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Developing Alternative Fruit Crops for Maryland Regional and Niche Markets

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## Contents

[Contents… i](#_TOC_250016)

[Executive Summary… ii](#_TOC_250015)

[List of Tables. iii](#_TOC_250014)

List of Figures. iv

[Introduction 1](#_TOC_250013)

[Crop Summaries. 1](#_TOC_250012)

Highbush Blueberries. 1

Trial 1. Southern and Northern Highbush Blueberries 1

[Trial 2. Northern Highbush Blueberries and Soil Amendments. 5](#_TOC_250011)

[Highbush Blueberry Conclusions and Impact Statement 6](#_TOC_250010)

[Beach Plums. 6](#_TOC_250009)

Beach Plum Conclusions and Impact Statement 8

[Wine and Table Grapes 8](#_TOC_250008)

[Trial 1. Trial of Standard Table Grapes Varieties Under Southern Maryland Conditions. 8](#_TOC_250007)

[Variety Comments: 9](#_TOC_250006)

[Trial 2. Trial of Standard Winegrape Varieties Under Southern Maryland Conditions. 10](#_TOC_250005)

[Trial 3. Trial of “Alternative” Winegrape Varieties Under Southern Maryland Conditions.](#_TOC_250004)

............................................................................................................................................... 11

[Trial 4. Trial of “Alternative” Winegrape Varieties Under Commercial Southwestern Maryland Conditions 13](#_TOC_250003)

[Trial 5. Trial of Muscadine Grapes Varieties Under Southern Maryland Conditions. 14](#_TOC_250002)

[Outreach: Publications and Presentations 14](#_TOC_250001)

[Appendices 18](#_TOC_250000)

## Executive Summary

Maryland agriculture is under pressure due to high development pressure on farmland. In addition, Southern Maryland is dealing with the agricultural transition of former tobacco farmers. The good news is that the long warm growing season and mild winters provides an excellent mesoclimate for many horticultural crops. It also is a major tourist destination in the summer, augmenting the agritourism draw. This combination of growing conditions and strong markets is prime for high value “alternative” crops that can be grown economically and marketed directly through the many farm markets, roadside stands, high-end restaurant trade, and specialty markets prevalent in the region. This grant supported research and demonstrations to determine if specific new, high value, alternative crops can be grown economically in Southern Maryland.

**Highbush Blueberries.** Blueberries are in very high demand and are commanding record market prices due to positive health claims. The challenges facing profitable production are soil pH, soil drainage, and ripening in excessive heat. The opportunity lies in the recent development of new varieties of southern highbush blueberries (SHB). The results of this research are very encouraging that SHB and some varieties of northern highbush as well as rabbiteye blueberries are commercially feasible for Southern Maryland. SHB plants are better adapted than NHB and the establishment, yield and flavor are specific to variety. The wide range of harvest dates is desirable for missing late freezes and staggering harvest periods. The SHB varieties are late but tolerated the heat and performed very well. Netting is necessary to avoid bird predation.

**Beach Plum.** The beach plum is a wild, native plum of the Northeastern United States that is commonly used for the making of jam and jelly. Interest in bringing beach plum into commercial production has necessitated seedling trials to select for plant form, pest resistance, and fresh and processing fruit quality. The beach plums seedlings thrive in multiple soil and climatic combinations. Site specific selections have been made for desirable characteristics, including plant habit, pest resistance, and fruit quality. Selections consistent with quality attributes over multiple years will be propagated.

**Table Grapes.** Recently many seedless table grape varieties have been developed that will withstand Eastern U.S. winters although they have not been tested in the heat of Southern Maryland. Vines established well and were precocious in fruiting. Most varieties were very susceptible to downy mildew. Cluster quality was variable depending on variety but individual berry quality was excellent. ‘Canadice,’ ‘Reliance,’ ‘Vanessa,’ ‘Himrod,’ and ‘Lakemont’ all had both desirable and undesirable characteristics and would have to be trialed in specific locations. ‘Concord Seedless’ would not be recommended for commercial planting.

**Winegrapes.** The maritime southern coastal region is warmer and receives greater precipitation; however the threat of winter injury is less than the Maryland piedmont where grapes are commonly grown. The climatic uniqueness of the region warrants evaluations of specific cultivars from areas of the world with comparable climates. The standard varieties varied greatly in performance under the heat conditions. Powdery and Downy mildew were persistent problems. Pinot Gris, Chardonnay, Traminette, Vidal Blanc, Petit Verdot, and Merlot performed well in the vineyard and produced good wines. Cabernet Franc and the Pinot Noir clones performed well in the vineyard but wine quality was sub-par. Syrah and Nebbiolo are not recommended. The preliminary results with “alternative” varieties such as Sauvignon Blanc, Chardonel, Negro Amaro, Petite Sirah, and Tanat were encouraging. Carmenere, Petit Manseng, Sangiovese, Touriga, and Vignoles need to be evaluated over a longer period. Cynthiana did not receive a fail test as it was constantly retarded because of the Sulfur needed to control powdery mildew on the majority of varieties in the trial.

## List of Tables

Table 1. Blueberry Variety Plot Plan for Planting at CMREC 3

Table 2. Harvest Parameters for Blueberry Variety Planting at CMREC in 2007. 4

Table 3. Harvest Parameters for Blueberry Variety Planting at CMREC in 2008. 4

Table 4. NHB Blueberry Plot Plan for Soil Amendment Planting at CMREC 5

Table 5. NHB Blueberry Soil Amendment Planting at CMREC 6

Table 6. Table Grapes Plot Plan for Planting at CMREC. 9

Table 7. Observations and Characteristics of Standard Winegrape Varieties at CMREC 11

Table 8. Backgrounds, Observations, and Charateristics of Young Grapevines at CMREC 12

## List of Figures

Appendix 1. CMREC Upper Marlboro Beach Plum Screening Trial – Plot Layout 18

Appendix 2. CMREC – UM Flowering Stage and Plant Height – May 5, 2005 19

Appendix 3. Beach Plums – CMREC, Upper Marlboro – Flower/Bud Break Stage 21

Appendix 4. Beach Plums – CMREC – Pictures of various selections, August, 2006 22

Appendix 5. LESREC Salisbury Beach Plum Development Stages 23

Appendix 6. Winegrapes – CMREC, Upper Marlboro, 2006 24

Appendix 7. Winegrapes – Summerseat Farm Vineyard, Lusby, MD 25

Appendix 8. Winegrapes 2006 Yields – Summerseat Vineyard, Lusby, MD 26

Appendix 9. Grape Root Borer and Squash Vine Borer Trap Counts 2006 – Summerseat 27

Appendix 10. Development Stage and Damage from April Frost 2007 – Summerseat 28

Appendix 11. Pictures of Muscadine Grape berries 2006 – Michaels Manor Vineyard. 29

## Introduction

Geographic position and proximity to the Nation’s capital have caused Maryland’s property values to become the fifth highest in the nation. This has increased development pressure on farmland, and each year Maryland loses 3 times more farmland to development than is preserved. In addition, Southern Maryland is currently dealing with the agricultural transition of more than 500 former tobacco farmers. The region also contains many tourist destinations in the summer, augmenting the agritourism draw. The good news is that the Southern Shore region provides excellent climates for many horticultural crops, with a long warm growing season and mild winters provided by the moderating effects of the Chesapeake Bay, rivers, and their many tributaries. This combination of growing conditions and strong markets is prime for introduction of high value “alternative” crops that can be grown economically and marketed directly through the many farm markets, roadside stands, high-end restaurant trade, and specialty markets prevalent in the region.

There are also exciting and profitable opportunities for fruit grown directly for the processing industry, with a rapidly growing wine industry in the state as well as processing plants such as McCutcheon’s in the area. Information presented in this repost from the R&D supported by this grant will provide growers with options for crops that can be grown, processed, and sold as value-added products that are of very high value. These high value crops offer the potential for high return on small acreage, and expanded farmland preservation programs.

This grant supported research and demonstrations to determine if specific new, high value, alternative crops can be grown economically and marketed either directly or processed, in Southern Maryland and other areas of the state. Fresh market fruit included southern high bush blueberries, eastern table grapes, and muscadine table grapes. Fruit tested for processing included winegrapes and beach plums. Because of the diversity and number of crops researched, background specifics, justification, variety choices, methods, results and conclusions will be addressed independently for each crop and location.

## Crop Summaries

**Highbush Blueberries Trial 1. Southern and Northern Highbush Blueberries**

**Introduction.** Blueberries are in very high demand and are commanding record market prices due to recent finding of high anti-oxidant level and general positive health claims. Many fruit growers in the region grow small fruit such as strawberries and brambles, so highbush blueberries would be a great addition to their market. U-Pick growers in the state do very well. However two major challenges face blueberry growers in Southern Maryland. First the well known traditional northern highbush blueberries (NHB) are native to the acidic, (low 4.7 pH) sandy, very-well drained soils in Southern New Jersey and present a major challenge on the upland soils. Secondly, NHBs are also not tolerant of excessive heat, which is commonly acknowledged characteristic of the Southern Maryland climate.

The opportunity lies in the recent development of new varieties of southern highbush blueberries (SHB). The southern highbush blueberry is a cross between the NHB (*Vaccinium corymbosum*) and the native southern species (*Vaccinium darwini*). The SHB is considered to have greater tolerance to high summer temperatures, if more widely adapted to upland (non-sandy) soils, has greater drought tolerance, and has earlier fruit production and superior fruit quality in warmer climates, therefore it is a prime candidate for Southern Maryland. Although the SHB is more cold sensitive than the NHB, the Southern Maryland’s moderate maritime climate will greatly reduce the risk of winter damage. Rabbiteye blueberry (*Vaccinium ashei*), the blueberry of the deep south was also included for relative performance. This demonstration compared the NHS, SHB, and Rabbiteye in Southern Maryland.

The following were some of the considerations for the specific variety choices among the NHB, SHB, and Rabbiteye.

* ***Bluecrop*** - Standard NHB variety; will serve as standard commercial variety for comparisons in study.
* ***Duke*** - Popular NHB variety; also useful as commercial standard for comparisons in study.
* ***Reveille*** *-* A good early HB with an upright canopy, and high vigor, which is important for our soils. Recommended by all major universities. Good winter hardiness and can be harvested by machine or by hand.
* ***Legacy*** *-* A NHB/SHB variety from New Jersey and Rutgers University that has southern parentage. Mid-season. High yields during a long harvest season. However, it tends to hold its leaves during the winter. Good flavor. For trial in milder sites in the Mid-Atlantic.
* ***O’Neal*** - Standard SHB. Expect some damage from late spring frosts due to the low chilling requirement. A good candidate to evaluate cold tolerance and importance of time of bud break.
* ***Jubilee*** - A new SHB release from Mississippi that has a later spring bud break, but still ripens early. Upright and productive bush.
* ***Ozarkblue*** - SHB hybrid with some NHB parentage; late harvest season.
* ***Santa Fe* -** A release from the University of Florida. Short chilling requirement of about 400 hours. Santa Fe is strong, vigorous and upright, with early-ripening, high-quality, fruit.
* ***Brightwell*** *-* Rabbiteye variety that performs well, produces good fruit, and provides for late season harvest.
* ***Premier*** - Rabbiteye variety, produces good quality fruit; also late season harvest extension.

**Materials and Methods**. A replicated variety trial was established in 2005 at the Central Maryland Research and Education Center (CMREC) in Upper Marlboro which included 10 commercial cultivars described above, with plots of 4 bushes, replicated 4 times (please see plot plan below), all planted with standard soil amendments (see below). SHB have strict soil amendment and pH requirements, so special attention was paid to ground preparation before planting of the blueberries. As stated previously, blueberries typically are difficult to establish on “upland soils” (high pH; high clay content) as they are native to very sandy, low pH soils.

The soil was initially amended by “standard practices” utilized for soils outside of the typical production area:

* + Raised beds (8 inches to a foot high and about 30 inches wide) were formed with disks.
  + A 2 foot diameter by 1.5 foot deep hole was dug with a tractor mounted auger.

Peat moss was measured out (2.5 gallons) in one half of a five gallon bucket and incorporated into the soil in the hole with the auger.

* + Sulfur was added to bring the soil pH down to 4.7.
  + The bare root bush was planted into the amended soil.
  + Spacing was “standard” 4 feet between bushes and 10 feet between rows.
  + Drip irrigation was installed on the bed.

## Table 1. Blueberry Variety Plot Plan for Planting at CMREC

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Plot 1 | Plot 2 | Plot 3 | Plot 4 | Plot 5 | Plot 6 | Plot 7 | Plot 8 | Plot 9 | Plot 10 | Plot 11 |
| Block 1 | Legacy | Reveille | BrtWell | O'Neal | OzarkBl | Duke | SantFe | Premeir | BluCrp |  |  |
| Block 2 | BrtWell | Legacy | SantFe | Reveille | BluCrp | Premeir | Duke | Jubilee | O'Neal | OzarkBl |  |
| Block 3 | Legacy | BluCrp | Jubilee | SantFe | Duke | Reveille | BrtWell | O'Neal | OzarkBl | Premeir | Jubilee\* |
| Block 4 | OzarkBl | O'Neal | Duke | Jubilee | BluCrp | Reveille | BrtWell | Premeir | Legacy | SantFe |  |

\*Because of the shape of the plot and the ground prep, the ‘Jubilee’ plot form block 1 was moved to block 3.

**Results.** The planting was in its third leaf in 2007 and had established very well. The first significant bloom was in 2007, and the fruit was allowed to develop. There was a significant cold snap from April 7th through 12th which brought very low temperatures to Maryland including the Southern region where the demonstration planting was located:

* + Minimum temperatures ranged from 24-28°F for multiple nights.
  + The cold destroyed the majority of the peach crop in the region.
  + The regular highbush varieties had not developed far enough to be affected, so the later bud break saved the crop.
  + The southern highbush and rabbiteye varieties lost terminal buds that were beyond T3 (the corollas are exposed), but lower buds that were not as far along survived.
    - It had been noted a couple of weeks earlier that some terminal buds on southern varieties had developed too early and had already been killed by frost.
    - In a personal correspondence with Dr. Mark Ehlenfeldt, the USDA Blueberry breeder at Chatsworth, NJ, he noted his plantings of southern cvs in NJ frequently loses terminal buds in late cold spells. However, the bushes still manage to produce a decent crop.
  + This is important information for future cultivar recommendations for the region.

Bird predation of “almost ripe” fruit started early and a significant amount of the fruit of the early varieties was lost before netting was applied. Therefore, only the cultivars listed in the following table were harvested.

* + Bird management, most likely netting of some sort, will be a necessity in the region.

## Table 2. Harvest Parameters for Blueberry Variety Planting at CMREC in 2007.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variety** | **Harvest**  **Date** | **% Ripe** | **Total Yield (lb.)** | **bushes** | **Avg. size (mm)** |  |
| Legacy | 13-Jul | 65% | 4.5 | 16 | 15 |  |
| Blue Crop | 13-Jul | 60% | 1.5 | 13 | 13.9 |  |
| Brightwell | 13-Jul | 45% | 14 | 15 | 14.1 |  |
| Ozark Blue | 13-Jul | 50% | 8 | 15 | 13.8 |  |
| Jubilee | 13-Jul | 85% | minimal |  | 11.7 |  |
| Reveille | 13-Jul | 85% | minimal |  | 9.6 |  |
|  |  |  |  |  |  |  |
| **Variety** | **Harvest**  **date** | **% Ripe** | **Total yield (lb)** | **bushes** | **Avg. size (mm)** | **Avg wt (g)** |
| Legacy | 25-Jul | 85-100 | 2 | 14 | 13.4 | 1.2 |
| Blue Crop | 25-Jul | 85-100 | minimal | 7 | 12.7 | 1 |
| Brightwell | 25-Jul | 60-80% | 10.5 | 14 | 13.2 | 1.1 |
| Ozark Blue | 26-Jul | 60-70% | 9 | 15 | 14.3 | 1.3 |
| Jubilee | 26-Jul | 90-100% | minimal | 12 | 8.5 |  |

Fruit was only harvested twice since the plot was not in full production and much was lost to birds. Totals above are for all of bushes of particular cultivar.

In the limited first harvest of 2007, fruit quality from all cultivars harvested was excellent and of high commercial value. Shelf life was very good of fruit grown and harvested in high heat.

Rabbiteye fruit quality was a very pleasant surprise compared to common northern highbush.

The second harvest of the replicated variety trial took place in 2008. Cropping levels ranged from full to minimal on some of the weaker growing varieties. Bird predation was very strong again so a complete over-head-netting system was constructed. There was a wide range of harvest dates, which will be desirable for missing late freezes and staggering harvest periods. The southern highbush varieties are very late but tolerated the heat and performed very well.

## Table 3. Harvest Parameters for Blueberry Variety Planting at CMREC in 2008.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variety** | **HarvEst**  **Date** | **Season** | **Total Yield** | **Bush Size** | **Berry size** | **Flavor/ comments** |
|  |  |  |  |  |  |  |
| Blue Crop | 11-Jun | 6 | 7 | 3 | 3 | 7 standard |
| Duke | 11-Jun | 3 conc | 6 | 5 | 8 | 6 standard |
| Reveille | 11-Jun | 5 | 4 | 5 | 5 | 6 spicy |
| Legacy | 11-Jun | 8 | 9 | 7 | 7 | 4 crunch |
| Ozark Blue | 11-Jun | 9 | 8 | 7 | 8 | 6/7 acid |
| Jubilee | 11-Jun | 5 conc | 5 | 6 | 4 | 6 crunch |
| O’Neal | 11-Jun | 6 | 4 | 5 | 6 | 5 weird |
| SantaFe | 11-Jun | 6 | 3 | 5 | 7 | 5/8 variable |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variety** | **HarvEst**  **Date** | **Season** | **Total Yield** | **Bush Size** | **Berry size** | **Flavor/ comments** |
| Premier | 11-Jun | 6 | 4 | 5 | 5 | 7 nice |
| Brightwell | 11-Jun | 10 | 5 | 8 | 5 | NR |

***Southern Highbush Blueberries.*** A small demonstration planting was established at D & S Farms. Soil was not amended rigorously at this site so establishment has been slow. Deer pressure was also significant. No fruit had been harvested by the time of this report.

## Trial 2. Northern Highbush Blueberries and Soil Amendments.

**Introduction.** As previously described, blueberries typically are difficult to establish on “upland soils” (higher pH; higher clay content) as they are native to very sandy low pH soils. A second demonstration was designed to determine the need and or benefit of soil amendments in the establishment and production of NHBs.

**Materials and Methods.** A second spilt-plot experiment (Treatments = soil amendment; sub- plot = variety; 4 replications/blocks; 3 bushes per rep; please see plot plan below) was established adjacent to the above experiment to compare performance of 2 commercial varieties on unamended upland soil vs. “standard” blueberry soil amendments (increased organic matter). The soil was initially amended by “standard practices” utilized for soils outside of the typical production area:

* Raised bed (8 inches to a foot high and about 30 inches wide) was formed with disks.
* A 2 foot diameter by 1.5 foot deep hole was dug with a tractor mounted auger.
* The non-amended bushes were planted directly into the augured soil
* For the amended treatment, peat moss was measured out (2.5 gallons) in one half of a five gallon bucket and incorporated into the soil in the hole with the auger.
* Sulfur was added to drop the ph to 4.7.
* The bare root bush was planted into amended soil.
* Drip irrigation was installed on the bed.

## Table 4. NHB Blueberry Plot Plan for Soil Amendment Planting at CMREC

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Block 1 | | | | Block 2 | | | |
| Duke | O'Neal | Duke | O'Neal | Duke | O'Neal | Duke | O'Neal |
| Amended | | Unamended | | Unamended | | Amended | |
| Block 3 | | | | Block 4 | | | |
| Duke | O'Neal | O'Neal | Duke | O'Neal | Duke | Duke | O'Neal |
| Unamended | | Amended | | Amended | | Unamended | |

**Results.** The planting was in its third leaf in 2007 and grew well.

* The first harvest was expected in 2007; however, the varieties planted were early varieties and were subject to the high bird predation therefore no yield data was collected.
* As of the third leaf there did not seem to be significant differences in the establishment and growth of the bushes on the amended soil versus no amendments.

## Table 5. NHB Blueberry Bush Size in Soil Amendment Planting at CMREC

|  |  |  |
| --- | --- | --- |
| Variety | Amend or not | Bush size (1 small – 10 large) |
| Duke | Yes | 4.4 |
|  | No | 4.2 |
| O’Neal | Yes | 4.6 |
|  | No | 4.5 |

## Highbush Blueberry Conclusions and Impact Statement:

The early harvest results of this research conducted are very encouraging that SHB and NHB as well as rabbiteye blueberries can be commercially feasible in Southern Maryland.

* Southern highbush plants seem to be better adapted than NHB
* Variety and flavor are specific to variety
* Plant vigor and cropping levels range from full to minimal on some of the weaker growing varieties.
* There was wide range of harvest dates which will be desirable for missing late freezes and staggering harvest periods.
* The southern highbush varieties are very late but tolerated the heat and performed very well.
* Bird predation is very strong and a netting system will be necessary.
* ‘Legacy’ shows good vigor and fruit size however fruit quality is average
* ‘Ozark Blue’ SHB shows good vigor and fruit size and fruit quality is average
* ‘Duke’ was the best overall NHB with good fruit size, flavor and concentrated ripening. However, the plant takes a bit longer to establish

## Beach Plums

**Introduction.** The beach plum (*Prunus maritima* Marsh.) is a wild, native plum of the Northeastern United States. It grows among the sand dunes on the coastal planes from Virginia to Nova Scotia. The fruit can be consumed fresh but is commonly used for the making of jam and jelly. These plums are native to the Eastern shore but have not been domesticated and grown commercially on upland soils. Interest in bringing beach plum into commercial production has necessitated small-scale seedling trials to select for plant form, pest resistance, and fresh and processing fruit quality. From bloom through fruit display, the plants also have high ornamental value***.*** The objective of this research is to determine the feasibly of growing beach plums and processing into high value jam and jelly products, marketing to the significant agritourism trade in the state. Seedlings were tested in diverse locations from the western mountains through the southern and eastern shores to make region specific selections.

**Materials and Methods.** The seedling trees utilized in this study were selected by a researcher from Cornell University and came from various areas from the Northeastern coast. Three unique seedling plantings were established at WMREC in Keedysville (western mountains), CMREC in Upper Marlboro (southern shore), and LESREC in Salisbury (lower eastern shore).

WMREC - Approximately 220 seedling trees were planted in May of 2003. CMREC - The planting contained fifty-one seedlings (see Appendix 1).

LESREC - The planting included fifty seedlings.

Since the objective was to find seedlings with superior traits, data collection focused on vegetative qualities (vigor, plant habit), pest resistance (leaf and fruit, disease and insect), and reproductive (fruit) qualities (crop amount, size, firmness, flavor, sugar/acid balance, astringency, and skin attributes). Cutting propagation of selected trees was attempted in 2006.

**Results.** The trees came into precocious fruiting in 2005, followed by full fruiting in 2006 and 2007 (see Appendices 2 and 3). The small trees were rated for vigor, plant habit, leaf disease, crop amount, fruit size, fruit disease, fruit firmness, and fruit quality attributes including type of flavor, sugar/acid balance, astringency, skin attributes. There was a great amount of variation for all of the attributes which will allow for directed selection according to function; please see attached photos in Appendix 4.

CMREC, upper Marlboro

* In 2006, initial selections were made of trees with fruit of desired quality, and trees of desirable plant habit and disease resistance at all 3 locations.
* There was one selection with golden fruit – this is very unusual as the great majority of known beach plums have reddish-purple fruit.
* There were a few selections which had very desirable low skin astringency, which will be important for fresh consumption as well as processing.
* The fruit from some of the selected trees was harvested and processed into jam which was highly received by informal taste panels at the regional education centers.
* The fruit from two selected trees was harvested and processed into wine which shows very good potential.
* Cutting propagation of selected trees was attempted in 2006. About 600 cuttings of 6 selections were stuck but only about 6 rooted and developed into established potted plants. Techniques were refined for 2007: about 800 cuttings were taken 4 weeks earlier (7/30/07), scarified, and dipped in IBA hormone before sticking, regretfully with similar results. Grafting may give better results.

WMREC, Keedysville

* The plantings at WMREC were suited with 3’ grow tubes that forced the growth up into more of a tree – like shape instead of allowing the plants to low branch and sucker. These plants had experienced severe deer grazing in the past year but a newly installed exclusion fence alleviated the problem and allowed the rapid growth. The Keedysville planting did not fruit in 2005, but made tremendous growth and fruited in 2006 and 2007. There was a great amount of variation for all of the attributes which will allow for directed selection according to function. Selections have been made for desirable characteristics and will be followed in subsequent years. Selections consistent with quality attributes over multiple years will be propagated.

LESREC, Salisbury

* The planting at LESREC in Salisbury did not fruit in 2005 but made good growth. These plants were slow to establish on the sandy soil without adequate irrigation during the drought year of 2005. Trees fruited in 2006 and 2007, and again there was a great amount of variation for all of the attributes which will allow for directed selection according to function under the specific shore conditions (see Appendix 5). Selections have been made for desirable characteristics and will be followed in subsequent years. Selections consistent with quality attributes over multiple years will be propagated.

Beach Plum Conclusions and Impact Statement:

* Beach plums seem to thrive in multiple soil and climatic combinations, not just the sandy coast soil to which they are native. Establishment may actually be easier and quicker on high clay content soil versus sand.
* Significant variation for desirable characteristics was observed, including plant structure (vigor, habit), pest resistance (leaf and fruit, disease and insect), and fresh and processed fruit qualities (crop amount, fruit size, firmness, flavor, sugar/acid balance, astringency, skin attributes).
* Site specific selections have been made at three diverse sites for desirable characteristics, including plant habit, pest resistance, and fruit quality.
* Selections consistent with quality attributes over multiple years will be propagated.
* Cutting propagation is very difficult; grafting may be the only option.

## Wine and Table Grapes

## Trial 1. Trial of Standard Table Grapes Varieties Under Southern Maryland Conditions.

**Introduction.** Over the past 40 years many seedless table grape varieties have been developed that will withstand Eastern U.S. winters. The author has conducted extensive variety and cultural trials while at Rutgers University, however, again, there are few areas of the world where grapes are grown with conditions like Southern Maryland, so specific variety trials and cultural practice studies are needed.

**Materials and Methods.** For the planting at CMREC in Upper Marlboro, six seedless table grape varieties were planted in the spring of 2005. The following is the list of varieties to be tested: Concord, Lakemont Seedless, Himrod Seedless, Candice Seedless, Reliance Seedless, and Vanessa Seedless. These vines were in a Randomized Complete Block design with 8’x6’ spacing with each variety replicated 4 times.

* Bare root vines were planted on April 7. Herbicides, including Gramoxone® and Devrinol®, were applied on May 3.
* Bamboo stakes and high cordon wire installed at 6’ in grape plots on May 27.
* Cordon selection began in mid-June.
* A standard winegrape fungicides and insecticide program was followed.
* The vines were trained to a high wire cordon training system – the Hudson River Bilateral Umbrella with two trunks, the traditional system for table grapes in the eastern U.S.

## Table 6. Table Grapes Plot Plan for Planting at CMREC.

Rep 1 Rep 2 Rep 3 Rep 4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Plot #-Variety | Plot #-Variety | Plot #-Variety | Plot #-Variety |
| Row 1 | 01- Lakemont | 07-Vanessa | 13-Concord | 19-Himrod |
| Row 2 | 02-Canadice | 08-Himrod | 14-Reliance | 20-Lakemont |
| Row 3 | 03-Concord | 09-Lakemont | 15-Vanessa | 21-Reliance |
| Row 4 | 04-Vanessa | 10-Reliance | 16-Canadice | 22-Concord |
| Row 5 | 05-Himrod | 11-Concord | 17-Lakemont | 23-Canadice |
| Row 6 | 06-Reliance | 12-Canadice | 18-Himrod | 24-Vanessa |

**Results.** Growth was exceptionally good in the establishment year, with the vines reaching the top cordon wire and partial cordon establishment during the growing season.

* Due to rapid establishment, a small precocious crop was allowed to set in 2006. Approximately 2/3 of set grape bunches were removed in July as over cropping could have significantly set back the development of the vines for future harvest.
* Fruit was harvested and evaluated by participants at the CMREC summer field day in early August. Cluster quality was acceptable, but individual berry quality was excellent.
* Most varieties are very susceptible to downy mildew.

## Variety Comments:

* **‘Concord Seedless’** clusters and berries are much smaller and the fruit matures earlier than seeded Concord. Our planting contained both seedless and seeded vines (nursery mistake but good for comparison). Though similar in flavor, the texture of the seedless is much different, and not particularly appealing to the researchers. Concord Seedless is prone to produce fully developed seeds and did on some cases in this plot. Productivity was erratic. It probably will not be recommended for commercial planting.
* **‘Canadice’** is one of the more winter hardy seedless grapes. It produced medium clusters with small red berries. The vines are productive and in the heat of the south fruit rot was a problem because the clusters are very compact. Berry quality was excellent.
* **‘Reliance’** produces large clusters of round, red, medium-sized berries. The skins are tender and the flesh is melting in texture, with a sweet “labrusca” flavor. Coloring was poor in hot conditions, and there was some fruit cracking from late rains.
* **‘Vanessa’** is a red dessert grape of excellent quality. The vines are only moderately vigorous, however grafting may be desirable to increase vine size. The seed remnants were large but soft and may be a cause for limited marketability depending on public acceptance. Berries are medium in size on medium clusters. Cluster fill was poor to average. Storage potential seemed good. The flavor was mild and fruity, and berry texture was firm. The fruit quality was among the best of the red seedless types.
* **‘Himrod’** was produced from a cross between Ontario and Thompson Seedless. It produced large bunches of white seedless grapes with excellent, honey like flavor and melting, juicy texture. The brittle rachis sometimes broke when handled, and the berries shelled in storage, which may limit commercial adaptation, depending on market type. The rachis is also subject to bunch stem necrosis, a disorder that causes a shriveling of the cluster stem, often just before harvest. The clusters are long and did not have a large enough number of berries to fill them out.
* **‘Lakemont’** was produced from the same cross as Himrod but has a milder flavor and more compact clusters of small to medium-sized berries. Cluster thinning was practiced to prevent over cropping. Bunch rot or late season rots were a problem after rains. Overall flavor was good. Cluster quality poor to medium

## Trial 2. Trial of Standard Winegrape Varieties Under Southern Maryland Conditions.

**Introduction.** Winegrape cultivar evaluations in Maryland have been performed only at Keedysville, in the mountains of Western Maryland. The maritime southern coastal region is warmer (day and night temperatures) and receives greater precipitation, although the threat of winter injury is less. The tobacco acreage in this region has decreased dramatically and grapes are one of the top alternative crops being considered. There are many new vineyards being established in the area and the climatic uniqueness of the region warrants specific cultivar evaluations.

**Materials and Methods.** A winegrape cultivar evaluation was established at CMREC in Upper Marlboro, Maryland, in spring, 2001.

* Cultivars and clones include: Cabernet Franc 3; Chardonnay clones 76, 96, 95, and Colmar; Merlot clones 1, 3, and 6; Nebbiolo 1; Petite Verdot 2; Pinot Noir clones 13, 15, and 19; Pinot Gris 146; Shiraz 7; Traminette; Vidal Blanc.
* The planting consists of eight four-vine plots (6x10 spacing).
* Each variety was trained to two different management systems, Vertical Shoot Positioned (VSP) and a divided canopy (Smart-Dyson).
* The design is a split-pot (2 training systems) with four reps (blocks) of each variety/training system combination (4 vine plots).
* Drip irrigation is available. Vines and vineyard were managed following commercially recommended practices.

**Results**. The plot carried over relatively well given heavy pest pressure from both 2004 and 2005. In this Southern Maryland vineyard in 2006, rainfall was below normal for July and August, but then above normal for September and October. This accelerated the harvest for the early varieties. In between the September rains there were no significant periods of dry weather for the vines and clusters to recover from the previous precipitation. Powdery mildew, especially on clusters, started early, probably due to high amounts of carryover inoculum. Downy mildew was also a persistent problem. Fruit set in 2006 was very good for most varieties; Traminette fruit set was less than desirable and the raccoons loved it when ripe!

Pinot Gris 146, the Pinot Noir clones, the Chardonnay clones, and Merlot were harvested with the “early” group. Pinot Gris and Pinot Noir were harvested on September 7th, and the Chardonnay clones, Merlot clones, and Traminette on September 11th. The Pinot Noir fruit would have benefited from an earlier harvest. Traminette could have used more time but the animal pests were beginning to take their toll. The late group, Syrah, Cabernet Franc, Nebbiolo, Petit Verdot and Vidal were next, harvested September 27, a week later than 2005 (see Appendix 6).

## Table 7. Observations and Characteristics of Standard Winegrape Varieties at CMREC

|  |  |  |  |
| --- | --- | --- | --- |
| **Variety** | **Growth** | **Fruit** | **Wine** |
| **Cabernet Franc 3** | Upright growth habit. | Late ripening | Soft; decent color; slightly herbaceous |
| **Chardonnay (Clones 76, 95, 96, Colmar)** | Moderate vigor; vines  get bushy in midsummer. | Susceptible to Powdery Mildew | Versatile; typical |
| **Merlot (clones 1, 3, 6)** | Vigorous growth; many lateral and basal shoots. | Heavy crop- requires thinning.  early ripening | Soft; good color; better than expected |
| **Nebbiolo 1** | Bushy and vigorous; vines must be cane-  pruned. | No clear fruit zone | Light; poor color; herbaceous |
| **Petit Verdot 2** | Upright growth habit; moderate vigor | Late ripening. | Soft; excellent color; adds body, spice and aroma |
| **Pinot Noir (Clones 13, 17, 19)** | Upright vertical shoots;  requires little thinning. | Early ripening | Red Burgundy |
| **Pinot Gris 146** | Requires little thinning. | Gray-colored  Fruit | Floral and citrus; better  than expected |
| **Shiraz/Syrah 7** | Vigorous and bushy vine growth; many lateral shoots | Some vines produce light crop | Soft; decent color; herbaceous |
| **Traminette** | Vigorous growth; large leaves; many laterals;  disease res. | Fruit zone needs frequent leaf  removal; birds | Very aromatic, Germanic style white |
| **Vidal Blanc** | Vigorous; good shoot density; well adapted to SD; disease resistant. | Very large clusters; birds | Very aromatic, Germanic style white |

## Trial 3. Trial of “Alternative” Winegrape Varieties Under Southern Maryland Conditions.

**Introduction.** The maritime southern coastal region is warmer (day and night temperatures) and receives greater precipitation; however the threat of winter injury is less. There are many new vineyards being established in the area and the climatic uniqueness of the region warrants specific cultivar evaluations. Since the very hot days and very warm nights of the southern shore are very distinct from established premium grape growing areas of the world, specific varieties were selected that have produced quality wine in production areas of the world with comparable climates. Standards are included for reference.

The above trial was established with the varieties most common to the Mid-Atlantic and commercial wine industry. However many of these varieties are not typically adapted to the very hot humid climate of Southern Maryland. The ten varieties were selected and imported from various areas of the world which have climates more comparable to Southern Maryland. These varieties have been shown to make high quality commercial wine in their respective regions, so,

although the variety name recognition may not be there, we anticipate good performance in our challenging climate.

**Materials and Methods.** An “alternative” winegrape cultivar evaluation was established at CMREC in Upper Marlboro, Maryland, in spring, 2005. Cultivars and clones include: Cynthiana, Carmenere, Chardonel, Negro Amaro, Petit Manseng, Petite Syrah, Sangiovese, Sauvignon Blanc, Tanat, Touriga, and Vignoles. See Table 8 below for variety origin and characteristics.

* The planting consists of four four-vine plots (10x6 spacing) which will be compared to four six-vine plots (10x4 spacing).
* All varieties were trained to Vertical Shoot Positioned (VSP).
* The design is a split-pot (2 vine densities) with four reps (blocks) of each variety/density combination (4 vine plots).
* Drip irrigation is available. Vines and vineyard were managed following commercially recommended practices.

**Results.** Nine of ten varieties planted in the spring of 2005 at CMREC in Upper Marlboro established well and scaffold structure was completed in 2006.

* ‘Norton’ vines were weak in establishment and are behind in development.
* Fruit set has been good to very good; crop was thinned on weaker vines or where the crop was too large for the young vines.
* Early performance has been very encouraging.

## Table 8. Backgrounds, Observations, and Characteristics of Young Grapevines at CMREC

|  |  |  |
| --- | --- | --- |
| **Variety** | **Growth** | **Background** |
| **Carmenere** | Vigorous, wild and tangled. | “6th” Bordeaux variety; now popular in South America |
| **Chardonel** | Heavy crop; good shoot density. | Chardonnay x Seyval hybrid;  best in hot environment |
| **Cynthiana** | Vigorous vine growth - little fruit; drought  sensitive; sensitive to sulfur and herbicides. | Native to VA; V. aestivalis;  disease resistant |
| **Negro Amaro** | Vigorous- excellent cordon establishment | Southern Italy; heat tolerant? |
| **Petit Manseng** | Good cordon establishment | Southern France; high acid - heat tolerant? |
| **Petite Sirah** | Good shoot spacing; early veraison and  much earlier ripening than expected. | Durif; hot CA variety |
| **Sangiovese** | Sensitive to frost?- no cordons established;  needs to be heavily crop thinned | ‘Chianti’ variety; tolerate heat? |
| **Sauvignon Blanc** | Good natural shoot density; very vigorous | White Bordeaux; hot CA, New Zealand variety |
| **Tanat** | Sensitive to frost - no cordons established | Southwest France |
| **Touriga** | Good cordon establishment | Portugal/Port variety |
| **Vignoles** | Heavy crop | French Hybrid; heat tolerant? Very aromatic |

## Trial 4. Trial of “Alternative” Winegrape Varieties Under Commercial Southwestern Maryland Conditions

**Introduction.** A small demonstration trial planting was established at a commercial Southern Maryland vineyard, Summerseat Farm Vineyards in Lusby, Maryland. Summerseat is a 501(c)

1. charitable organization, and Summerseat Farm, Inc. formed and purchased the farm in 2001. The original vineyard was planted in the early 1990’s by the farm’s previous owner with own- rooted Chambourcin, Foch, Vidal, and Villard Blanc, but was not effectively managed and became overgrown. Major renovation took place in 2003 and 2004 as part of this grant – participants rebuilt the trellis, removed some vines, replanted dead vines, and added 105 vinifera vines. Please see Appendix 7 for establishment data on new vines.

**Materials and Methods.** The 2003 planting conditions were less than optimal following a very wet winter which caused a high water table. Spring continued cool and wet followed by a dry summer.

* + No new vine made it to the cordon wire during the first year’s growth.
  + Significant amount of crown gall noted in the newly planted vines the following year.

**Results.** Due to slow establishment, only a small crop was allowed to set in 2005. In 2006, some of the vines were fully established and some were still behind (see Appendix 8). Some results and comments on the early establishment and yields are as follows:

* Sangiovese was the best as far as establishment and early yields.
* Malvasia Blanco also had good establishment and relatively early yields; quality is very promising.
* Nebbiolo requires cane pruning. Vigor is hard to manage.
* Malvasia Bianca and Dolcetto greatly benefit from cane pruning.
* Viognier vines have been very weak:
  + Low vigor and very low productivity.
* Shiraz had very low survival rate.
* Widespread crown gall due to planting conditions in 2003.
* Metal posts sink (up to 12 inches) under load in light sandy soils.
* Many of the late season fruit rots that are common in North Carolina and typically not in Western Maryland were noted to pose potential challenges.
* Many insects were observed, some typical of Maryland vineyards, some much less common: flea beetles, climbing cutworms, rose chaffers, grape cane girdlers, leaf hoppers, grape berry moths, Japanese beetles, Multi-colored Asian Lady Beetles, wasps, hornets, yellow jackets.
* Grape root borers were surveyed via pheromone traps in 2005. Pupae casings had been previously observed in the soil in late June.
  + Traps were set out in and monitored weekly.
  + Bore tracks were not yet found on roots of extracted vines.
  + See Appendix 9 for graph of data

Unseasonably cold early April 2007 weather allowed a great opportunity to monitor late frost tolerance of specific varieties (see Appendix 10). There were 5 nights below freezing (April 6 – 11), and several vines at or near bud burst. Three temperature data loggers were installed in the vineyard at 8” above ground, 40” at cordon height, and at 114”.

* Coldest temperatures were recorded on April 9th: 19.6°F @ 8”, 22.4°F @ 40”, 23.9°F @ 114”
* Duration of freezing temperatures was at least 10 hours each night (8th – 11th).
* There seem to be some varietal variation for tolerance.

## Trial 5. Trial of Muscadine Grapes Varieties Under Southern Maryland Conditions.

**Introduction.** The Muscadine or “Southern Grape,” *Vitis rotundifolia*, is grown widely from North Carolina to Florida. The fruit can be processed into juice and wine; however, there has been a surge of demand for fresh fruit, especially in the Washington, D.C. region (Barclay Poling, Personal Communication). Although they will only grow in the most protected sites in the region due to cold sensitivity, they may be able to fit into a very lucrative niche market.

These trials would be limited to the most protected sites in Southern Maryland.

***Muscadine grapevines are cold sensitive, and this project will test the feasibility of exploiting the relatively mild winter temperatures of far Southern shore Maryland.***

**Materials and Methods*.*** A small demonstration planting was established at Michaels Manor in Scotland, MD, near Point Lookout. This site may be the most “moderate” climate farm site in Maryland.

**Results.** Establishment and growth was very poor initially but great strides were made in 2006; a few fruit were allowed to set for evaluation of early fruit quality.

* Classic non-bunch habit of fruiting was noted
* Berries were very resistant to disease and birds.
* The skins are tough and thick.
* Fruit tastes like concord.
* See Appendix 11 for pictures of fruit

## Outreach: Publications and Presentations:

**Presentations:**

Fiola, J.A. 2005. Traditional and Alternative Variety Considerations for the Mid-Atlantic. Annual New Jersey Vegetable Growers Meeting – Grape Session. Atlantic City, New Jersey. 70 participants. (With Proceedings of the Annual New Jersey Vegetable Growers Meeting). (Invited)

The Potential for Vineyards and Wineries in Southern Maryland. Presentation to St Mary’s County Council and Marketing Committee. Leonardtown, Maryland. February 17, 2005.

Fiola, J.A. 2005. Traditional and Alternative Varieties for Southern Maryland. Maryland Grape Growers Association – SoMD Chapter Meeting. St Mary’s County, Maryland. February 23, 2005. 18 participants. (Invited)

Fiola, J.A. 2005. UMD Research Program in Viticulture and Enology. Maryland Grape Growers Association Annual Meeting*.* Howard County, Maryland. March 2005. 82 participants from 4 surrounding states.

Fiola, J.A. 2005. Alternative Varieties and Marketing. Wineries Unlimited Annual Meeting.

Lancaster, Pennsylvania. March 2005. 120 participants. (Invited)

Beginners’ Grape Growing Workshop. Regional Cooperative program with Virginia Tech and Penn State.

Lancaster, PA. March 2005. 120 participants from 5 surrounding states. Winchester, VA. November 2005. 60 participants from 5 surrounding states.

Fiola, J.A. 2005. Alternative Varieties for Maryland. Maryland Grape Growers Association Annual Summer Field Day. Union Mills, Maryland. June 2005. 42 participants. (Invited)

“Timely Viticulture” Regional Summer Twilight Meetings.

Jubilee Farms and Vineyard, Leonardtown, Maryland. June 2005. Shelton Vineyard, Freedom, Maryland. June 2005.

Fruit and Vegetable In-Service Training and Tour. Upper Marlboro, Largo, Maryland. August 18, 2005. 24 participants.

Experimental Vineyard Variety and Pest Management Update Southern Highbush Blueberries for Southern Maryland

Beach Plums – An Alternative Crop for Southern Maryland

Annual Summer Regional Twilight Commercial Fruit Tour. Upper Marlboro, Largo, Maryland. August 2005. 60 participants.

Wine and Table Grape Variety and Pest Management Update.

Alternative Crops Research for the SoMD region: Southern Highbush Blueberries and Beach Plums.

Fiola, J.A. 2005. The UMD Viticulture, Enology, and Alternative Fruit Program. Rural Heritage Day/WyeREC Open House. Centerville, Maryland. September 2005.

Fiola, J.A. 2005. The University of Maryland Viticulture Enology and Alternative Fruit Research and Extension Program. Invited poster presentation at “The Land Grant Mission: Relevant or Relic?” A symposium to kick off the University of Maryland’s 150th Anniversary. October 22, 2005.

Fiola, J.A. 2005. The Basics of Wine and Table Grape Growing. Annual Mid-Atlantic Crop Management School for MD/DE Certified Crop Advisors and Extension Educators. Ocean City, Maryland. November 2005. 80+ participants. (Invited)

Fiola, J.A. 2006. Traditional and Alternative Variety Considerations for the Mid-Atlantic. Annual New Jersey Vegetable Growers Meeting – Grape Session. Atlantic City, New Jersey. 45 participants. (With Proceedings of the Annual New Jersey Vegetable Growers Meeting).

Fiola, J.A. 2006. The University of Maryland Viticulture and Enology Program. University of Maryland Department of Entomology Professional Seminar Series. College Park, Maryland.

*Beginners’ Grape Growing Workshop.* Regional Cooperative program with Virginia Tech and Penn State (M. Chien, T. Wolf, and J.A. Fiola).

Lancaster, Pennsylvania. March 2006. 40+ annual participants from 5 surrounding states. Washington County, Maryland. October 2006. 35+ participants from 4 surrounding states. Southern Maryland. October 2006. 80+ annual participants from 5 surrounding counties.

Fiola, J.A. 2006. Site Selection and Matching Varieties for Southern Maryland. MGGA Southern Maryland Chapter Meeting. Leonardtown, Maryland. 26 participants.

Fiola J.A. 2006. Small Fruit Culture and Disease Management Update. Annual Regional Spring Twilight Fruit Meeting. Catoctin Mountain Orchards, Catoctin, Maryland.

Fiola J.A. 2006. Small Fruit Culture and Disease Management Update. Annual Regional Spring Twilight Fruit Meeting. Barr Orchards, Cavetown, Maryland.

“Timely Viticulture” Regional Summer Twilight Meetings.

Jubilee Farms and Vineyard, Leonardtown, Maryland. June 2006. Shelton Vineyard, Freedom, Maryland. June 2006.

Fiola, J.A. 2006. Current issues in Canopy and Pest Management. Maryland Grape Growers Association Annual Summer Field Day. Upper Marlboro, Maryland. June 2006. 48 participants.

Fiola, J.A. 2006. Wine and Table Grape Variety and Pest Management Update *and* Alternative Crops Research for the SoMD region: Southern Highbush Blueberries and Beach Plums.

Annual Summer Regional Twilight Commercial Fruit Tour. Upper Marlboro, Largo, Maryland. August 2006. 60 participants.

Fiola, J.A. 2006. The UMD Viticulture, Enology, and Small Fruit Program. WMREC Open- House. Keedysville, Maryland.

Fiola, J.A. 2006. The Basics of Wine and Table Grape Production. Annual Mid-Atlantic Crop Management School for MD/DE Certified Crop Advisors and Extension Educators. Ocean City, Maryland. November 2006. 80+ participants. (Invited)

Fiola, J.A. 2007. The University of Maryland Viticulture and Enology Program. University of Maryland Department of Plant Science Professional Seminar Series. College Park, Maryland.

*Beginners’ Grape Growing Workshop.* Regional program with MCE faulty.

Salisbury Maryland. February 2007. 80+ annual participants from 5 surrounding counties.

Fiola J.A. 2007. Small Fruit Culture and Disease Management Update. Annual Regional Spring Twilight Fruit Meeting. Reinhart Orchards, Smithburg, Maryland.

Fiola, J.A. 2007. Site Selection and Matching Varieties for Southern Maryland. MGGA Annual Summer Filed Day. Lusby, Maryland. 45 participants.

“Timely Viticulture” Regional Summer Twilight Meetings.

Shelton Vineyard, Freedom, Maryland. June 2007. 23 participants.

Fiola, J.A. 2007. Wine and Table Grape Variety and Pest Management Update *and* Alternative Crops Research for the SoMD region: Southern Highbush Blueberries and Beach Plums.

Annual Summer Regional Twilight Commercial Fruit Tour. Upper Marlboro, Largo, Maryland. August 2007. 90 participants.

## Publications:

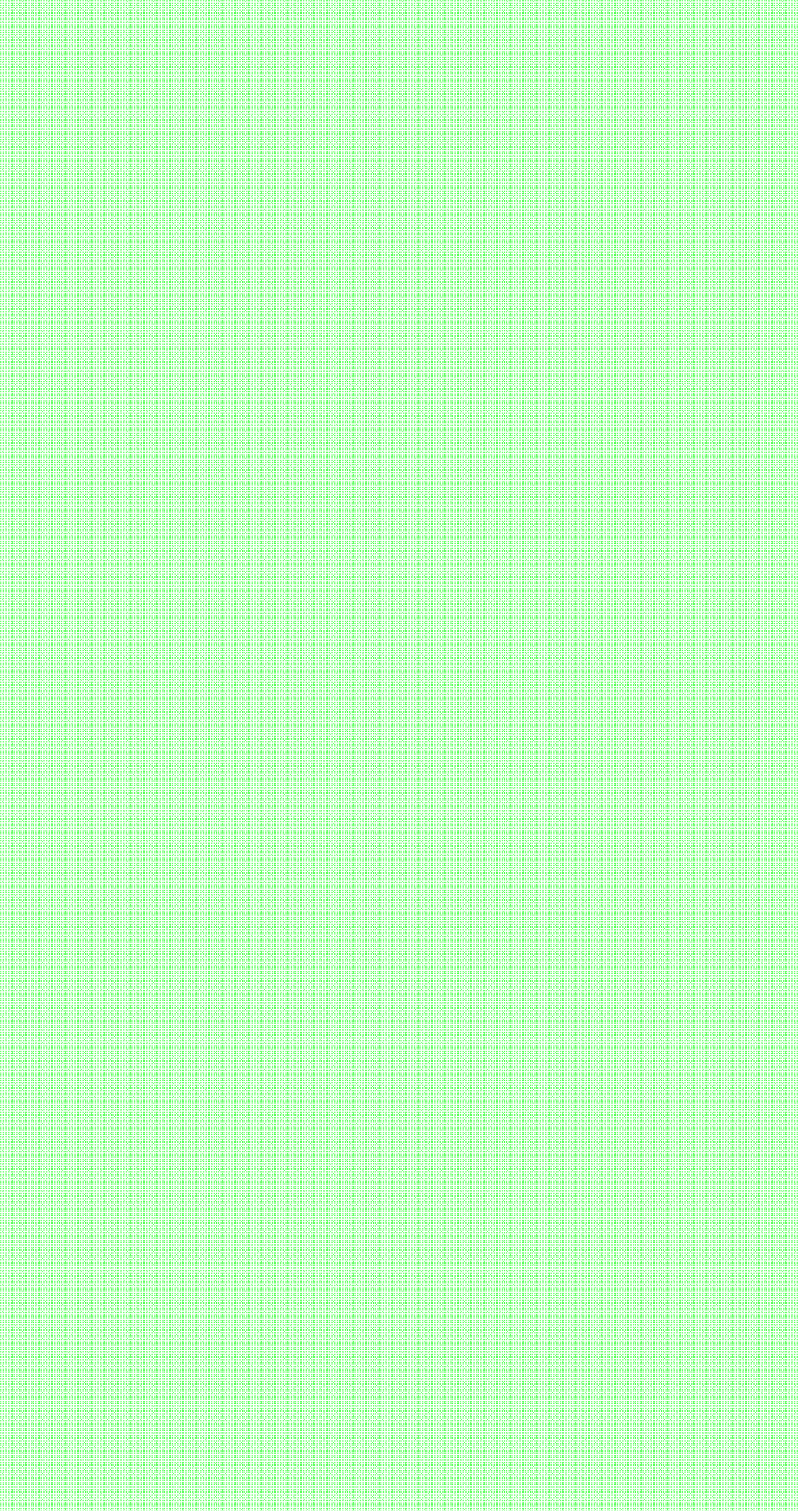
Demchak, K., J.A. Fiola, A.D. Bratsch, A. Biggs, and G.C. Pavlis. - 2008. Mid-Atlantic Berry Guide for Commercial Growers. 205 pp. (Note – this is a partial list of authors of this publication.)

## Appendices

**Appendix 1. CMREC Upper Marlboro Beach Plum Screening Trial - Plot Layout**

60 ft.

225 ft.



Row A 1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

Row B 1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

Row C 1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

Blueberries

Orchard-Woods

## Appendix 2. CMREC – UM Flowering Stage and Plant Height - May 5, 2005

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Plant Number*** | ***Plant Size/Height*** | ***Flowering Stage*** | ***Portion of plant with***  ***flowers*** | ***Comments*** |
| **Row A** |  |  |  |  |
| 1A | 6inches | Partial Bloom | -¼ Plant | Weak |
| 2A | 2’ | Full Bloom | W. Plant |  |
| 3A | 3’ | Partial Bloom | ¼ Plant |  |
| 4A | 4’ | Full Bloom | ½ Plant |  |
| 5A | 4’ | Full Bloom | ⅓ Plant |  |
| 6A | 2’ | Bud Break | ¼ Plant | Late |
| 7A | 5’ | Full Bloom | Whole Plant | Nice |
| 8A | 3’ | Full Bloom | Whole Plant |  |
| 9A | 3.5’ | Full Bloom | ⅓ Plant |  |
| 10A | 2’ | Full Bloom | Whole Plant | Small |
| 11A | 3’ | Early Bloom | ½ Plant |  |
| 12A | 2’ | Early Bloom | ½ Plant |  |
| 13A | 3’ | Full Bloom | Whole Plant |  |
| 14A | 3’ | Full Bloom | ¼ Plant |  |
| 15A | 2’ | Partial Bloom | ¼ Plant |  |
| 16A | 2’ | Partial Bloom | ¼ Plant |  |
|  | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Plant Number*** | ***Plant Size/Height*** | ***Flowering Stage*** | ***Portion of***  ***plant with flowers*** | ***Comments*** |
| **Row B** |  |  |  |  |
| 1B |  | Full Bloom | ⅔ Plant | Early |
| 2B | 4’ | P. Bloom |  |  |
| 3B | 4’ | Full Bloom |  |  |
| 4B | 5’ | Full Bloom |  |  |
| 5B | 3’ | P. Bloom | ⅛ Plant |  |
| 6B | 5’ | Bud Break | No Blooms | Very Late |
| 7B | 4’ | Bloom | ⅓ Plant |  |
| 8B | 3’ | Bloom | ½ Plant |  |
| 9B | 2’ | Bloom | ½ Plant |  |
| 10B | 4’ | Bloom | ½ Plant |  |
| 11B | 5’ | Full Bloom | Whole Plant | Very Nice |
| 12B | Dead | - | - | - |
| 13B | 3’ | No Bloom | - | Very Late |
| 14B | 3.5’ | Early Bloom | ¼ Plant | Late |
| 15B | 3’ | Bud Break | - | Late |
| 16B | 3’ | Full Bloom |  |  |
| 17B | 2’ | Bloom | ⅓ Plant |  |
| 18B | 4’ | Bloom  19 | ½ Plant |  |

**Appendix 2, cont.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Plant Number*** | ***Plant Size/Height*** | ***Flowering Stage*** | ***Portion of plant with***  ***flowers*** | ***Comments*** |
| **Row C** |  |  |  |  |
| 1C | 4’ | Full-Post Bloom | Whole Plant | Early |
| 2C | 4.5’ | Full Bloom | Whole Plant | Early |
| 3C | 6’ | Full Bloom | Whole Plant | Upright, Nice |
| 4C | 3’ | Full Bloom | Whole Plant | Nice |
| 5C | 6’ | Full Bloom | Whole Plant | Nice |
| 6C | 3’ | Full Bloom | Whole Plant |  |
| 7C | 2’ | Partial Bloom | ⅛ Plant |  |
| 8C | 3’ | Partial Bloom | ½ Plant | Early |
| 9C | 2’ | Full Bloom | ⅛ Plant |  |
| 10C | 4’ | Early Bloom | ⅛ Plant | Late |
| 11C | 2’ | Bud Swell |  | Very Late |
| 12C | 1’ | Bloom | ⅛ Plant | Suckering@Base |
| 13C | 4’ | Full Bloom | Whole Plant | Nice |
| 14C | 3’ | Full Bloom | ⅓ Plant |  |
| 15C | 3’ | Full Bloom |  |  |
| 16C | 3’ | Partial Bloom | ⅛ Plant | Few blooms |
| 17C | 3’ | Early Bloom |  | Late |

**Appendix 3. Beach Plums – CMREC, Upper Marlboro - Flower/Bud Break Stage April 10 and 17, 2006**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Plant Number*** | ***Flowering Stage 4/10/06*** | ***Flowering Stage 4/17/06*** | ***Flowering Stage 4/10/06*** | ***Flowering Stage April 17*** | ***Flowering Stage 4/10/06*** | ***Flowering Stage- 4/17/06*** |
|  | **Row A** | | **Row B** | | **Row C** | |
| 1 | 0 | 0 | 0 | 2 | 2 | 3 |
| 2 | 2 | 3 | 2 | 3 | 2 | 4 |
| 3 | 2 | 3 | 2 | 3 | 2 | 4 |
| 4 | 2 | 5 | 2 | 4 | 2 | 5 |
| 5 | 1 | 1 | 2 | 3 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0 | 1 | 1 |
| 7 | 0 | 1 | 1 | 1 | 2 | 4 |
| 8 | 1 | 0 | 1 | 0 | 2 | 4 |
| 9 | 0 | 1 | 1 | 1 | 2 | 4 |
| 10 | 2 | 2 | 1 | 1 | 2 | 4 |
| 11 | 2 | 2 | Na | -- | 1 | 3 |
| 12 | 1 | 1 | 2 | 4 | 1 | 1 |
| 13 | 2 | 2 | 1 | 2 | 2 | 3 |
| 14 | 2 | 3 | 1 | 1 | 2 | 4 |
| 15 | 1 | 2 | 0 | 0 | 2 | 5 |
| 16 | 0 | 0 | 1 | 1 | 1 | 2 |
| 17 |  |  | 1 | 2 | Na | -- |

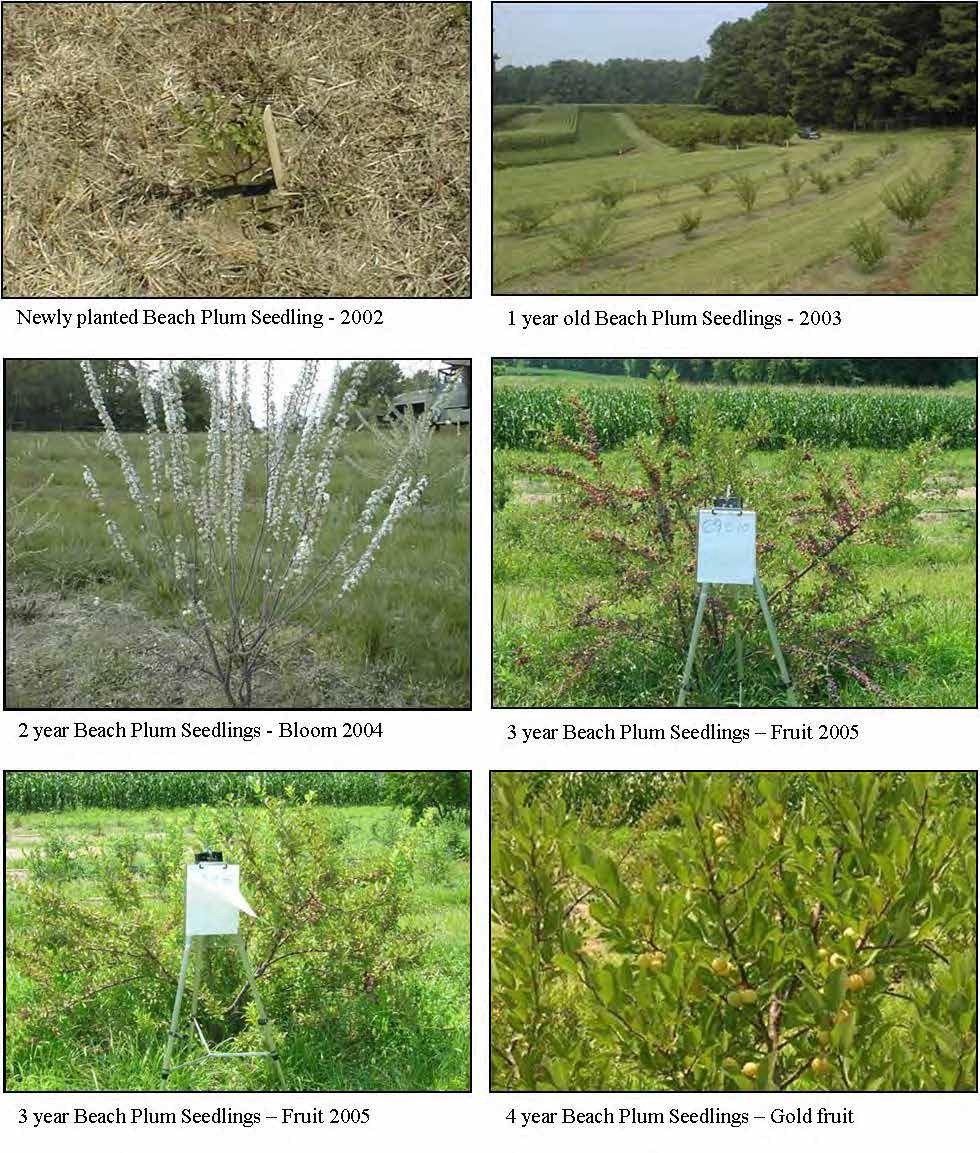
0=Dormant 1=Bud Swell

2=Flower beginning to open on some 25% of buds 3=Flowering of 50% of buds

4=Partial Bloom, Flowering on more than 50% of plant 5=Full Flower over entire plant

Na – Plant died

## Appendix 4. Beach Plums – CMREC, Upper Marlboro - Pictures of various selections, August 2006



**Appendix 5 – LESREC Salisbury Beach Plum Development Stages**

**4/13**

**Row Plant Budstage fruit development - 5/21 Fruit Development - 7/23**

1 1 tight no crop, plant only had about 40% leaves low crop, 50% ripe

1 2 breaking small pea moderate crop, 20% ripe

1 3 early break small pea moderate crop, 20% ripe

1 4 breaking pinhead w/ blossoms still attached moderate crop, 50% ripe

1 5 early break small pea moderate crop 80% ripe

1 6 breaking small pea moderate crop 80% ripe

1 7 tight pinhead w/ blossoms still attached low crop, all green

1 8 tight pinhead w/ blossoms still attached but w/ fewer crop low crop, 10% ripe

1. 9 tight pinhead w/ blossoms still attached low crop, all green
2. 1 tight pinhead w/ blossoms still attached moderate crop, 20% ripe mixed - some small pea, some pinheads w/ blossoms

2 2 breaking attached moderate crop, 50% ripe

2 3 breaking only about 1% crop very low crop, 50% ripe

2 4 breaking only about 1% crop very low crop, 10% ripe

2 5 tight pinhead w/ blossoms still attached moderate crop, 10% ripe mixed - some small pea, some pinheads w/ blossoms

2 6 early break attached no crop

2 7 breaking small pea high crop, 80% ripe

2 8 tight pinhead w/ blossoms still attached moderate crop, 10% ripe

1. 9 breaking pinhead w/ blossoms still attached low crop, 10% ripe
2. 1 breaking small pea, few fruit moderate crop 80% ripe

3 2 tight small pea, few fruit low crop, 20% ripe

3 3 NO PLANT No plant no plant

3 4 tight pinhead w/ blossoms still attached moderate crop, 10% ripe

3 5 tight small pea, few fruit low crop, 20% ripe

3 6 early break pinhead w/ blossoms still attached low crop, all green

3 7 tight blossoms, no fruit devt. no crop

3 8 tight no fruit, no blossoms no crop

1. 9 breaking small pea moderate crop 40% ripe
2. 1 breaking pinhead w/ blossoms still attached moderate crop, 50% ripe

4 2 breaking small pea high crop, 80% ripe

4 3 breaking fruit between small pea and pinhead- a lot of fruit! high crop, 80% ripe

4 4 breaking small pea no crop

4 5 breaking small pea moderate crop, 20% ripe

4 6 tight small pea, few fruit very low crop, 20% ripe

4 7 breaking pinhead w/ blossoms still attached moderate crop, all green

4 8 tight pinhead w/ blossoms still attached moderate crop, 20% ripe

1. 9 tight pinhead w/ blossoms still attached low crop, 30% ripe
2. 1 tight only about 1% crop no crop

5 2 tight no crop no crop

5 3 early break pinhead w/ blossoms still attached moderate crop, all green

5 4 breaking small pea high crop, 80% ripe

5 5 tight pinhead w/ blossoms still attached, few fruit low crop, 10% ripe

5 6 breaking small pea moderate crop, 50% ripe

5 7 tight pinhead w/ blossoms still attached very low crop, all green

5 8 tight pinhead w/ blossoms still attached low crop, all green

5 9 breaking small pea, but 50% less crop low crop, 10% ripe

## Appendix 6. Winegrapes – CMREC, Upper Marlboro, 2006

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Yield (kg/v)** | | | | | |
| **Variety/Clone** | **Harvest Date** | **Smart Dyson** | | | **VSP** | | |
| **2006** | **Total** | **Marketable** | **Diseased** | **Total** | **Marketable** | **Diseased** |
| Pinot Gris 146 | 9/7 | 3.7 | 3.7 | 0 | 2.6 | 2.6 | 0 |
| Pinot Noir 13 | 9/7 | 3.1 | 3.14 | 0 | 1.8 | 1.74 | .11 |
| Pinot Noir 15 | 9/7 | 2.1 | 2.16 | 0 | 2.1 | 2.14 | 0 |
| Pinot Noir 19 | 9/7 | 2.9 | 2.11 | .83 | 1.8 | 1.15 | .66 |
| Chardonnay 76 | 9/11 | 4 | 3.06 | .95 | 1.9 | 1.47 | .4 |
| Chardonnay 95 | 9/11 | 2.8 | 1.59 | 1.22 | 2.2 | 1.59 | .61 |
| Chardonnay 96 | 9/11 | 3.5 | 2.82 | .72 | 1.8 | 1.38 | .42 |
| Chard Colmar | 9/11 | 3 | 2.02 | .98 | 2.6 | 1.87 | .70 |
| Merlot 1 | 9/11 | 4.9 | 4.74 | 2.04 | 3.5 | 2.87 | .62 |
| Merlot 3 | 9/11 | 4.7 | 4.60 | .07 | 2.6 | 2.57 | .03 |
| Merlot 6 | 9/11 | 4.8 | 4.45 | .40 | 2.7 | 2.35 | .45 |
| Traminette | 9/11 | 4.1 | 4.08 | 0 | 3.5 | 3.52 | 0 |
| Vidal Blanc | 9/27 | 5.5 | 4.92 | .62 | 4.5 | 3.93 | .60 |
| Cab Franc 3 | 9/27 | 2.6 | 1.70 | .91 | 3 | 1.97 | 1.10 |
| Nebbiolo 1 | 9/27 | 4 | 3.92 | .96 | 2.9 | 1.99 | .91 |
| Petite Verdot 2 | 9/27 | 2.2 | 1.42 | .79 | 2.1 | 1.35 | .85 |
| Shiraz/Syrah 7 | 9/27 | .9 | .57 | .28 | .6 | .42 | .17 |

**Appendix 7. Winegrapes – Summerseat Farm Vineyard, Lusby, MD**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variety | Clone | Rootstock | Year  Planted | Current  Quantity | Original  Quantity | Vine  Loss | %  Loss |
| Foch | - | own | ~1994 | 32 | 48 | 0 | 0% |
| Vidal | - | own\* | ~1994 | 51 | 51 | 0 | 0% |
| Chambourcin | - | own\* | ~1994 | 33 | 33 | 0 | 0% |
| Norton | - | own | 2007 | 16 | 16 | - | - |
| Barbera | 1 | 101-14 | 2003 | 6 | 8 | 2 | 25% |
| Cabernet Franc | 312 | 3309 | 2007 | 8 | 8 | - | - |
| Malvasia Bianca | 2 | 3390 | 2003 | 6 | 8 | 2 | 25% |
| Dolcetto | 2 | RipGlo | 2003 | 8 | 8 | 0 | 0% |
| Nebbiola | 1 | 101-14 | 2003 | 12 | 13 | 1 | 8% |
| Petite Sirah | 3 | 3309 | 2003 | 11 | 12 | 1 | 8% |
| Petite Verdot | 2 | 3390 | 2003 | 4 | 8 | 4 | 50% |
| Sangiovese | 2 | 3309 | 2003 | 7 | 8 | 1 | 13% |
| Sangiovese | vcr6 | 101-14 | 2003 | 7 | 8 | 1 | 13% |
| Sangiovese | ? | ? | 2004 | 4 | 4 | 0 | 0% |
| Shiraz | 1 | 3309 | 2003 | 0\*\* | 8 | 5 | 63% |
| Shiraz | 174 | 101-14 | 2003 | 0\*\* | 8 | 5 | 63% |
| Vignoles | n/a | 101-14 | 2007 | 8 | 8 | - | - |
| Viognier | 1 | 101-14 | 2003 | 7 | 8 | 4 | 50% |
| Viognier | ? | 3309 | 2003 | 5 | 8 | 1 | 13% |

\* replanted vines on 3309 rootstock

\*\* removed in 2007

**Appendix 8. Winegrape 2006 Yields – Summerseat Vineyard, Lusby, MD**

**Vinifera Summary**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variety | Harvest Date | Harvest Weight  (Lbs) | Lbs per  Vine | Est. Ton  per Acre | Brix % | TA (g/L) | pH |
| Malvasia Bianca | 8/27/06 | 32.1 | 4.59 | 1.25 | 21.0 | 0.645 | 3.38 |
| Viognier (all) | 8/27/06 | 7.5 | 0.83 | 0.23 | 22.3 | 0.675 | 3.50 |
| Dolcetto | no harvest | - | - |  | - | - | - |
| Shiraz - 1 | 9/23/06 | 7.1 | 2.38 | 0.65 | 20.4 | 0.615 | 3.52 |
| Shiraz - 174 | 9/23/06 | 4.6 | 1.54 | 0.42 | " | " | " |
| Sangiovese - 2 | 10/4/06 | 51.4 | 7.34 | 2.00 | 22.1 | 0.630 | 3.49 |
| Sangiovese - unk. | 10/4/06 | 2.1 | 0.53 | 0.14 | - | - | - |
| Sangiovese - VCR6 | 10/4/06 | 59.4 | 8.48 | 2.31 | 23.1 | 0.645 | 3.68 |
| Petite Sirah - 3 | 10/11/06 | 1.6 | 0.15 | 0.04 | 22.1 | 0.660 | 3.38 |
| Barbara - 1 | 10/16/06 | 1.0 | 0.14 | 0.04 | 23.5 | 0.915 | 3.38 |
| Petite Verdot - 2 | 10/16/06 | 0.2 | 0.08 | 0.02 | 23.6 | 0.885 | 3.35 |
| Nebbiola | 10/16/06 | 32.9 | 2.74 | 0.80 | 23.1 | 0.750 | 3.20 |

200.0

## Hybrid Summary

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variety | Harvest Date | Harvest Weight  (Lbs) | Lbs per  Vine | Est. Ton  per Acre | Brix | TA | pH |
| Foch 1 | 8/27/2006 | 343 | 10.7 | 2.9 | 23.6 | 0.645 | 3.37 |
| Foch 2\* | 8/28/2006 | 84 | n/a | n/a | n/a | n/a | n/a |
| Vidal 1 | 9/23/2006 | 444 | 9.3 | 2.5 | 23.0 | 0.750 | 3.31 |
| Chambourcin | 10/11/2006 | 138 | 4.9 | 1.3 | 21.8 | 0.735 | 3.53 |

\* est. 100 lbs not picked 1009

## Total Grapes Harvested -> 1209 lbs

**0.60 tons**

**Appendix 9. Grape Root Borer and Squash Vine Borer Trap Counts 2006 - Summerseat Vineyard, Lusby, MD**

**Grape Root Borer Survey - 2005 Summerseat Farm Vineyard**

20

15

10

5

0

25-Jun 2-Jul 9-Jul 16-Jul 23-Jul 30-Jul 6-Aug 13-Aug 20-Aug 27-Aug

**Sample Date**

GRB SVB

**Quantity Trapped**



**Appendix 10. Development Stage and Damage from April Frost 2007 – Summerseat Vineyard**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Cultivar | Clone | Rootstock | Block | Growth  Stage | %  Loss |
| Foch |  |  |  | 7 | 27% |
| Vidal |  |  |  | 3 | 1% |
| Chambourcin |  |  |  | 3 | 1% |
| Barbera | 1 | 101-14 | 19 | 3 | 15% |
|  |  |  | 21 | 3 | 4% |
| Malvasia Bianca | 2 | 3390 | 7 | 3 | 3% |
|  |  |  | 15 | 3 | 0% |
| Dolcetto | 2 | RipGlo | 6 | 3 | 2% |
|  |  |  | 13 | 3 | 0% |
| Nebbiola | 1 | 101-14 | 8 | 5 | 36% |
|  |  |  | 9 | 7 | 20% |
|  |  |  | 17 | 5 | - |
| Petite Sirah | 3 | 3309 | 10 | 4 | 10% |
|  |  |  | 11 | 4 | 2% |
|  |  |  | 20 | 5 | 2% |
| Petite Verdot | 2 | 3390 | 4 | 3 | 15% |
|  |  |  | 18 | 3 | 2% |
| Sangiovese | 2 | 3309 | 2 | 7 | 38% |
|  |  |  | 22 | 5 | - |
| Sangiovese | vcr6 | 101-14 | 14 | 3 | 8% |
|  |  |  | 23 | 5 | - |
| Sangiovese | unknown | unknown | 25 | 5 | 43% |
| Shiraz | 1 | 3309 | 12 | 5 | ? |
|  |  |  | 26 | 5 | ? |
| Shiraz | 174 | 101-14 | 5 | 4 | ? |
| Viognier | 1 | 101-14 | 3 | - | - |
| Viognier | unknown | 3309 | 1 | 5 | 14% |
|  |  |  | 16 | 3 | 14% |



**Cordon form vine showing dead (from frost) primary buds and live secondary buds.**

**Appendix 11. Pictures of Muscadine Grape berries 2006– Michaels Manor Vineyard, Scotland, MD**

