# Vegetarian Newsletter

**A Horticultural Sciences Department Extension Publication on Vegetable Crops**

**Eat your Veggies!!!!!**

**Issue No. 546 June 2009**

# Direct Marketing: Bradford County Style

**By: Jim DeValerio, Agricultural Extension Agent**
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Bradford County boasts a total of ten roadside produce stands; eight are located along the US 301 corridor, three within the City of Starke and two are located off the major highway. In addition to selling to highway travelers, these locally owned small businesses provide a daily flow of fresh produce to residents of Lawtey, Starke and Hampton. They specialize in selling seasonal commodities including fruits, vegetables, citrus, pecans and Christmas trees.

Bradford County's network of roadside stands benefits the community in many ways. It provides local jobs, brings in revenue and supports local farmers. All of the proprietors sell seasonal produce they either grow or buy from local farms. Many farmers do not want to direct market their produce and they are happy to sell their produce wholesale to a local outlet. Local supply is seasonal and is not available throughout the year so, out of necessity, all of the markets sell produce that is shipped in from out of state and from foreign markets. If the markets do not thrive all year they cannot support the local farmer during their growing season.

Half of Bradford County's roadside markets have been open between seven and twenty years and their successes prove that locating a roadside stand near high density cities and/or high traffic locations is a good business strategy. According to Florida Department of Transportation statistics, twenty thousand potential customers see these stands every day. It is no accident that the majority of Bradford County roadside stands are located on the Tampa – Jacksonville highway.

Another successful strategy for locating a roadside stand is to grow the produce near the stand. Two prominent stand owners in Bradford County feature farms adjacent to their stores. Both of these farmer's stands are adorned with trophies from the Bradford County Fair Association recognizing them for their record winning berries over the years. Generally, the products they grow are easy to sell and yield the greatest profit margins. The presence of those big berries and other vegetables growing on location brings in customers. The word is, "*Fresh is Best.*"


Bradford County roadside stands from north to south: White Oaks Produce, Kings, Normans, King's Kountry Produce, J.C.'s Scales & Tails Seafood & Produce, Norman's County Market, Sara B's Market, and Citrus Shop & Produce.

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# Make Room for Vertical Vegetable Gardening

**By: Angela Sachson**
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You may be experiencing sticker shock in the produce department these days. It costs a lot to bring vegetables all the way from Colorado (the origin of my bag of carrots) and Peru (the onions). If you have a couple of tomato plants and think that's all you have room for think again. You can ramp up your veggie production without taking over the entire yard. This is about containers but containers in a major way. Containers are great for controlling nematodes and weeds and providing a controlled environment for your produce – and many containers in a small space will give you lots more great edibles.

Just follow the example of Mr. M. T. Alden a gardener in Okeechobee County who grows 36 full-size plants in a vertical wall just ten feet by three feet and about six feet tall. Mr. Alden, a kind of container-gardening guru, has thousands of plants in hundreds of pots. But just one of his ten foot segments should grow enough for a family. This "Wall of Vegetables" can also block an unattractive view.

Here is his method. M. T. places three 8-foot landscape timbers in a row five feet apart. He buries them 18-inches in the ground after putting a notch in the top. The notch holds one-inch pipe at the top of the structure. This is the pipe that holds the 18 ten-inch pots in each section. These 18 pots are an under-approximation, as you can also put six pots on the ground. That would make 24 pots!

Pots are suspended, one under the one above, for three layers. The pots are filled with a lightweight mixture of composted manure, perlite and vermiculite. Our garden guru uses horse manure obtained from a friend, but this may also be purchased as composted manure at most garden centers. The other two ingredients for this mix are easy to find locally as well.

Mr. Alden grows just about all popular garden crops in his intensive container gardens. The ten-inch pots can accommodate one large tomato plant. The tomatoes are not staked and they have plenty of room to produce. Three strawberry plants, three of beans and peas, several large onions or many many scallions fit in these pots. Three corn stalks can grow upright from one pot and several potatoes can be harvested in this small size container. One pepper plant can produce lots of fruit also.

In addition to saving space, this gardening method gets fungus-susceptible plants up where air circulation is available so it is good for cukes and melons too. You may need to support heavy melons. Mr. Alden places them near a fence to provide horizontal supports.

Although there is an initial start-up cost for this method – timbers, pipe, pots and potting mix, the cost is pretty low. There are wholesale suppliers for pots and timbers are not expensive. Mr. Alden uses a drip irrigation system but a watering can or hose would suffice for a small garden.

This garden is portable – if you move you can take it with you. It is frost-proof too: if low temperatures are predicted you can bring the individual pots inside. And, if you add collecting troughs and a rain barrel to this installation to catch and store water that runs out of the pots, you can conserve water!

Adapted from an original article that appeared in the *Okeechobee News* December 21, 2008, and is archived on line at: http://okeechobee.ifas.ufl.edu/News%20columns/FYN.Vertical.Veges.htm.

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# Tomato Yellow Leaf Curl Resistant Variety Trial North Florida Research and Education Center-Quincy, FL Fall 2008

**By: Stephen Olson, Professor**
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During the 2007-2008 production season 31,500 acres of tomatoes were harvested in Florida with a farm-gate value of over $619 million. Total production was 45.5 million 25-pound boxes. Tomatoes accounted for about 26% of the total value of vegetables grown in Florida during that production season making it the most valuable vegetable crop in Florida. In the panhandle area of Florida, tomatoes are by far the most valuable of the vegetable crops.

A tomato variety trial was conducted at NFREC, Quincy during the fall season of 2008 to evaluate fresh market (large rounds) tomato varieties and potential new hybrids. The replicated trial started out with 23 entries but due to a very high incidence of tomato yellow leaf curl virus (TYLC), only 5 entries are being reported on. Growing conditions were very poor. Plants received extensive damage from wind rain due to a tropical storm. Crop also matured much later than normal due to damage.

Entries were seeded on 26 June into planter flats containing a commercial media. Cell size of flats was 1.5 in by 1.5 in by 2.5 in. Seedlings were fertilized weekly with a dilute solution of 15-16-17 ($N$-$P_2O_5$-$K_2O$) peat-lite special. Plants were hardened off before transplanting by reducing water and fertilizer. Production was on raised full bed mulched system. Beds were fumigated with methyl bromide/chloropicrin (67/33) at broadcast rate of 200 lbs/acre before mulch (white on black Blockade) application. Irrigation was with single drip tube placed 6 inches off center. Total fertilization was 195-60-195 lbs/acre of $N$-$P_2O_5$-$K_2O$. Row spacing was 6 feet between rows with a finished bed width of 34 inches. Transplanting was done on 5 August. Plots consisted of 12 plants spaced 20 inches apart. Plots were tied 4 times and maintenance pesticides were used as needed to control pest problems. Design was a random complete block with 4 replications. Fruit were harvested at or beyond the mature-green stage on 4 and 11

November.  At each harvest fruit were graded and sized into medium, large and extra-large fruit. Weights and fruit numbers were recorded for each size along with cull weight.

Incidence of TYLC in susceptible entries was nearing 100% by harvest time.  Total yields ranged from 490 boxes/a for 'Tygress' to 897 boxes/a for 'Tycoon' (Table 1).  As comparison, 'BHN 602', a widely used variety in fall, only produced about 100 boxes/a total.  Mean fruit size ranged from 5.7 oz for 'Tycoon' to 4.7 oz for 'Tygress'.

**Table 1.  Yield and fruit size of TYLC resistant varieties trialed at North Florida Research and Education Center, Quincy, Florida, Fall, 2008.**

| Entry | Yield (25 lb boxes/a) | | Mean fruit wt. (oz) |
|---|---|---|---|
| | Extra-large size | Total | |
| Tycoon | 547 a[z] | 897 a | 5.7 a |
| BHN 765 | 380 ab | 810 ab | 5.2 a |
| Inbar | 396 ab | 737 ab | 5.5 a |
| Security 28 | 342 ab | 645 ab | 5.5 a |
| Tygress | 189 b | 490 b | 4.7 b |

[z] Mean separation using Duncan's multiple range test, 5% level.

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# Managing pH of Muck Soils for Vegetable Production

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**and**
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**Palm Beach County Extension, West Palm Beach, FL**

Historically, the Everglades Agricultural Area (EAA) evolved under seasonally-flooded conditions that predominately supported sawgrass and other wetland vegetation. Over several thousand years, Histosol “muck” soils were deposited as organic matter accumulated above the limestone (calcium carbonate) bedrock. In the early 1900s, these soils were drained. Declining water table levels coupled with increased urban development and agricultural activities initiated muck oxidation, soil compaction, promotion of muck fires, and increased potential for soil loss due to wind erosion. These factors have led to decreases in soil depth above the bedrock limestone, a phenomena commonly referred to as subsidence.

When these soils were initially drained, soil pH values were lower than they are now. Most organic soils typically reflect acidic soil pH values ranging from 4.5 to 5.5. Current soil pH values in the EAA for shallow muck soils are considerably higher, ranging from 6.5 to 8.5, although soil pH is spatially variable.

As a consequence of field operations to prepare crop lands, tillage efforts for weed control, incorporation of fertilizers, and planting, as well as subsurface irrigation, high pH particles of calcium carbonate (originating from the bedrock) are transported from the subsurface into the root zone (Figure 1). Since calcium carbonate is the source of agricultural lime, tillage of shallow muck soils is effectively liming the soil. This tillage-induced transport is more problematic for many of the shallow soils less than 2 feet in depth. Additionally, carbonates dissolved in water can move up in the soil profile due to capillary action, and are often deposited at or near the soil surface after water is evaporated. Evidence of this effect can be observed by the white crust formation on the soil surface during drying weather conditions, which is a combination of calcium carbonate and calcium sulfate.

### *Nutrient Availability*

Organic soils within the EAA formed as oligotrophic wetlands, meaning that most nutrient concentrations were commonly deficient for growth of plants other than the native vegetation. This deficiency is readily observed for phosphorus and micronutrients, such as manganese, copper, and zinc. Early research demonstrated that application of these nutrients as fertilizers significantly increased crop growth and yield. However, required rates of fertilizer application to support favorable crop growth responses have increased with time, corresponding with decreasing soil depth and increasing pH. Clearly, crop nutrient requirements have also increased over time due to the adoption of modern-day cultivars that have significantly greater growth potentials.

Most micronutrients and P are readily available to vegetables at lower acidic soil pH values. Phosphorus and micronutrient availability to crops typically declines as soil pH values increase into the higher ranges characterizing current EAA muck soils. Due to increases in soil pH in the EAA, the problem is not so much that total concentrations of nutrients are low but rather that the availability of these soil nutrients to crops is too low. Thus, the current situation is that muck soils are increasingly developing soil chemical conditions that compromise the availability of applied fertilizer nutrients for crop growth.

### *How to Address the pH Problem*

There are several practical ways to address the problem of increasing soil pH. One way is to add an acid-forming amendment to reduce the pH, resulting in increased nutrient availability. Another strategy is to adopt improved fertilizer management practices, such as improved timing, placement, split applications of fertilizers, and use of slow-release fertilizers. Modified cultural practices, such as a reduction in the number and intensity of tillage operations, may attenuate the vertical movement of calcium carbonate through the soil profile, and could likely be attractive due to reduced energy costs. Reductions in the rate of soil subsidence by flooding of fields during fallow will also help to decrease soil pH. It is likely that stabilizing the water table will slow the movement of solubilized calcium carbonate upward with capillary water movement.

### *Soil pH Adjustment*

A common method to reduce soil pH in the EAA is the application of elemental sulfur. When mixed into soil, sulfur-oxidizing microorganisms utilize the sulfur and convert it to sulfate, and in the process, generate acid-forming hydrogen ions which decrease the soil pH. However, depending on the buffering capacity of the soil, large quantities of sulfur are often needed to effect a change in pH. The routine use of sulfur to reduce soil pH across large field areas is improbable since the large amounts that would be required annually would simply be cost-prohibitive. This statement is especially true considering the large amounts of calcium carbonate present in EAA soils that can potentially buffer or neutralize the acidifying effects of sulfur addition.

Strategic banding of sulfur near the plant row is an effective means of adding considerably less sulfur while improving nutrient availability in sufficient soil volume to satisfy immediate crop nutrient requirements for phosphorus and micronutrients. Applying sulfur primarily in problematic (high soil pH hotspots) areas such as along field ditches and near roadways, where calcium carbonate ditch spoils accumulate, is a successful practice that is used for sugarcane in the EAA. These precise placement techniques result in low sulfur application rates.

***Fertilizer Management Practices***

Fertilizer management strategies can be used to avoid or minimize nutritional problems associated with increasing soil pH. One option is to just increase total fertilizer application rates to overcome nutrient availability limitations. However, rising fertilizer costs and the desire by growers to impart good land stewardship in areas near sensitive wetlands makes this option unattractive.

Banding of fertilizers has been recognized as an effective practice that supports lower fertilizer application rates while maintaining economically attractive vegetable crop yields. The use of banding techniques is even more important given the previous discussion on changing soil chemistry conditions. Currently, a popular "banding" strategy is to band-apply fertilizer sources in a band 1-2 feet wide during vegetable bed preparation, with the fertilizer band incorporated into the bed profile, with the expectation that roots will be able to utilize these fertilizers more efficiently than fertilizers broadcast across the entire field. More precise application methods such as utilization of narrow bands of fertilizer should minimize direct contact of fertilizers with soil, while maintaining higher plant-available nutrient concentrations for the longest period of time.

Another potential strategy is the split-application of fertilizers, which would also reduce nutrient fixation to soil particles and increase potential nutrient availability for different crop growth stages, and adapt to open bed operation. The timing of applications would be more time-consuming and require additional trips through the field, increasing fuel and equipment costs, but may ultimately reduce the total amount of fertilizer necessary to produce crops. With the increasing costs of fertilizers, especially in combination with reduced tillage trips, the expanded use of split applications may prove viable in the future.

Most P fertilizers for vegetables grown in muck soils are soil-applied at planting, which has proven reliable in the past. However, another management option that could avoid nutrient deficiencies brought about by increasing soil pH trends is to expand the use of foliar application. Many micronutrients are currently applied via foliar application, especially for vegetable crops. Since soil-applied nutrients are increasingly rendered unavailable due to rising soil pH, their application directly to crop canopies may be a viable option in the future.

The use of slow-release fertilizers (SRF) has not received much attention in the EAA in the past due to their high costs relative to traditional fertilizer sources. However, SRFs offer potential benefits including the slow-release of nutrients, which minimizes their fixation to soil particles and thus increases nutrient availability for crop growth. The disadvantage of the relatively higher cost for this type of fertilizer can be offset somewhat by the lower rates of slow-release fertilizers that may be required. The result of wide-spread use of SRFs may also include a potential reduction in the total amount of fertilizers applied to EAA soils, which would be consistent with region-wide efforts to reduce the export of phosphorus and other nutrients into waterways entering the Everglades wetlands while still supporting required commercial yields and market quality.

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# 'Florida Elyana': First Florida-Bred Cultivar Designed for Tunnel and Greenhouse Production


**By: Craig K. Chandler, Professor, Bielinski M. Santos, Assistant Professor, and Natalia A. Peres, Assistant Professor**
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## Introduction

There are two predominant strawberry (*Fragaria* × *ananassa* Duch.) production systems throughout the world: Open-field cultivation and production under protective structures (e.g. high-tunnels and greenhouses). In California and Florida, strawberry is produced predominately under open-field conditions, whereas in Japan and in parts of Europe, such as Spain, Netherlands, and Germany, the latter system is widely utilized. Because the environmental differences between of these two systems, there is a necessity for breeding cultivars that could be adapted to each specific situation. 'Florida Elyana' is the first Florida-bred cultivar designed for tunnel and greenhouse production. It is a short-day plant and produces flavorful fruit. 'Florida Elyana' produces larger fruit than 'Strawberry Festival', which is the predominant cultivar in Florida and it holds a large market share in Spain, Morocco, and Egypt.

## Origin

'Florida Elyana' strawberry (*Fragaria* × *ananassa* Duch.) originated from a 2000 cross between FL 96-114 and FL 95-200. FL 96-114 resulted from a cross between 'Sweet Charlie', a 1992 University of Florida release, and 'Cuesta' (U.S. Plant Patent 8,662), a Univ. of California cultivar released in the early 1990s. FL 95-200 is a result of a cross of the lines FL 93-46 and FL 93-66, both of which have a number of cultivars in its complex pedigree, including 'Rosa Linda' and 'Pajaro'.

Based on the desirable appearance and firmness of 'Florida Elyana' fruit, it was included in randomized complete block trials at the Gulf Coast Research and Education Center of the University of Florida at Dover and Balm, Fla., respectively, during the 2004-05 and 2006-07 seasons. Ripe fruit were harvested, graded, counted, and weighed twice a week from December through March. For postharvest quality analysis, sensory evaluations were conducted at the Gulf

Coast Research and Education Center two times during 2006 and three times during 2007. At least 50 untrained panelists participated in the sensory panels, and rated fruit for appearance, texture, and flavor. Panelists were asked to taste the berries following the codes written on their ballot sheets and answer the questions on the ballots. Presentation was randomized across panelists and serving order was balanced so that each sample was tested in each station. Panelists were asked to rate samples for appearance, flavor and texture on a 9-point hedonic scale (1 = dislike extremely and 9 = like extremely). A line for comments was provided after each question. Fresh fruit were analyzed for soluble solids content (SSC) and titratable acidity (TA). Fruit were analyzed for surface color using a colorimeter (Konica Minolta Sensing, Inc., Japan), and firmness using a penetrometer (Instron, Model 4411, Canton, Mass.).

**Description**

'Florida Elyana' is a short-day cultivar. It is smaller and has a lower stature plant than 'Strawberry Festival'. This habit, along with fruit that are attached to long pedicels, makes the fruit easy to harvest (Fig. 1). 'Florida Elyana' produces larger fruit than 'Strawberry Festival'. It has a mean fruit weight in west central Florida of between 24 and 27 g, compared to between 17 and 21 g for 'Strawberry Festival' (Tables 1 and 2). Fruit are mostly medium-conic to wedge-shaped, with the wedge-shaped fruit often showing a longitudinal crease on the broad sides of the fruit (Fig. 2). 'Florida Elyana' fruit are quite susceptible to surface cracking, which is due to exposure to free moisture. Thus we are not recommending this cultivar for open-field culture where there is a high likelihood of multiple rain or dew events during the fruiting season. External fruit color is a bright red, and internal color is carmine pink. The calyx is generally medium in size and attractive. Fruit texture is firm (Table 3), and the flavor is usually sweet with a pleasant aroma. The soluble solids content of 'Florida Elyana' fruit is as high as or higher than that of 'Strawberry Festival' (Table 4), and its SSC/TA ratio is consistently higher than that of 'Strawberry Festival'.

**Performance**

'Florida Elyana' is as productive as 'Strawberry Festival' in December and January, but not as productive later in the season (Tables 1 and 2). This could be due to the fact that 'Florida Elyana' plants stay relatively small throughout the season, whereas 'Strawberry Festival' plants are more vigorous in terms of producing new branch crowns. However, in a high tunnel trial at the Gulf Coast Research and Education Center in the 2006-07 season, total season yield for 'Florida Elyana' was not significantly different from that of 'Strawberry Festival'. Growers may be able to increase the productivity of 'Florida Elyana' on a per unit area basis by planting this cultivar at a higher than standard density. 'Florida Elyana' is moderately resistant to the two most serious disease problems on strawberry in Florida: Botrytis fruit rot (caused by *Botrytis cinerea* [de Bary] Whetzel) and anthracnose fruit rot (caused by *Colletotrichum acutatum* Simm.). In an unsprayed trial during the 2007-08 season, only 3% of the 'Florida Elyana' fruit harvested from mid-February to mid-March showed symptoms of anthracnose fruit rot, compared to 53% for 'Treasure', the susceptible control. 'Florida Elyana' also appears to have resistance to wilts which are most likely caused by *C. gloeosporioides* (Penz.) Penz. and Sacc. and *Phytophthora* spp. In summary, 'Florida Elyana' is recommended for winter and spring production areas where strawberries are grown in tunnels or greenhouses.

## Availability

Information on nurseries licensed to propagate 'Florida Elyana' can be obtained from the Florida Foundation Seed Producers, Inc. (http://ffsp.net).

Fig. 1. Plants of 'Florida Elyana' strawberry in Spain. Photo by: Craig Chandler, GCREC.

**Table 1. Performance of strawberry cultivars at Dover, Fla. during the 2004-05 season in open-field culture[z].**

| Cultivars | Marketable fruit yield | | | | | |
|---|---|---|---|---|---|---|
| | December | January | February | March | Total | (g/fruit) |
| | (g/plant) | | | | | |
| Florida Elyana | 76 a[y] | 108 b | 178 a | 353 a | 715 a | 27.1 a |
| Strawberry Festival | 37 b | 144 a | 155 b | 592 a | 928 b | 20.6 b |

[z]Mean fruit weight was determined by dividing total marketable fruit yield per plot by total marketable fruit number per plot.
[y]Means based on four replications of 10 plants each. Mean separation within columns by Fisher's protected LSD test, $P < 0.05$.

**Table 2. Performance of strawberry cultivars at Dover, Fla. during the 2006-07 season in high-tunnel culture[z].**

| Cultivars | Marketable fruit yield | | | | | |
|---|---|---|---|---|---|---|
| | December | January | February | March | Total | (g/fruit) |
| | (g/plant) | | | | | |
| Florida Elyana | 46 a[y] | 99 a | 159 b | 322 b | 626 b | 24.4 a |
| Strawberry Festival | 65 a | 94 a | 218 a | 459 a | 836 a | 17.3 b |

[z]Mean fruit weight was determined by dividing total marketable fruit yield per plot by total marketable fruit number per plot.
[y]Means based on four replications of 10 plants each. Mean separation within columns by Fisher's protected LSD test, $P < 0.05$.

**Table 3. Mean acceptance scores (9-point hedonic scale) for appearance, texture, and flavor of 'Florida Elyana' and 'Strawberry Festival' strawberry evaluated over two harvest seasons.**

| | Feb. 06 | Mar. 06 | Jan. 07 | Feb. 07 | Mar. 07 |
|---|---|---|---|---|---|
| **Appearance** | | | | | |
| Florida Elyana | 6.6 b[z] | 7.5 a | 5.9 a | 6.4 b | 6.0 a |
| Strawberry Festival | 7.8 a | 6.8 b | 6.2 a | 7.2 a | 6.3 a |
| **Texture** | | | | | |
| Florida Elyana | 7.4 a | 7.1 a | 6.9 a | 6.9 a | 6.2 a |
| Strawberry Festival | 7.5 a | 6.6 a | 6.4 a | 6.8 a | 6.2 a |
| **Flavor** | | | | | |
| Florida Elyana | 7.3 a | 7.0 a | 6.5 a | 6.7 a | 6.2 a |
| Strawberry Festival | 7.3 a | 6.2 b | 5.9 b | 6.9 a | 5.1 b |

[z]Mean separation within columns by Fisher's protected LSD test, $P \leq 0.05$.

**Table 4. Soluble solids content (SSC) and titratable acidity (TA) of 'Florida Elyana' and 'Strawberry Festival' strawberry evaluated over two harvest seasons.**

| | Feb. 06 | Mar. 06 | Jan. 07 | Feb. 07 | Mar. 07 |
|---|---|---|---|---|---|
| **SSC (°Brix)** | | | | | |
| Florida Elyana | 10.2 a[z] | 8.2 a | 7.7 a | 9.6 a | 7.3 a |
| Strawberry Festival | 7.5 b | 7.5 b | 6.9 b | 9.8 a | 6.2 b |
| **TA (%)** | | | | | |
| Florida Elyana | 0.82 a | 0.58 a | 0.78 b | 0.71 b | 0.69 a |
| Strawberry Festival | 0.75 b | 0.63 a | 0.91 a | 0.87 a | 0.73 a |

[z]Mean separation within columns by Fisher's protected LSD test, $P \leq 0.05$.

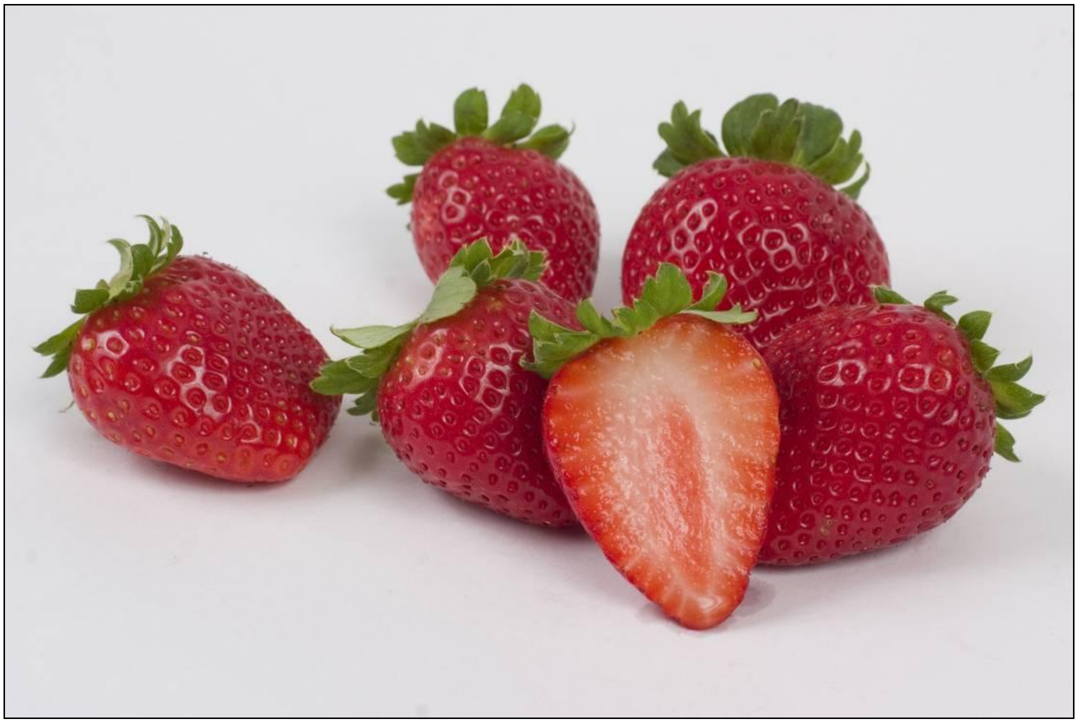

Fig. 2. Fruit of ‘Florida Elyana’ strawberry.  Photo by: Bielinski Santos, GCREC.