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Special Reports:

Notes on the Winter Season 2009-2010

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It has been a remarkably cold winter! I recall that even before I gave my presentation on the topic of *High Tunnel Strawberry Production* at the Strawberry Conference in Savannah on January 9, 2010, that the session moderator, Dr. Powell Smith, Clemson University, asked if I could provide a brief assessment of how the strawberry crop would likely be impacted by a forecast for temperatures in the teens and single digits for January 11, 2010? As it turned out, we experienced a low of only 15 F on January 11 in Raleigh, NC, and most of the strawberry crop across North Carolina, South Carolina and Georgia was spared any real crown damage. A number of Extension Agents in North Carolina went right to work soon after the January 11 cold episode to survey strawberry plasticulture fields, and what they discovered was that no damage occurred in fields with row covers, but they also found very little evidence of crown injury in fields that were not covered (see Table 1). A related report containing agent photographs of strawberry crown tissues can be found at <http://ncsu.edu/enterprises/strawberries/files/2010/01/berry-mg-jan12-eve-comp.pdf>

Table 1: NC Cooperative Extension Agents Freeze Assessment

Grower/ Agent	County	City/town	Min. temp (F) 1/11/10	Variety	Uncovered damage
ENC					
No. 1	Hyde	Pantego	14.5	Chandler	1
No. 2	Pender	Burgaw	14.0	Camarosa	1
PIEDMONT					
No. 3	Nash	Zebulon	15.0	Chander	1
No. 4	Guilford	Gibsonville	15.0	Chandler	none
No. 5	Guilford	Greensboro	12.0	Chandler	none
WNC					
No. 6(agent)	Yancey	Burnsville ^z	1.0		1

Damage rating: 1-minor; 2-moderate; 3-severe

^z Burnsville is a NC mountain location, and this assessment was for a matted row crop that had a pine straw mulch.

Uncovered plants had lots of foliar burn this winter

It must be noted though that all uncovered fields this winter had an exceptional amount of dead foliage – this was due to freezing temperatures in January and early February plus some very high winds. You can see the extent of the canopy injury in these photographs provided by Maryland farmer, Russ Schlegal (Figures 1a and 1b). This type of damage to the canopy led to a much greater labor bill for leaf “sanitation” in 2010 – many growers ending up spending around \$400/acre in February to hand remove the older leaves that were killed by the high winds and cold. Fields that had row covers had only minor foliar burn (Fig. 2).



Figure 1a: Non-covered plant in Maryland.



Figure 1b: Plant protected with row covers.



Figure 2: Chandler plug plant set on October 4, 2009 at Brookdale Farm in Virginia Beach, and had been covered since January 7th. Photo taken by B. Poling on Feb. 24, 2010. There was only minor "foliar burn" for these covered plants, and this resulted in some cost savings for "sanitation" operations in February 2010

Fort Mill, SC (January 22, 2010)

I personally visited a field of Camarosa fresh dugs (from PEI) in late January in Fort Mill, SC, where you could see that the row covered plants had excellent size (10 inches in diameter or more) and virtually no leaf burn (Figure 3a, 3b).



Figure 3a. Camarosa plants under row cover from the New Year until January 22nd when this photo was taken in Fort Mill, SC.



Figure 3b. Plants with 10 inch diameter are about perfect for late January/early February. Planting date was October 6, 2009.



Figure 4: Photograph taken on January 22, 2010 that shows the relative difference in plant size for plants that had been covered since the New Year (to the left) vs. plants that had not been covered (to the right).

At the time of my visit to this plasticulture field in Fort Mill, SC (1/22/10), I expressed to the grower my concern about excess plant size with the plants shown in Fig. 3a and 3b (about 10 inch diameter). If the individual plants had already been “touching in the row” in late January, I would have definitely recommended pulling the covers back. As it turned out, the month of February was nearly as cold as January in Fort Mill:

Jan 2010 ave temp 37.5 F (-4.2 F deviation from norm)

Feb 2010 ave temp 38.3 F (-6.9 F deviation from norm)

The manager of the farm decided to leave the covers on the crop for all of February and right up until March 22nd! I am definitely looking forward to a return visit this spring to see how all this turns out, and to see if the plants covered from New Year until March 22 are excessive in size? The grower further reported to me on March 18, 2010 by phone that the plants that had been covered since New Year were about double the size of uncovered plants.

In Figures 5a and 5b, you can see the Camarosa fresh duggs that had not been under row covers. But, just after my visit on Jan. 22, the grower went ahead and applied covers to almost all of the rest of his acreage that had not been previously covered to encourage more branch crown development in February and into mid-March. In speaking to the grower on March 18th, he was extremely pleased with the appearance and condition of his Camarosa crop under row covers.



Figures 5a and 5b: These plants that had not been covered with row covers from the New Year through January 22, and were good candidates for row covers.

Exceptionally cold February

In hindsight, I wish that we had made a similar decision in late January 2010 to cover our strawberry research plots at Central Crops Research Station near Raleigh! The average temperature for February 2010 (37.5) in Raleigh, NC, was actually colder than for January 2010 (37.8). And, it is very interesting to compare the deviations from average monthly temperatures for this winter (09-10) compared to last winter (Table 2). Furthermore, if you sum up the monthly deviations for from October through February for the 2008-2009 season you get + 2.7 degrees. Whereas, for the same months in 2009-2010, you get -7.3 degrees. No wonder that the strawberry crop at Clayton is taking so long to break out of its dormant winter condition this year!

Table 2 - Deviation from monthly average temperature, Raleigh, NC

	2008-2009	Ave-08-09	2009-2010	Ave-09-10
Oct	-0.7	59.3	0.3	60.3
Nov	-1.6	49.4	2.2	53.2
Dec	4.4	47.4	-2.5	40.5
Jan	0.3	40.0	-1.9	37.8
Feb	0.3	46.0	-5.4	37.5
Sum (Oct-Feb)	2.7		-7.3	
Mar	1.5	52.2	na	na
Apr	3.3	62.4	na	na
May	4.3	71.3	na	na

And, even by the first week of March at the Central Crops Research Station, we were only just beginning to see new leaves emerging from the crowns (similar to Figure 6b below). In most years, we can see several or more emerged flower buds by the last week of February.

Virginia Strawberry Walk – February 24, 2010

I visited the Brookdale Farm (Tom and Amanda Baker) as part of the Virginia Beach Strawberry Crop Walk program on February 24th, and although I could not see that much difference in the size of the Chandler plug plants that had been covered with row covers since early January and ones with no cover, I could definitely see that the covered plants were at least 10 days ahead in development (see Figures 6a and 6b). The covered plants had numerous emerged flower buds from the main crown (6a); whereas the non-covered were just starting to show some new leaf development (6b).



Figure 6a: Photo taken February 24th in Virginia Beach of plant that had been under a row cover since January 7th and you can see numerous “emerged flower buds” and even an open blossom (killed by recent freeze). The plant shown in **Figure 6b** had not been under row cover protection, and was only beginning to push new leaves by the time of this photo (2/24/10).

Branch crown development under covers?

I normally like to see about 3-4 branch crowns for plug plants at the end of February, but as seen in Figure 7, this particular plant had six branch crowns, and other plants that we dissected from under the covered area in VA Beach had even higher numbers of branch crowns. It is also interesting to note the similarity in size of the individual branch crowns on this Chandler plug plant – this could potentially lead to a more concentrated crop during the harvest season.



Figure 7: Chandler plug with 6 branch crowns similar in crown diameter and this can lead to a more concentrated crop in May (Va Beach, 2/24/10).



Figure 8: This Camarosa plug plant with only four branch crowns at the end of February has the ideal number of branch crowns to achieve an excellent marketable yield as well as good berry size and a more “spread out” harvest season than will likely occur for the plant shown Fig. 7.

Summary

Despite the colder winter conditions in 2009-2010, the good news is that the crop across the mid-South went into the winter in a very hardy condition, and even with temperatures dipping into the mid-to-low teens on January 11, 2010, there was virtually no detectable injury to the crop. There has been more “leaf burn” this winter in fields that were not covered with floating row covers, and this has added to grower’s labor bill for late winter “sanitation.”

The overwinter covers may add another \$1,000 dollars or so in total production costs per acre (assuming 2 years use for the row cover and 6 years for the hold down rock bags), but, more and more growers across the Mid-South are learning to take advantage of winter season row covers to: 1) protect their crop from potentially dangerous winter freezes, 2) enhance overall plant development in a colder than normal fall and winter, and 3) to accelerate crop ripening. The amount of forcing you get will depend on when the covers are applied. Covers applied in late December/early January may provide up to 10-14 days of earlier ripening in 2010, and that should be really good news for your early season customers! As a final point of clarification, it is true that growers can plant somewhat later in the fall if they are planning to use row covers, but I would not recommend more than a 1 week delay in planting. In other words, if your usual planting date

is around October 1st, then delaying until around October 7th should not pose a problem even in a colder winter like 2009-2010.

Postharvest handling and storage of blackberries and raspberries

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Of all the small fruits, raspberries have the shortest shelf life. One can watch the mold grow on raspberries held on the counter at room temperature. In addition to decay, raspberries often change from a bright red color to an unattractive purple color, signaling overripe fruit to many people. Blackberries are somewhat easier, being less prone to rapid mold. While blackberries won’t get unacceptably dark, they can develop color reversion, either in patches of drupelets or all over the fruit, depending on the reasons. Both raspberries and blackberries become very soft in a matter of hours if not held at cold temperatures.

To further complicate matters, neither raspberry nor blackberry can be picked half ripe, as they have no carbohydrate resources within the fruit and depend on direct import of sugars from the plant to facilitate full sweetness, texture, and color. The fruit don’t like being picked wet with dew or rain, nor can they be cleaned or cooled using water. The high respiration rate of the fruit, combined with the ability to quickly lose water and weight from the lack of a protective peel or rind, mean that the fruit must also be rapidly cooled, and kept cold during the handling and marketing process. Raspberries and blackberries are harvested by machine for processing, but are too soft for machine harvesting for fresh market. For these reasons, fresh market fruit are picked by hand into final containers is done in the field.

As with many fruits and vegetables, the first answer to longevity is careful choice of cultivar/variety and decisions made about type of system. Will fruit be used for processing or fresh market? Processed fruit must be of

varieties that don't have high drip loss, maintain black color after freezing, and can be picked fully ripe. Blackberries in this category include Marionberry, Obsidian, Metolius and raspberries are Meeker. Fresh market fruit usually are not of the same varieties as processed as fresh market fruit must detach at a slightly less ripe stage (shiny black rather than dull black or light red rather than dark red for raspberries) and be very firm, especially if shipping long distances. Blackberries suitable for shipping include Chester Thornless, Apache, Ouachita, Navaho, Natchez. Raspberries include Nova, Autumn Bliss, Autumn Britten, Heritage, Himbo Top. Fruit for local or on farm markets can be of softer types, and often with raspberries it's better to have more flavorful types, such as Caroline, or large fruited blackberries such as Kiowa (thorny) or Apache (thornless).

Caneberries have to be selected first for productivity/disease resistance in the environment where it will be grown, and second, but just as important, for fruit quality in that environment. For instance, several of the varieties developed for the Pacific Northwest will do well in North Carolina, but tend to ripen rapidly and darken too much for fresh market. Blackberries are somewhat easier to adapt to the south because there were many varieties released from a southern breeding program in Arkansas, so tend to be more heat adapted.

Production practices, such as amount of nitrogen, amount of rainfall or irrigation, can also affect fruit quality. Drought and heat can greatly reduce raspberry fruit size, while irrigation within 8 hours of picking can soften blackberries; water droplets standing on the surface of blackberries can cause a reddening effect. Food safety issues have to be considered both with choice of fertilizer and with irrigation source, in order to reduce food contamination risks. Above all, avoid putting soft, decayed, or injured berries into the packs. These fruit will accelerate decay of the whole pack.

As mentioned earlier, fruit are harvested into their final container in the field. Essentially there are only 2 handling steps-the initial harvest and final consumer use. Fruit are usually taken to an in field grading shed mounted on a trailer, so that injured or overripe fruit are removed. The packs are then placed directly into a refrigerated truck and taken to a distribution/collection point, cooled with forced air, and held in cold rooms until loaded for shipment to the buyer's designated point. Selection of container should center around the type of cooling and effectiveness of the package in allowing air flow.

Other factors such as ability of the packs to be stacked, the smoothness of the holes (to avoid fruit injury), and size should be considered when choosing containers. Sometimes market dictates what container size will be harvested for that period, but initial choice of materials and style should be made carefully.

Cooling can be done by room cooling, if pallets of fruit are stacked with aisles between them and the size of the room is adequate for the room to get efficient cooling. Generally, cooling of large amounts of fruit is not efficient unless cool air is forced into and around pallets. This can be done using a tarp and box fan, or by building a cold wall at one end of the cooler that has outlets to line up fruit. Cooling is especially critical for raspberries, which can mold in as little as a day if held at 68 F. For each hour in delayed cooling, a day of shelf life is lost. Caneberries can tolerate elevated carbon dioxide (10-20%) and slightly reduced oxygen levels (10-15%), but some raspberries can have altered flavor after modified atmosphere storage. Generally MA in caneberry is done just before shipment as fruit must be delivered to consumers within 5-10 days of harvest.

Summary

Consider the following questions before planting blackberries:

1. What is your market-local or national?
2. What varieties will suit your market (large, softer, good flavor for local, med/large, and firm for national) ?
3. What type of packaging and size of package will you need?
4. What type of system will you use for harvest?
5. What type of cooling facility will you have?
6. Will you be using modified atmosphere during storage/shipment?
7. What are your food safety hazard points from production through shipment/sales?

Major issues that make caneberries different in handling:

No protective cuticle
High respiration rate
High rate of weight loss

Have to be picked very near full ripeness
High rate of softening
Susceptible to gray mold (Botrytis cinerea)
Blackberries can turn red
Raspberries can turn purple
Maximum shelf life is short (2 days to 2 weeks)

Sources of information:

- **NORTH CAROLINA STATE**
<http://www.bae.ncsu.edu/programs/extension/publicat/postharv/>
 - **UNIV CALIFORNIA-DAVIS AND UC-KEARNEYSVILLE**
<http://postharvest.ucdavis.edu/>
 - **USDA HANDBOOK 66**
<http://www.ba.ars.usda.gov/hb66/contents.html>
postharvest.ucdavis.edu/Pubs/publications.shtml
 - **Postharvest Technology of Horticultural Crops publication 3311 (UC-davis) 2002**
 - **Postharvest Technology for Small-Scale Produce Marketers: Economic Opportunities, Quality and Food Safety**
- NC BRAMBLE PORTAL**
<http://www.ncsu.edu/enterprises/blackberries-raspberries>

NC STRAWBERRY ASSOCIATION INITIATES SCHOLARSHIP PROGRAM

Debby Wechsler
Executive Secretary, NC Strawberry Association

The North Carolina Strawberry Association is pleased to announce a new scholarship program to promote future leadership in the strawberry industry. The scholarship is open to all rising college juniors or seniors or graduate students in a land grant university program of study directly related to the strawberry industry, including but not limited to production, marketing, food science, etc. The Association plans to make its first award in spring 2010.

The first scholarship will be \$500 to one student; the number and/or amount of scholarships should grow as our scholarship fund grows. Applications are due May 1 this year, and March 1 in subsequent years.

The association invites all land grant universities to share this opportunity with potential scholarship

candidates. An application accompanies this letter. It is also posted at www.ncstrawberry.com/docs/NCSAScholarshipApplication.pdf or may be requested from the NC Strawberry Association office.

Paraquat: Not Just Gramoxone Anymore!

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NC State University, Clemson University
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Orchard and Vineyard Floor Management

Paraquat is a non-selective contact herbicide that has been around for a long time. I personally know of 30+ years and with the exception of the last few years it has been primarily marketed under the trade name "Gramoxone". Of course during this time there have been various formulations and renditions of the name like Gramoxone Max, Gramoxone Extra, and the current formulation Gramoxone Inteon.

The latest formulation, Gramoxone Inteon, is formulated as a 2 lb of active ingredient per gallon concentration of paraquat and in most fruit crops the use rate ranges from 2 to 4 pts per acre. Gramoxone Inteon was introduced to the market place several years ago as a formulation that is somewhat "safer" than previous formulations however the precautions and personal protective equipment requirements are the same as they have always been.

A few years ago generic paraquat formulations hit the market place. The first one I knew about in the Carolinas was Firestorm which is manufactured by Chemtura. Since then Parazone by MANA and Paraquat Concentrate by Solera have been marketed here as well. All three of these generic formulations contain 3 lb of active ingredient per gallon and use rate in fruit crops ranges from 1.3 to 2.7 pts per acre.

Growers often ask if one formulation or brand is better than another and it is my feeling that they are all very similar. A decision as to which product to purchase should be based upon two factors, price and product availability.

Commercial Fresh Blackberry Shipping Market Growth and Price Trends in the United States

By Thais De Carvalho, Graduate Research Assistant; Michael R. Thomsen, Associate Professor; and John R. Clark, University Professor; Univ. of Arkansas

The fresh blackberry market in the United States has changed significantly over the past two decades. In the early 1990s, the market was concentrated in pick-your-own and pre-picked blackberries, sold on the farm or at farmers' markets. Blackberries were rarely seen in supermarkets. Today, tens of millions of pounds of fresh blackberries move through commercial channels and blackberries are commonplace in retail produce departments. In this article, we document the growth in fresh blackberry shipments, characterize seasonal price patterns, and assess the overall price trend in the shipping market for fresh blackberries.

Our analysis is based largely on data provided by the USDA's Agricultural Marketing Service. These data are available online through the agency's website, <http://www.marketnews.usda.gov>. The USDA data are probably the best source of historic information on blackberries in the public domain. However, it should be noted that berries originating from the Southeastern United States are not reported in these data, nor are any berries included from non-shipping markets (on-farm sales, farmers markets, etc.). That said, an analysis based on USDA shipments data can still be valuable because market fundamentals that impact prices in late May to early August, when Southeastern blackberries hit the market, are being driven to a large extent by forces outside of the region. Moreover, Southeastern blackberries are moving through terminal markets where USDA does collect and report price information. Thus, the behavior of terminal market prices will reflect the growing importance of Southeastern berries as a source of supply to the market.

Since the 2000-2001 marketing year, blackberry shipments reported to the USDA increased 610 percent (see Fig. 1). Much of this growth reflects imported blackberries from Mexico. Mexico surpassed Guatemala as the largest exporter of blackberries to the US market in the late 1990's and Mexican shipments are now over 1,000% of their 2000-2001 levels. In fact, during the most recent 2008-2009 marketing year (Sept. 2008-Aug.

2009), Mexican berries accounted for 84% of all USDA reported fresh blackberry shipments.

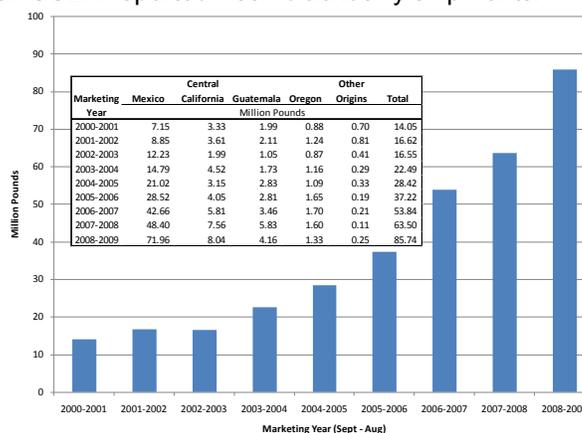


Figure 1: Blackberry shipments reported to USDA's Agricultural Marketing Service by marketing year. Total shipment volume is underreported as not all regions provide data to USDA. For example, blackberries originating in the Southeastern United States are not reflected in the totals above. Source: USDA Agricultural Marketing Service.

On balance, the presence of imported berries has been beneficial for domestic producers. Berries from Mexico supply the market during the off-season, when domestic berries are unavailable (Fig. 2). As shown in Fig. 2, domestic prices have generally risen as Mexican berries leave the market and domestic shipments begin. Furthermore, a year-round market presence has enabled blackberries to become a habitual purchase item for more and more consumers and this has probably been an important factor facilitating overall demand growth.

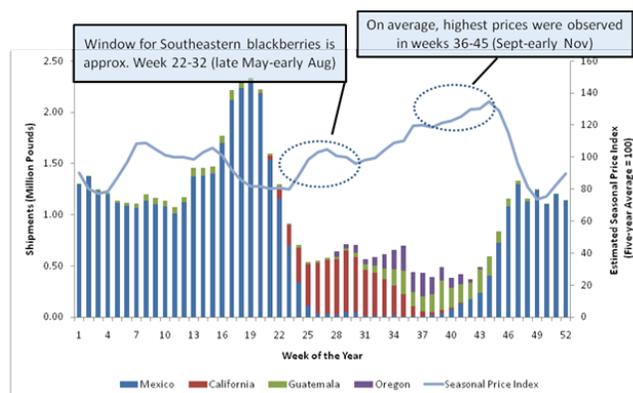


Figure 2: Five-year average shipments by week and average seasonal price index. Seasonal price index is based on terminal market prices from Atlanta, Boston, Detroit, Miami, New York, and Philadelphia. Blackberries of Southeastern origin appear most frequently in these six terminal markets. Source: USDA Agricultural Marketing Service.

While the USDA data do not show demand trends, it is possible to make some inferences about demand based on the behavior of prices over the past decade (Fig. 3). Blackberry prices exhibit a great deal of seasonality and fluctuate substantially throughout the marketing year. However, the overall trend in the long-run average price has been relatively flat. This is remarkable. Normally, supply growth of the magnitude shown earlier in Fig. 1 would put substantial downward pressure on prices. That the long-run average price pattern was not characterized by a strong downward trend indicates that demand has been growing along with the supply, and marketing efforts of the major shippers have been very effective. In fact, demand may have outpaced supply during most of the past decade. As an industry develops and grows, production and marketing costs tend to decline because efficiencies throughout the supply chain often come with increased volume and experience. Since these efficiencies put additional downward pressure on prices, the relatively flat price trend shown in Fig. 3 is even more noteworthy.

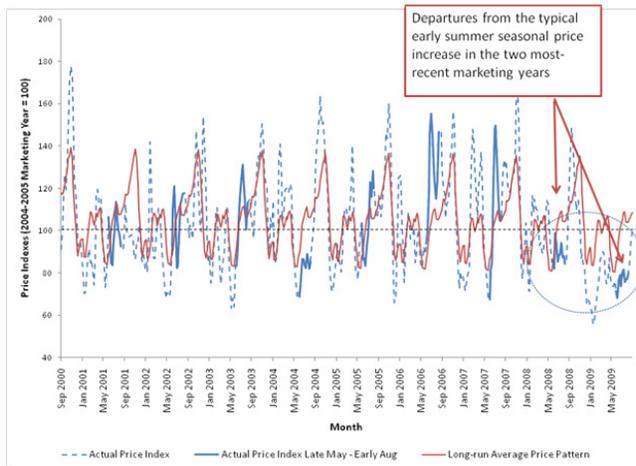


Figure 3: Blackberry price behavior over the past decade. Price indexes shown are computed from terminal market prices from Atlanta, Boston, Detroit, Miami, New York, and Philadelphia. Blackberries of Southeastern origin appear most frequently in these six terminal markets. Source: USDA Agricultural Marketing Service.

However, there are reasons to be concerned that the long-term price situation is worsening. First, actual prices were below the long-run average throughout the 2008-2009 marketing year. This may be due, in part, to general economy-wide malaise. Most consumers do not consider blackberries to be a necessity item and so prices may have softened as consumers sought to reign in grocery bills. Second, and more troubling, is that

the typical seasonal increase in price that normally begins in the early summer, at the onset of the domestic harvest season, was delayed well into August during both the 2007-08 and 2008-09 marketing seasons. There were quite a few more domestic blackberries hitting the market during these two most recent years. As shown in Fig. 1, the volume of California shipments nearly doubled from the 2005-2006 to the 2008-2009 marketing years. And, as mentioned earlier, the contribution of the Southeastern U.S. is not included in the volume shipments, but an increase in berries from this region is another factor that is placing downward pressure on prices during June and July. Correspondence between the authors and a major blackberry shipper indicates that Southeastern blackberries increased from roughly 200,000 flats (about 0.90 million pounds) in 2005 to 1.7 million flats in 2009 (about 7.65 million pounds). This dramatic increase in volume indicates that the Southeast has emerged as a major supply source. In fact, the Southeast is now comparable to California in terms of overall importance. Reported shipments from California totaled just over 8 million pounds in 2009 (Fig. 1). The demand that has developed for domestic berries in retail markets (from a once wild-harvested fruit) is very impressive as is the ability of shippers and marketers to move this huge production expansion. However, the changes to the typical seasonal price pattern coupled with the increases in domestic shipments from California and the Southeastern United States indicate that supply may finally be outpacing demand or at least causing the expected price pressures that usually result when supplies expand this rapidly.

It is hard to say whether the recent lower prices observed during the peak domestic harvest period are an anomaly or whether they represent a new market paradigm. However, the industry needs to be proactive. In particular, recent price behavior does emphasize the need for continued vigilance in efforts to facilitate demand growth through industry-wide programs that emphasize consistent quality and safety. Additional promotion efforts are needed that emphasize the convenience and health benefits of blackberries and thereby develop new demand. Prices have historically been highest during the late summer and early fall. Breeding programs are working to develop new varieties to address

this market opportunity. In particular, the University of Arkansas Fruit Breeding Program has been working to develop fall-fruiting (primocane) blackberries, which could expand production and supply in this high-priced season.

Bramble (Caneberry) Seasonal Checklist

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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>

SPRING

Plant growth and development

- √ Plants deacclimate quickly
- √ Bud differentiation (additional flowers formed)
- √ Bud break
- √ Flowering
- √ Primocane emergence

Pruning and trellising

- √ Finish pruning and make sure all canes are tied to the trellis before budbreak
- √ Rotate shift trellises to horizontal position before budbreak, rotate to upright position immediately after flowering

Weeds

- √ Weed growth can be very vigorous at the same time as the bramble crop peaks, don't let weeds get out of control
- √ Weed control is best done earlier in the season before harvest commences.
- √ Handweed perennial weeds in and around plots

Insect and disease scouting

The period of time in the spring when the plant is flowering is the most important season for chemical control of **insects** and diseases. Know what your pests are and how to control them. Check the Southern Regional Bramble integrated

Management Guide for recommendations.
www.smallfruits.org

Insects

- √ Raspberry crown borer burrows into cambium
- √ Stink bugs (white drupelets in summer)
- √ Rednecked cane borer adults (starting at bloom)
- √ Raspberry cane borer adults
- √ Thrips
- √ Tarnished plant bug
- √ Japanese beetle
- √ Raspberry fruit worm
- √ Midge
- √ Raspberry sawfly
- √ Blackberry psyllid
- √ Two spotted spider mites
- √ Aphids
- √ Whiteflies

Diseases

- √ Antracnose
- √ Botrytis (gray mold)
- √ Spur blight
- √ Cane blight
- √ Septoria leaf spot
- √ Leaf and cane rust
- √ Powdery mildew
- √ Viruses

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. Turn on once or twice a day from 10 am to 3 pm for short periods of time (approx. 15 minutes) until mid afternoon

Nutrient management

- √ Apply second half of nutrients if doing split application
- √ Take leaf samples after harvest and send to a clinic for nutrient analysis for recommendations for next year

Marketing and miscellaneous

- √ Service and clean coolers
- √ Make sure you have enough containers for fruit next season
- √ Prepare advertising and signage for your stand

- ✓ Contact buyers to finalize orders
- ✓ Hire pickers
- ✓ Prepare signage for field orientation, it is easier to tell pickers where to go if rows are numbered

Quarterly Strawberry Plasticulture Checklist

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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 Guide and the Southeast Regional Strawberry Plasticulture Production Guide at:

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

Spring (March-May)

- ✓ Send in leaf samples to testing lab every 14 days starting in late February/March
- ✓ Adjust fertility according to the recommendations
- ✓ Scout fields for mites, insects and diseases. Botrytis, anthracnose, powdery mildew, aphids, thrips, mites and clippers will be your primary pest problems at this time
- ✓ Remove old leaves and open plastic where any branch crowns might be growing underneath plastic
- ✓ Get pest problems under control with dormant, pre-bloom, pre-harvest and harvest sprays, customers don't like to see sprayers in the field when they are harvesting
- ✓ Make sure your irrigation systems for frost protection and drip are ready
- ✓ Monitor weather forecasts closely, frost protect as needed, start on a date that is typical for your area, any earlier may result deformed fruit and unnecessary loss of sleep
- ✓ Check your frost alarm to make sure that it is working properly
- ✓ Control weeds or ryegrass in aisles with herbicide if not done so already
- ✓ Apply straw mulch in aisles, if rye grass did not take

- ✓ Place 2 hives of honeybees/acre near your field
- ✓ Schedule picking and sales labor
- ✓ Order portable toilets and emphasize proper sanitation for farm labor and the public
- ✓ Get sales stand ready, tidy up, paint, make new signs, get new baskets...
- ✓ Check and organize supply inventory
- ✓ Clean out and fire-up refrigeration units
- ✓ Have scales checked by proper authorities in your state
- ✓ Harvest each plant 2x week (start early to mid April)
- ✓ Figure out a system to collect customer names etc for your mailing list
- ✓ Keep harvest records even when you are busy

Small Fruit News

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