harvested as they matured, where mature is defined as when about 25% of the tops of an entry had fallen down naturally. Bulbs were lifted, allowed to dry for a few hours and tops and roots removed. Bulbs were then placed in bushel baskets and dried for 72 hours at 100º F in large drying rooms. After drying time was complete, onions were removed, allowed to cool down and graded. Grading consisted of discarding culls (small onions, splits, off-color and decayed) and sizing into medium (1.5-2 inches), large (2-3 inches) and jumbo (>3 inches) categories. Bulbs were then weighed and counted.

Harvest occurred from the period of 17 April to 7 May. Total yields ranged from 865 50-lb bags/a for ‘SSC 6436’ to 513 50-lb bags/a for ‘SSC 33076’ (Table 1). Three other entries produced yields as high as ‘SSC 6436’. Yields were good to excellent in 2003. Some of the later entries had problems with quality due to wet weather. ‘SSC 6372’ produced the largest bulb at 11.7 oz and ‘SSC 33076’ produced the smallest at 6.9 oz. Percent marketable bulbs ranged from a low of 72.6 % for ‘Yellow Granex Improved’ to a high of 97.6 % for ‘SSC 33076'. Percent bolting level was very low (<1%) on all entries.

Table 1. Sweet onion variety trial results, Spring 2003, NFREC-Quincy.

Entry	Source	Marketable Yield (50-lb sacks/a)				Marketable (%)	Bulb wt (oz)
		Medium	Large	Jumbo	Total		
SSC 6436	Shamrock	10.3 b[z]	67.5 c-e	786.9 a	864.9 a	95.6 ab	10.9 ab
Sugar Belle	Shamrock	8.2 bc	47.9 c-e	777.4 a	833.6 ab	93.8 ab	10.9 ab
SSC 6372	Shamrock	3.1 c	50.0 ef	756.7 a	809.8 ab	93.4 ab	11.7 a
EX 19013	Seminis	6.2 bc	46.9 ef	655.1 ab	708.2 bc	87.2 a-d	10.4 bc
Nirvana	Sunseeds	7.6 bc	109.3 b	520.3 bc	637.2 cb	91.7 a-c	8.9 d-f
Century	Seminis	6.5 bc	37.9 f	573.0 bc	617.4 cd	78.6 de	10.3 bc
Savannah Sweet	Seminis	9.1 bc	67.9 c-e	533.8 bc	610.9 cd	79.6 de	9.9 b-d
Georgia Pride	Shamrock	9.6 bc	77.8 cd	520.8 bc	608.3 cd	94.2 ab	7.9 e-g
Rio Bravo	Sunseeds	5.9 bc	50.3 ef	544.5 bc	600.8 cd	78.6 de	10.0 b-d
Georgia	Shamrock	10.4 b	89.1 bc	481.6 c	581.2 cd	93.8 ab	7.7 fg
Sweet Melody	Sunseeds	6.9 bc	55.5 d-f	475.7 cd	538.2 d	78.4 de	9.2 c-e
Yellow Granex	Sunseeds	6.6 bc	41.3 ef	489.6 c	537.7 d	72.6 e	9.7 b-d
Improved Granex 33	Seminis	10.5 b	87.5 bc	425.4 cd	523.5 d	82.8 b-e	8.3 ef
SSC 33076	Shamrock	27.6 a	150.8 a	335.0 d	513.5 d	97.6 a	6.9 g

[z] Mean separation in columns by Duncan's Multiple Range Test, 5% level.
Comments: Fertilizer applied 160-80-80 lb/aN-P_2O_5-K_2O. Plant population 65,340 plants/a.

(Olson - Vegetarian 03-06)

GREEN-HARVESTED TOMATOES: STEPS TO ASSURE HIGH QUALITY PART 1. HARVEST OPERATIONS

The green harvest system for fresh-market tomatoes has allowed many Florida growers to remain competitive by reducing harvest costs and providing flexibility in marketing. However, the market share for Florida tomatoes has significantly decreased in recent years for a variety of reasons. The elimination of import duties and the availability of firmer varieties have favored tomato imports from non-traditional production areas. Also, consumers have demonstrated a willingness to pay premium prices for “specialty tomatoes”, such as grape, cluster, roma (plum) and “vine-ripe” round tomatoes. While round-type tomatoes are generally field-grown using conventional or organic production methods, specialty tomatoes are often grown under protected culture.

Buyers demand consistent tomato quality from shippers. In order to meet this demand, tomatoes must be properly handled at each step from harvest through packing, gassing and shipping. In order to study the effects of handling on tomato quality, we conducted extensive tests in the 1990's to determine how tomato flavor and quality are affected by harvest and postharvest operations. Over several seasons trained taste panelists compared flavor characteristics of green-harvested tomatoes with ripe-harvested tomatoes grown in the major Florida production areas. Results from these tests showed that, when properly ripened, tomatoes harvested at mature-green stage developed excellent aroma, sweetness and flavor, and were comparable to tomatoes harvested red ripe.

Several factors can interfere with normal tomato ripening and result in poor flavor and color development, namely harvest maturity, bruising, improper gassing, excessively cold shipping/storage temperatures, and differences in quality due to the tomato variety.

In this first of a two-part series, two questions related to harvest maturity will be addressed:

-Why is harvest maturity important to tomato flavor and quality?
-How can the number of immature-harvested tomatoes be kept to a minimum?

The second article in this series will focus on proper gassing procedures and temperature management during storage and shipping.

1) Why is harvest maturity important to tomato flavor and quality?

After pollination, the growth phase ends with the tomato reaching final fruit size. Once this growth phase is completed, the tomato begins the ripening phase. Tomatoes can be picked at any time after growth is complete (the mature-green stage) and ripened off the plant with high quality. Tomatoes picked prior to the completion of the growth phase are immature-green and cannot ripen normally. Ripening begins internally, in the locules. However, in order to accurately determine whether a green tomato is mature or immature, it must be sliced through the equator. Tomato maturity is rated by four categories as described in Table 1 below, and shown Figure 1.

Table 1. Definitions of maturity stages for green tomatoes.[1]

Maturity Stage	Internal Appearance
M-1	Seeds are immature (white) and are cut when the tomato is sliced; no gel in the locule.
M-2	Seeds are mature (tan); gel formation in at least two locules.
M-3	Seeds are pushed aside when tomato is sliced; all locules have gel; internal color is still green.
M-4	Appearance of red color in gel and pulp tissue.

[1]Adapted from Kader and Morris (1976).

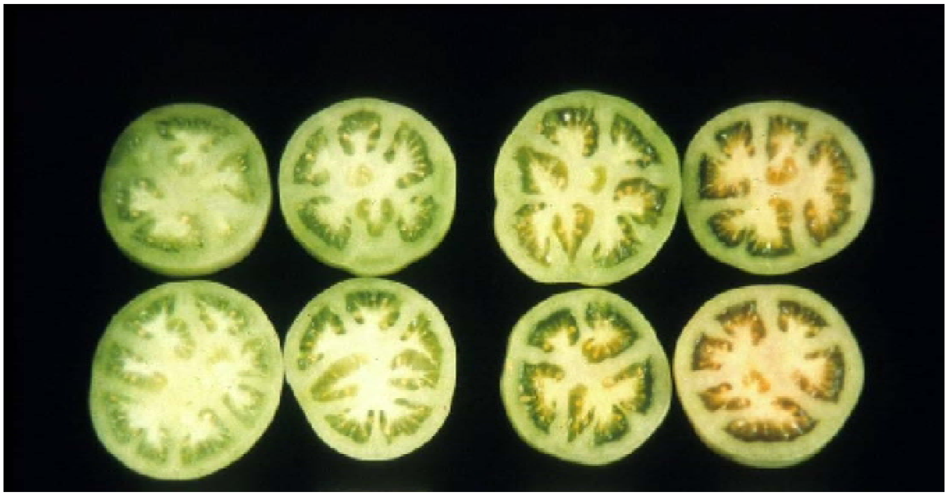

Figure 1. Maturity stages for green tomatoes.
M-1 (left) to M-4 (right).

Since ripening begins internally, it is impossible to consistently determine when a green tomato is mature and ready to pick. External appearance has been shown to have little correlation to internal maturity. For example, tomato size, intensity of green color (Figure 2a), and appearance of a star pattern on the blossom end (Figure 2b) are not reliable methods for determining maturity. Actually, the only fail-safe method for picking 100% mature tomatoes is to harvest at breaker stage or later!

Figure 2. Looks can be deceiving...
(a) One light-green color tomato was not mature-green, the other was mature green.
(b) One "star breaker" tomato was immature, the other was mature.

As a result, during commercial harvest immature-green tomatoes are picked along with mature-green tomatoes, and it is common to find 30 to 40% immature tomatoes within a harvested lot. Once these tomatoes at M-1 to M-4 stages have been packed and gassed, there will be wide variability in ripening rates during handling and shipping (Figure 3). This can favor development of decay, since riper tomatoes will be more susceptible to decay pathogens than less ripe tomatoes.

Figure 3. Harvest maturity affects ripening and decay. These tomatoes were taken from a bin and held for 13 days. The tomato on the left never began to ripen while the one on the right ripened and began to show decay in the harvest injury.

2) How can the number of immature-picked tomatoes be kept to a minimum?

To maximize the percentage of mature-green tomatoes harvested, the field block must be sampled and tomato maturity assessed. The field sample should represent the conditions of the entire block since maturity varies due to time of planting, soil and environmental conditions, field drainage and variety. The following sampling method is suggested.

- 1) Select sample tomatoes by walking in a grid pattern throughout the block and picking 25 tomatoes per acre.
- 2) Sample from the oldest hand on the plant to determine the plant height that the harvesting crews will pick.
- 3) Slice the tomatoes through the equator and determine the number of M-1 (immature-green) tomatoes.
- 4) Divide the number of M-1 tomatoes in the sample by the total
- number sampled and multiply by 100 to determine the percent immature tomatoes in the block.

Harvest of immature-green tomatoes can be kept to a minimum by using consistent field sampling techniques and by closely monitoring the picking crew. Recommendations for the next steps, gassing and temperature management, will be discussed in Part 2 of this series.

For Further Reading:

Kader, A.A. and L.L. Morris. 1976. Correlating subjective and objective measurements of maturation and ripeness of tomatoes. In: Proc. 2nd Tomato Quality Workshop. Veg. Crops Series 178. Univ. of California, Davis.

Sargent, S.A., F. Maul and C.A. Sims. 1998. Implementing the Florida Premium-quality Tomato Program. Proc. Florida Tomato Institute. PRO 111. University of Florida/Citrus & Vegetable Magazine. pp. 49-51.

(Sargent- Vegetarian 03-06)

Extension Vegetable Crops Specialists

Daniel J. Cantliffe Professor and Chairman	**Ronald W. Rice** Assistant Professor, nutrition
John Duval Assistant Professor, strawberry	**Steven A. Sargent** Professor, postharvest, ***and EDITOR***
Chad Hutchinson Assistant Professor, vegetable production	**Eric Simonne** Assistant Professor, vegetable nutrition
Elizabeth M. Lamb *Assistant Professor, production*	***William M. Stall*** *Professor, weed control*
Yuncong Li *Assistant Professor, soils*	***James M. Stephens*** *(retired)* *Professor, vegetable gardening*
Donald N. Maynard *Professor, varieties*	***Charles S. Vavrina*** *Professor, transplants*
Stephen M. Olson *Professor, small farms*	***James M. White*** *Associate Professor, organic farming*
Mark A. Ritenour *Assistant Professor, postharvest*	

Related Links:

University of Florida
Institute of Food and Agricultural Sciences
Horticultural Sciences Department
Florida Cooperative Extension Service
North Florida Research and Education Center - Suwannee Valley
Gulf Coast Research and Education Center - Dover
UF/IFAS Postharvest

This page is maintained by Susie Lonon.