

Special Reports:

Fresh Market Muscadine Trial in Southeastern North Carolina

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Introduction

The North Carolina muscadine grape industry is currently based on 'Carlos' for wine production, with less than 5% of other cultivars grown for wine or fresh market sales. Best estimates are that the state has 1,300 acres of muscadines (2006), but actual production and value are difficult to determine because official statistical analyses do not separate muscadine and bunch types. The current experiment was started by Terry Bland during his tenure as muscadine grape extension specialist for NCSU, who, having observed the success and popularity of large-fruited muscadines with edible skins in other states, felt that we were missing an opportunity by not having information on similar cultivars in North Carolina. Our purpose was to

determine which fresh-market muscadines might be suitable for NC.

Experimental Design and Maintenance

Vines were initially planted beginning in 1998 and blocks of new cultivars are continually being added to the expanding trial area. Vines were set on a single-wire trellis, 10x20 ft spacing, single-vine plots, in randomized blocks using four or five replications. Vines were irrigated with overhead sprinklers during establishment, and grow tubes were used to speed initial growth and to protect the vines from herbicide sprays. No irrigation was used on bearing vines. Standard NC cultural practices were followed with regard to weed control, fertility and vineyard floor management. In general, fungicides were not used. Insecticides were used only as needed based on vineyard scouting, generally once or twice per summer to control Japanese, June and oriental beetles between bloom and harvest.

Pruning was conducted at two times of the year: Winter pruning consisted of rough hedging in February using hand-held gasoline powered hedge trimmers, or a tractor-mounted sickle bar hedger. Following rough mechanical pruning to within 6 inches or less of the cordon, hand pruning was used to thin bearing shoots to every 4-6 inches. Summer pruning consisted of undercutting with hedge trimmers to shorten the "curtain" of excess vine growth, facilitating grass mowing and hand harvesting. This consisted of using hedge trimmers around the first of August each year to trim off all pendant growth within 3 feet of the ground. Sides and tops of vines were not summer pruned, only those whips hanging down (i.e., pendant) and perpendicular to the ground.

Harvesting

In most years, single cordons or sections of cordons were harvested to determine season, size, yield and other fruit quality parameters. Once vines reached maturity (approx 8 yr), harvest samples were reduced to a single representative 2-ft section from each vine, from which all grapes (green and ripe) were harvested on a single date. This produced a “percent ripe” figure that could be used to compare cultivars on a given date. Grapes were weighed to determine yield, and 100 ripe grapes per vine were weighed to determine mature size. Ripe fruit at each harvest date was sorted into decayed versus marketable, and rots were further sorted by type. Other observations of fruit quality and trueness-to-type were made, including evaluations of stem scar, cracking, flavor, firmness, and other potential defects.



Results

Trueness-to-type: Perhaps 9 out of 10 plants ordered from commercial sources were what they were supposed to be; however a few cultivars were suspected to be something other than what was ordered, and in some cases were obviously not true-to-type, i.e., when bronze – fruited vines were received for a black-fruited cultivar. Since these “unknown” vines could not be identified with certainty, they were removed and replaced. Some cultivars considered to be true-to-type performed differently in NC than reported in GA; for instance ‘Pam’ ripened later than reported.

Cracking (rain splitting): As shown in the accompanying table, some cultivars developed splits in rainy harvest seasons. This was not evident in every harvest season, and some of

our favorite cultivars in early evaluations (such as Sugargate) were dropped when this characteristic became evident. This flaw alone is sufficient to rule out cultivars for commercial fresh market shipping, although less critical for pick-your-own operations.

Yields: Yield varied widely among cultivars, with only a few consistently high (see table). Triumph, Ison, Summit, Supreme and Nesbitt were the best performers among those suitable for fresh market. Carlos and Noble were also high-yielding, but are not considered fresh-market cultivars.

Stem scar, size, flavor and other characteristics: (See table below).

Cultivar	Characteristics	Yield	Comments/Recommendations for growers in NC
Alachua	Black, large, midseason, self-fertile, wet scar	M	Inconsistent with other descriptions of Alachua; possible mix? Not recommended due to poor scar, poor flavor
Black Beauty	Omitted from trial; vines received were not true-to-type	--	Observed at grower sites. Splits badly in wet weather, not recommended
Black Fry	Black, large, early, female, dry scar	L-M	Good quality and flavor; not recommended due to low yield
Carlos (wine only)	Bronze, small, midseason, self-fertile, dry scar	VH	Wine/juice cultivar, included in trial for comparison only. Skin very tart and not especially edible
Darlene	Bronze, large, early-midseason, female, dry scar	L	Good quality and flavor, however not recommended due to low yield
Doreen	Bronze, small, late, self-fertile, dry scar	M	Distinctive oblong fruit, too small for fresh-market shipping but has excellent flavor and edible skin
Farrer	Black, large, mid-late, female, variable scar	M	Not recommended due to variable scar and poor flavor
Fry	Bronze, large, midseason, female, variable scar	M	Not recommended due to poor scar, decline/death of mature vines, and susceptibility to rots.

Granny Val	Bronze, large, very late, self-fertile, variable scar	H	Not recommended due to leaf diseases, failure to ripen some yrs
Higgins	Bronze-red, med-large, midseason, female, variable scar	M	Highly vigorous vines. Not recommended due to modest yields and soft fruit
Ison	Black, med-large, early, self-fertile, variable scar	H	Trial only; highly vigorous, early and productive, but tight clusters distort fruit, and vines are not reliably cold-hardy statewide
Jumbo	Black, med-large, early, female, variable scar	L-M	Not recommended due to low yield, poor flavor, tough skin
Nesbitt	Black, large, late, self-fertile, dry scar	H	<u>Recommended</u> . May overcrop, slight "peeling" of outer skin at the stem scar when underripe.
Noble (wine only)	Black, small, mid-late, self-fertile, wet scar	VH	Wine/juice cultivar, included in trial for comparison only. Not for fresh market due to small size and wet scar.
Pam	Bronze, very large, mid-late, female, variable scar	M	Trial only. Large attractive fruit, scar may be problematic for shipping. Susceptible to fruit rots.
Scarlett	Red, large, midseason, female, dry scar	M	Trial only. Excellent flavor that declines and eventually becomes objectionable when overripe.
Seedless Fry	Red, very small, early to late, dry scar	VL	Not recommended due to extremely low yields
Southern Home	Black, small-medium, midseason, self-fertile, dry scar	M-H	Unique interspecific hybrid with good flavor and edible skin; not recommended due to small size and susceptibility to powdery mildew

Sugargate	Black, very large, early-midseason, female, dry scar	M-H	Excellent flavor and very attractive fruit, not recommended due to cracking in wet weather
Summit	Bronze/pink, large, midseason, female, dry scar	H	<u>Recommended</u> for fresh market shipping. Unique color, excellent flavor. Detaches very easily when fully ripe, so a catcher frame is needed to avoid loss at harvest
Supreme	Black, very large, mid-season, female, dry scar	H	<u>Recommended</u> . Fruit thinning may be needed to prevent young vines from overfruiting
Sweet Jenny	Bronze, large, early-midseason, female, dry scar	H	Not recommended due to fruit rots
Tara	<u>Omitted from trial</u> ; vines received were not true-to-type	--	Recommended for trial only, pending more field data from NC
Triumph	Bronze, large, very early, self-fertile, dry scar	H	<u>Recommended</u> . Comparatively rot-resistant, but susceptible to macrophoma rot



Disease susceptibility: In general, bronze fresh-market cultivars were susceptible to fruit rots while black fruited cultivars were more resistant. 'Granny Val' was susceptible leaf diseases, especially to angular leaf spot, and in some years defoliated prior to ripening. Fruit of 'Southern Home' was susceptible to powdery mildew. See table for additional comments.

Conclusions

Lack of trueness-to-type was the most worrisome aspect brought out by this experiment. Because some cultivars were found to be totally unacceptable for fresh market shipping, substitutions or mix-ups by the nursery would prove disastrous for a new grower attempting to establish a vineyard. Cracking (rain splitting) prevents commercial viability of some cultivars. Of those cultivars included in this trial, Triumph, Summit, Supreme and Nesbitt were suitable for commercial fresh market sales where grapes are harvested singly and packed in plastic clamshell containers; Scarlett and possibly Pam are recommended for further trials.

Methyl Bromide Alternative Update

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If you haven't shopped for fumigants yet this year, prepare yourself for a few shocks. First of all, the price of methyl bromide continues to go up. That really should not shock anyone as we continue to see shortening supplies and reduced production of the product. At last report you can expect to pay \$5.50 or more per pound of methyl bromide 50:50 this year, but that might be an underestimation. Something else has happened this year that no one really saw coming; a Telone shortage. Telone is actually a co-product of plastic and epoxy manufacturing, especially for the automotive industry. With the current economy, not many cars are being sold, so not many are being built and not much plastic is being made. Telone supplies were already a little short after hurricane Ike hit Texas near the Telone production facility in September and the resulting loss of power shut down production for several weeks. The amount of Telone that will be available this year will be a fraction of what we have had in years past (down by anywhere from 40-60% by some estimates) and not everyone is really sure how much Telone will be available this year. So all the alternatives that contain a Telone component (Telone II, Telone C-35 or C-17, PicClor 60, Inline, etc.) will be limited in their supply and availability, and surely more expensive. This will probably drive the cost of methyl bromide even higher as the reduction in availability of these products will

create more demand for the remaining methyl bromide.

With the cost of methyl bromide and the possible limited availability of Telone products, it becomes even more critical to ask the key question: "Why do I fumigate?" Since the alternative fumigants do not have the same broad spectrum activity as methyl bromide, it is important to know what the current and potential problems are on each farm or field. The chemicals that are currently available for use all have their strengths and weaknesses. However, you should be able to find a chemical or a combination of chemicals that will work for your farm. Below is a chart that shows the main alternatives and their effectiveness against selected soil problems as compared to methyl bromide.

Relative efficacy of currently registered alternative fumigants or fumigant combinations for managing soilborne nematodes, diseases and weeds.

Product	Nematodes	Disease	Nutsedge	(Weeds) Annual
Methyl Bromide	+++++	+++++	+++++	+++++
Telone C35	+++++	+++++	+	+++
Telone C35 + VIF	+++++	+++++	+++	+++
Metam Sodium (ms)	++	+++	+	++++
Chloropicrin	+	+++++	--	--
Chloropicrin + ms	++	+++++	++	++++
Paladin	++	++++	+++++	+++
MIDAS	+++++	+++++	+++++	+++++

Footnotes: metam sodium can be Vapam, Sectagon or other registered formulations. Each of these fumigant alternatives have performed well in our trials, with higher returns per acre, than MB. Some fumigants may need to be complemented with herbicides or hand weeding depending on weed pressure. You can also use Goal herbicide as a pre-plant spray, but it has a 30 day planting interval, and Stinger gives good post emergent control of certain weeds.

Even with the difficulties this past fall, there are some exciting things happening with alternatives. MIDAS is registered and is labeled for sale and has shown great efficacy in field trials. One difficulty with MIDAS has to do with the application rates which can be as low as 4 gallons of product per acre for the 50:50 (MIDAS:Chloropicrin) formulation, and even lower for the 98:2 formulation. These low rates make it critical for your application equipment to be set up properly and calibration be correct for adequate results. Paladin is now the trade name for DMDS, and it has an experimental use permit for NC, GA and FL. This permit allows soil fumigation for labeled crops (including strawberries and tomatoes) without destroying the crop. This product is currently formulated as a 79:21 mixture

(DMDS:chloropicrin) and additional formulations are being explored, including a 98:2 formulation and formulations that can be applied as a drip application rather than shank applied. The cost of Paladin is still not being released, but we have been told it will be competitive with the cost of methyl bromide.

Virtually Impermeable Films (VIF) continue to be another factor emerging as an important part of fumigation. New products have come on the market in the past few years and the questions about their effectiveness and use have also grown. Fumigants do not easily move through these tarps, so the chemical stays in contact with the soil in the bed for a longer period of time. This has allowed reduced application rates of fumigants with equivalent pathogen and weed control. The current price difference between VIF and standard plastics has been narrowing and current costs are approximately \$240 a roll vs. \$133 a roll for standard LDPE tarping. This cost can be, at least in part, offset by reduced chemical cost. Most of our data also indicates that better pathogen control can be obtained with many alternatives by using reduced chemical rates and VIF versus using full rates and standard plastics. And just so you will not be caught off guard, TIF (totally impermeable film) has also surfaced. This is a multi-layered product that essentially stops all chemical movement through the film, but there has been little work done with it to date, so no information about efficacy or cost is currently available. We are going to obtain some TIF this spring and plan on testing it during 2009 so that we can have some answers for all of you.

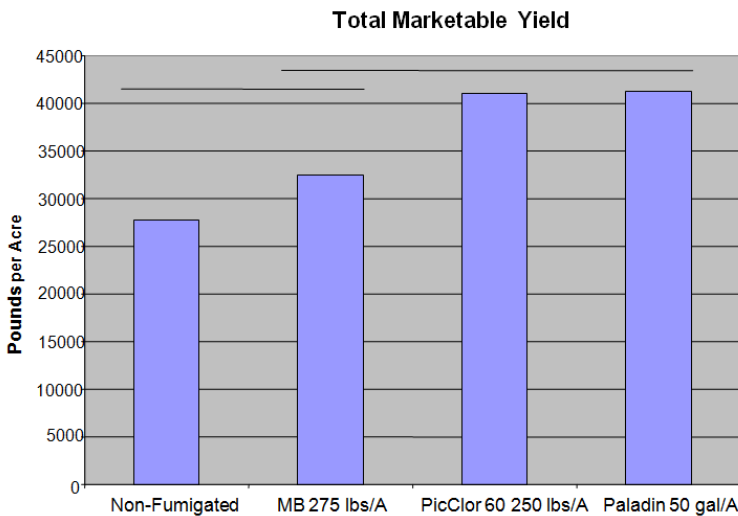
Something worth mentioning at this point are the new EPA regulations looming for several fumigants, including methyl bromide, chloropicrin and metam sodium. The proposed regulations would require many new things that we are not used to with our current fumigation practices. If the regulations are passed as-is, there would be big changes in buffer zones (including a ¼ mile exclusion area for all hospitals, prisons, schools, day care centers, etc.), the inability to overlap buffer zones, no occupied structures within a buffer zone, possible air monitoring in the buffer zone for 24 hours after applications, fumigant management plans for each field to be fumigated, respirator requirements for field workers and several other new regulations. If you need more information regarding these possible regulations, they can

be found at the EPA website or look for other summaries in commodity publications.

So how have these products been performing in actual fields? Over the past two years, nine large scale on-farm tests were conducted in North and South Carolina on tomato, pepper and strawberry crops. The following chart shows a summary of the treatments:

Treatment	Number of Locations
No Fumigation	3
Vapam 75 gal/A	1
Methyl Bromide 400 lb/A	6
Methyl Bromide 275 lb/A With VIF	3
Methyl Bromide 266 lb/A With VIF	2
Methyl Bromide 200 lb/A With VIF	3
Telone C-35 35 gal/A with VIF	2
Telone C-35 35 gal/A	1
Telone C-35 17.5 gal/A with VIF	1
Telone C-35 35 gal/A + Vapam 75 gal/A	3
Chloropicrin 75 lb/A With VIF	1
Chloropicrin 150 lb/A + Vapam 75 gal/A	3
Chloropicrin 150 lb/A	2
PicClor 60 250 lbs/A with VIF	2
Paladin 520 lbs/A with VIF	2
Inline 26 gal/A with VIF	2
MIDAS 150 lbs/A with VIF	2

Some of the application methods varied also. For example Inline is a drip applied product while the nearly identical product (Telone C-35) is a shank applied chemical. With all of these treatments, yield was tracked, and statistical analysis shows that for each site there was a statistical difference in total yield due to an alternative fumigant for only one of the test locations, all other locations showed no statistical differences. There was some reduction in weed control with certain fumigants, especially with the lower rates of methyl bromide under VIF and with grasses and the Paladin treatments. The following chart shows an example of the harvest data:



This graph shows the total yields in the trial using the reduced rate of methyl bromide and two alternative fumigants in a 2008 tomato trial in Western North Carolina. The bars at the top of the graph show statistical similarity and it can be seen that the non-fumigated areas yielded much lower than the fumigated areas, with the reduced rate of methyl bromide being an intermediate step between the two.

Which product or combinations of products will work best for you? Determine why you fumigate, and target that limiting factor. Switching chemicals will not be as simple as taking the Methyl Bromide tank off and putting a Product X tank on. Even if you switch to a fumigant that you will be shank applying, there will be changes to your application rig (orifice and pressure changes), changes in Personal Protective Equipment requirements (please pay close attention to the label requirements), possible buffer zone changes, changes in your

cultural practices (2 drip tapes for drip applied chemicals) and changes in your plant-back times. Several new chemical and plastic options are now available, and this year will be a good time to look at implementing some of these products even if you can still get some methyl bromide.

Two New Florida Strawberry Varieties

Debby Wechsler, NC Strawberry Association(<http://www.ncstrawberry.com/>)
(Reprinted from the June Issue of the NC Strawberry Association Newsletter)

Two new varieties developed by Dr. Craig Chandler and introduced in 2008 are now available for commercial production. The following descriptions are taken from articles by C.K. Chandler, B.M. Santos, and N.A. Peres. They may be found in their entirety at <http://www.edis.ifas.ufl.edu/HS400> and <http://www.edis.ifas.ufl.edu/HS399>.



Figure 1. Plants of 'Florida Radiance' strawberry grown on polyethylene mulch in Florida (left), and Spain (right).



Figure 2. External appearance and internal section of 'Florida Radiance' strawberry.

Florida Radiance

This variety originated from a 2001 cross between Winter Dawn and FL 99-35. Winter Dawn, a 2005 release from University of Florida strawberry breeding program, was used as a parent because of its high early-season yield potential and ability to produce large primary and secondary fruit. FL 99-35 was used as a parent because of its ability to produce firm, attractive fruit. Florida Radiance is a short day cultivar. It has a more open-plant habit

than Strawberry Festival which, along with fruit that are attached to long pedicels, makes the plant easy to harvest. In studies conducted in west central Florida, Florida Radiance had a mean fruit weight of 21-23 g, compared to 18-21 g for Strawberry Festival. Fruit are mostly medium conic in shape, with some early season fruit being elongated and some primary fruit being asymmetrical. The achenes are slightly sunken, giving the fruit a smooth appearance. External fruit color is a glossy bright to dark red (depending on maturity). Florida Radiance fruit are not significantly different in lightness than Strawberry Festival fruit. The internal color of Florida Radiance fruit is a warm red and the calyx is generally medium to large in size and attractive. Fruit of Florida Radiance are firm and juicy.

Yields of Florida Radiance were complementary to those of Strawberry Festival during recent studies. Florida Radiance had higher production than Strawberry Festival in February, while Strawberry Festival had higher production than Florida Radiance in January. Florida Radiance is moderately resistant to the two most serious disease problems on strawberry in Florida: Botrytis fruit rot (caused by *Botrytis cinerea*) and anthracnose fruit rot (caused by *Colletotrichum acutatum*). In an unsprayed trial during the 2007-08 season, only 3% of the Florida Radiance fruit harvested from mid-February to mid-March showed symptoms of anthracnose fruit rot, compared to 53% for Treasure, the susceptible control (N. Peres, unpublished data). But Florida Radiance is susceptible to crown rots (C.K. Chandler, personal observations), which are most likely caused by *C. gloeosporioides* or *Phytophthora spp.*

Florida Radiance strawberry has consistently produced high early-season yields, and has maintained good fruit size throughout the main production period in plots at the University of Florida, and on several commercial farms in west-central Florida and southwest Spain. It is recommended for trial in areas with mild winter climates.

Florida Elyana

Florida Elyana strawberry has produced large, flavorful fruit from December through March in experimental plots and in a high-tunnel trial on a commercial farm in western portions of Central Florida. This cultivar has also shown promise in

high- and low-tunnel trials on commercial farms in Spain, Morocco, and Egypt. Florida Elyana is recommended for trial in areas of winter and spring production where strawberries are grown in tunnels or greenhouses. It is not recommended for field production. Florida Elyana fruit are quite susceptible to surface cracking, which is due to exposure to free moisture. Thus, this cultivar is not recommended for open-field culture where there is a high likelihood of multiple rain or dew events during the fruiting season.



Figure 1. Plants of 'Florida Elyana' strawberry on polyethylene-mulched beds in Florida (left) and Spain (right).

Florida Elyana is a short-day cultivar. It is smaller and also a lower-stature plant than Strawberry Festival. Florida Elyana produces larger fruit than Strawberry Festival. In field studies, Florida Elyana mean fruit weight was 24-27 g, compared to 17-21 g for Strawberry Festival. Fruit of Florida Elyana are mostly medium conic to wedge shaped, with the wedge-shaped fruit often showing a longitudinal dimple on the broad sides of the fruit. External fruit color is bright red, and internal color is carmine pink. The calyx is generally medium in size and attractive. Fruit texture is firm, and the flavor is usually sweet with a pleasant aroma. The soluble solid content of Florida Elyana fruit is as high as or higher than that of Strawberry Festival.



Figure 2. Internal section (left) and outside appearance (right) of 'Florida Elyana'.

Florida Elyana is moderately resistant to the two most serious disease problems on strawberry in Florida: Botrytis fruit rot (caused by *Botrytis cinerea*) and anthracnose fruit rot (caused by *Colletotrichum acutatum*). Florida Elyana also

appears to have resistance to Colletotrichum and Phytophthora crown rots.

Strawberry Field Day Features Tunnels

Debby Wechsler,
NC Strawberry Association
(<http://www.ncstrawberry.com/>)
(Reprinted from the June Issue of the NC
Strawberry Association Newsletter)



NC Commissioner of Agriculture Steve Troxler welcomes participants to the Strawberry Field Day at the Piedmont Research Station. Behind him is one of NCDA's "Got to be NC" trucks, featuring NC strawberries and the Farm-to-school program.

At the Strawberry Field Day on May 5, held at the Piedmont Research Station in Salisbury, NC, not only was research in high tunnels a key focus of the event, the tunnels themselves were a welcome shelter on a cold, windy, and drizzly day. Here are a few points of information gleaned from the Field Day:

- According to Dr. Barclay Poling, Strawberry Festival, a Florida variety, has so far proven to be the most successful variety for tunnel production in North Carolina, though it has not proven very productive in open field conditions in the Carolinas – the tunnels simulate the Florida season and conditions. The flavor of the tunnel-grown Festival berries we sampled was outstanding and the berries were firm and well-shaped.
- Using row covers inside the tunnels has proved to be a good strategy for protection during winter cold snaps. In January, fruit and flowers survived an episode with

outside temperatures of 5° F. using double covers (either two 2-oz covers, or with a second 1.5 oz. cover elevated by one foot.). Plant temperatures stayed above 30° F. all night.

- In March, however, with threat of snow, tunnels were uncovered, and freezing rain then put frozen row covers in direct contact with plants. Though they lost all fruit and flowers, plants bounced back to provide great picking in April that still continued in May.
- His research includes investigating whether artificially shortening day length increases yield and comparison of plants from different sources.
- Dr. Jim Ballington is researching how to get earlier production in the fall using the day neutrals Seascape, Albion, and some breeding selections. He has been able to get 24 weeks of production for day neutrals in tunnels vs. 16 weeks in the field. He is also comparing silver and white-colored plastic for hot-weather production (the reflective silver plastic mulch keeps plants too cool in higher elevation plantings). He pointed out that the high initial cost of tunnels is a stumbling block and it is necessary to maximize fruit/sq. ft. in tunnels.



A large crowd turned out for the Strawberry Field Day at the Piedmont Research Station in Salisbury, NC on May 5.

- Dr. Hannah Burrack is doing research to see if biocontrol (with predatory mites) of mites in high tunnels is possible. Her answer is a "reserved yes" – she has done only one year of research so far. The research has been challenging because of the tight space, but she has been able to create the necessary buffer zones with chemical controls. Other

pest problems in tunnels include whiteflies, crickets, voles, and moles. There is also more powdery mildew than outdoors.

- Ralph Cramer, of Haygrove Tunnels, one of the event's sponsors, was one of the first to use high tunnels (for cut flower production) and then became a dealer. Haygrove now offers a number of different styles and sizes of tunnels. High wind speeds have been a factor in adoption in eastern U.S. but, says Ralph, "What you see here is the future."
- NCSU strawberry breeder Dr. Jeremy Pattison held a taste-test of about a dozen different varieties, collecting comments on flavor, appearance, mouth feel, etc. from participants. He compiled results during lunch and reported that the favorite was the California variety Albion. Successful breeding efforts require genetic diversity and variability, he said. Comparing strawberry breeding to auto-racing, he noted : "We have all the parts we need to make a great race car." His goals include large fruit, high quality, good disease resistance, and a smaller, easy-to-pick plant. He is trying to move from a big, bushy plant to a smaller, low growing plant – something like the new California variety Palomar.

Bramble (Caneberry) Seasonal Checklist

Gina Fernandez, Small Fruit Specialist
North Carolina State University

This checklist was originally developed for blackberry growers in North Carolina. Many of the items apply to raspberry production as well. You may have to adjust your work activities either earlier or later depending on your location. For more detailed information, check the Southern Region Integrated Bramble Management Guide and the Southeast Regional Bramble Production Guide at:
<http://www.smallfruits.org/SmallFruitsRegGuide/index.htm>

SUMMER

Plant growth and development

- ✓ Fruit development
- ✓ Rapid primocane growth
- ✓ Floricanes senesce
- ✓ Primocane fruiting types produce fruit

Pruning and Trellising

Erect types:

- ✓ Hedge (tip) the new primocanes when they are about 6-12" below the top wire of the trellis to encourage lateral branching
 - ✓ Continue hedging at monthly intervals to maintain desired branching and height of canopy (laterals should reach top wire)
 - ✓ Prune out spent floricanes after they have produced fruit, do not thin out primocanes until mid-to late winter.
 - ✓ Train primocanes to trellis to minimize interference with harvest. Shift trellises or V trellises make this relatively easy
- Trailing types
- ✓ Train new primocanes to middle of trellis, on ground in a weed free area or temporarily to trellis outside of fruiting area (depends on trellis type)
 - ✓ Cut back side shoots to 18"
 - ✓ Remove spent floricanes after harvest

Weed management

- ✓ Mow along side of row to maintain the width of the bed to 3-4 ft.
- ✓ Weed growth can be very vigorous at the same time as the bramble crop peaks.
- ✓ Weed control is best done earlier in the season before harvest commences.
- ✓ Mow middles regularly to allow pickers to move through rows easily

Insect and disease scouting

Check the Southern Regional Bramble integrated Management Guide for recommendations.
www.smallfruits.org

Insects

- ✓ Raspberry crown borer (canes girdled and wilt)
- ✓ Psyllid
- ✓ Two spotted spider mite
- ✓ June beetle

Disease

- ✓ Botrytis
- ✓ Late rust
- ✓ Sooty blotch
- ✓ Orange rust
- ✓ Powdery mildew

Water management

- ✓ Bramble plants need about 1"-2" water/week, and this amount is especially critical during harvest.
- ✓ Consider installing an overhead system for evaporative cooling to reduce sunscald. Turn on once or twice a day from 10 am to 3 pm for short periods of time (approx. 15 minutes).
- ✓ Give plants a deep irrigation after harvest

Nutrient management

- ✓ Take leaf samples after harvest and send to a clinic for nutrient analysis. For information on how to sample and where to send samples in NC go to: <http://www.ncagr.com/agronomi/pwshome.htm>

Harvest and marketing

- ✓ Blackberries are fully ripe when they are dull black, PYO only
- ✓ Pick shiny black fruit for shipping
- ✓ Pick directly into clamshells with absorbent pads OR for PYO use soft drink flats
- ✓ Keep harvested fruit in shade and move into coolers as soon as possible to lengthen the shelf life of the fruit.
- ✓ Force air pre-cooler is best for removal of field heat
- ✓ Store at 32 to 34°F and 95% RH
Freeze excess fruit for jam, juice or wine

Guide and the Southeast Regional Strawberry Plasticulture Production Guide at:

<http://www.smallfruits.org/SmallFruitsRegGuide/index.htm>

Summer (June-August)

- ✓ Clean-up fields after harvest
- ✓ Clean-up stand and fields
- ✓ Spray to kill spent plants with contact herbicide
- ✓ Remove and recycle plastic
- ✓ Send in soil sample for fall fertilizer recommendations
- ✓ Plant summer cover crop
- ✓ Order plants or tips
- ✓ If raising your own plug plants, organize your plug production set-up (irrigation, soil, flats, tips...)
- ✓ Plow in cover crop late summer
- ✓ Apply fall fertilizers as recommended
- ✓ Prepare fields for fumigation, allow adequate time for plant-back interval

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Editor and Contributor.....Tom Monaco

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Quarterly Strawberry Plasticulture Checklist

Gina Fernandez, Small Fruit Specialist
North Carolina State University

This checklist was originally developed for growers in North Carolina. You will have to adjust your work activities either earlier or later depending on your location. For more detailed information, check the Southern Region Integrated Strawberry Management

