Peach and Plum

Wednesday afternoon 2:00 pm

**Moderator:** Jason Fleming, MSHS Board

2:00 p.m. **Update on Plum and Peach Projects Underway at Michigan State**

Bill Shane, SWMREC, MSU Extension
Mira Danilovich, Oceana Co. MSU Extension

2:20 p.m. **Current Experiences and Future Plans for Peach Processing at Peterson Farms**

Leo Steffens, Peterson Farms, Shelby, MI

2:40 p.m. **Breeding Peaches and Plums for the Southeast and Beyond**

Dick Okie, SE Fruit & Tree Nut Research Lab

3:20 p.m. **Insect Management Programs for Peach in New Jersey**

Dean Polk, Fruit Research & Extension Ctr., Rutgers Univ.
Breeding Peaches and Plums for the Southeast and Beyond

W. R. Okie
Agricultural Research Service - USDA
Southeastern Fruit & Tree Nut Research Laboratory
21 Dunbar Road
Byron, Georgia 31008

Freestone peach production in the United States is concentrated in 3 regions: California; the Southeast, mainly Georgia and South Carolina; and the Northeast, including New Jersey, Pennsylvania and Michigan. Peach varieties are rarely grown in more than 1 region because of lack of climatic adaption. Most production of canning peaches, nectarines, Japanese-type plums and apricots is also in California. Varieties that do well there often do not thrive well elsewhere. The ARS-USDA Southeastern Fruit and Tree Nut Research Laboratory is located along I-75 in Byron, GA, about 2 hours south of Atlanta. This location (32° 40'N, 84° 44'W, 149 m elev.) annually receives about 1 m rainfall and 1100 chill hours, although both can vary greatly from year to year. Primary diseases are brown rot, scab and bacterial spot. Primary insect pests are plum curculio, stink bug, and peach-tree borer.

Peach Breeding. Our primary crop, both commercially and in breeding effort, is peach. Peach growers need a sequence of varieties ripening from 60 days before, to 30 days after Elberta (ripe mid-July at Byron). Redhaven ripens about 4 weeks before Elberta for us. A variety must be consistently productive, large-sized (>2.5 in.), firm and red blushed (>70%). USDA peach breeding in Georgia began in 1937 in Fort Valley and later moved to Byron, both in the center of the main peach production area, with breeders John Weinberger (1937-54) and Victor E. Prince (1954-80). To honor his efforts in establishing our research station at Byron, and to provide a "brand" name for growers, all yellow-fleshed peaches named since 1980 have used "-prince" as part of the name. We annually grow about 4000 peach, 3000 plum and 500 apricot seedlings. Most of our efforts in recent years have been for mid- and late-season peaches, rather than the very early. Newer varieties are listed in Table 1. We also have minor research interests in chilling (high-heat vs high-chill), narrow-leaf trees, and novelty fruits including blood-flesh and flat shape.

Nectarines have similar requirements except that attractive skin finish and improved rain tolerance are also needed. Nectarines will likely remain a minor crop here because they are more difficult and expensive to grow well, there is more risk to the grower of crop failure, and he must have a season-long supply in order to break into the market. However, nectarine development continues with the goal of attractive color combined with adaptability (nectarines in bold italics in Table 1).

Plum and Apricot Breeding. Plum breeding began in 1958, intercrossing California plums with disease resistant southern varieties such as Morris, Methley, Bruce and the native Chickasaw plum. Unfortunately the large attractive California plums would not survive in our humid climate. Breeder Jim Thompson (1972-1986) released 4 plums - Robusto, Segundo, Byrongold and Explorer. Three more plums, Rubysweet, Black Ruby and Ruby Queen, and Spring Satin plumcot have been released since then (Table 2). Apricot breeding has been a minor effort since 1964. Apricot seedlings are easy to grow but they don't live long and rarely fruit well, making breeding progress slow. Our current goals in both plum and apricot breeding are to combine good quality, large, firm fruit with consistent production on a healthy...
long-lived tree. Resistance is needed to bacterial canker, bacterial leafspot and twig canker and plum leaf scald. Most of our plum selections are highly resistant to the first two but only tolerant of the last, which is the disease that finally kills them. Late blooming is needed to ensure a crop every year.

SPECIFIC VARIETY NOTES


Fireprince. [(Halberta x Fireglow) x Redglobe] x (Sunhigh x Southland) op. An attractive peach released to fill the gap between ‘Harvester’ and ‘Redglobe’. Not widely planted after initial release, but production slowly increasing.

Flameprince. (Summerset x [(J. H. Hale x Valiant) op x Redglobe] x Merrill Fiesta) F2. Released as an alternative to ‘O’Henry’. More resistant to bacterial spot. Not solid red like ‘O’Henry’ but has an attractive golden ground color. Hangs well on the tree. Less prone to premature fruit drop.


Goldprince. Loring x [(Fairhaven x FV89-14) x (FV89-14 x Duke of Georgia)]. FV89-14=,(Hiley x Fireglow) x Fireglow. Replacing Junegold, which has been difficult to market due to poor shape and color, and bad split pits. Smaller but better color, firmness and shape. Less tree vigor sometimes.


Juneprince. [(Sunhigh x Southland) x Redcap] x Junegold. A very attractive peach with good red color and short fuzz. Tends to bloom ahead of most 650 hour varieties, making it harder to crop except on better sites. Replaced ‘Coronet’ in much of the Southeastern U.S.

Juneprincess. Fantasia F2. Bright colored nectarine ripening in mid-season. Seems to hold up well in rainy weather.


Scarletpearl. (Biscoe x Redgold) F2. A very pretty white-fleshed peach. Mostly red skin and medium firm flesh. Quality varies from year to year. Used for roadside markets.


Southern Pearl. Roseprincess op. Large, white-flesh peach with nice red blush. ‘Harvester’ season. Medium firmness and good quality.


Summerprince. (Summerset x [(Hale x Valiant) op x Redglobe] x M.Fiesta) F2. Released to replace ‘Redcap’ and ‘Dixired’, to which it is intermediate in chilling. Very round and nearly solid red. Sets heavily and blooms late so must be thinned early and hard in order to size.
**Sunprince.** *Redglobe x (Dixiland x FV240-1).* Very large and attractive, but lacks enough red color for current market. Replaced ‘Blake’ and ‘Redskin’ in Georgia.

**Sureprince.** *Fireprince x (Redgold x Durbin).* Ripens with Coronet. Extensive red blush. Heavy bud set need heavy thinning to size well. Cropped in 1996 at Byron. Less tree vigor.

**Black Ruby.** *BY4-95 op (=Queen Ann x Santa Rosa).* Large, firm fruit on healthy upright tree. Slightly sour skin.

**Ruby Queen.** *Frontier x Redroy F2.* Very late with dark red flesh. Excellent eating quality. Moderate tree vigor.

**Rubysweet.** *Mariposa x Methley.* Bronze skin color is less attractive but eating quality is excellent. Locally popular in southeast U.S.

**Spring Satin.** *BY8111-6 (=BY4-601(=Queen Ann x Santa Rosa) x Frontier) x unknown apricot.* Large, very early, good-cropping plumcot. Tree vigor is good. Quite tart until soft ripe.
Table 1. Characteristics of Byron peaches and *nectarines* from Byron, Georgia since 1980, listed by ripening season.

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Test no.</th>
<th>Release year</th>
<th>Cross year</th>
<th>Ripen date(^z)</th>
<th>Flower(^y) chilling</th>
<th>Flesh(^x)</th>
<th>Flower(^a)</th>
<th>Leaf gland(^w)</th>
<th>Bacterial spot reaction(^u)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Springprince</td>
<td>BY82P5972</td>
<td>1998</td>
<td>1981</td>
<td>-50</td>
<td>650</td>
<td>YNC</td>
<td>L,SH</td>
<td>G</td>
<td>MS</td>
</tr>
<tr>
<td>Scarletpearl</td>
<td>BY81P1411</td>
<td>1989</td>
<td>1980</td>
<td>-45</td>
<td>750</td>
<td>WMS</td>
<td>L,SH</td>
<td>G</td>
<td>MR</td>
</tr>
<tr>
<td>Goldprince</td>
<td>BY7-1240</td>
<td>1989</td>
<td>1966</td>
<td>-45</td>
<td>650</td>
<td>YMS</td>
<td>L,SH</td>
<td>N</td>
<td>MR</td>
</tr>
<tr>
<td>Rubyprince</td>
<td>BY82P5750</td>
<td>1997</td>
<td>1981</td>
<td>-42</td>
<td>800</td>
<td>YMC</td>
<td>L,SH</td>
<td>R</td>
<td>MR</td>
</tr>
<tr>
<td>Juneprince</td>
<td>BY4-3751</td>
<td>1985</td>
<td>1963</td>
<td>-35</td>
<td>600</td>
<td>YMF</td>
<td>L,SH</td>
<td>N</td>
<td>MR</td>
</tr>
<tr>
<td>GaLa</td>
<td>LA72-3-8</td>
<td>1992</td>
<td>1972</td>
<td>-34</td>
<td>750</td>
<td>YMF</td>
<td>M,NS</td>
<td>R</td>
<td>MR</td>
</tr>
<tr>
<td>Sureprince</td>
<td>BY81P1216</td>
<td>1998</td>
<td>1980</td>
<td>-33</td>
<td>900</td>
<td>YMS</td>
<td>L,SH</td>
<td>N</td>
<td>MR</td>
</tr>
<tr>
<td>Roseprincess</td>
<td>BY80N384</td>
<td>1989</td>
<td>1979</td>
<td>-25</td>
<td>850</td>
<td>WMF</td>
<td>L,SH</td>
<td>R</td>
<td>MR</td>
</tr>
<tr>
<td>Juneprincess</td>
<td>BY78AN38</td>
<td>1997</td>
<td>1977</td>
<td>-25</td>
<td>850</td>
<td>YMS</td>
<td>L,SH</td>
<td>R</td>
<td>MR</td>
</tr>
<tr>
<td>Southern Pearl</td>
<td>BY84P1807</td>
<td>1997</td>
<td>1983</td>
<td>-25</td>
<td>650</td>
<td>YMS</td>
<td>L,SH</td>
<td>G</td>
<td>MR</td>
</tr>
<tr>
<td>Fireprince</td>
<td>BY5-1942</td>
<td>1985</td>
<td>1964</td>
<td>-21</td>
<td>750</td>
<td>YMF</td>
<td>L,SH</td>
<td>R</td>
<td>MR</td>
</tr>
<tr>
<td>Blazeprince</td>
<td>BY84P3350</td>
<td>1997</td>
<td>1983</td>
<td>-20</td>
<td>850</td>
<td>YMF</td>
<td>L,SH</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td>Scarletprince</td>
<td>BY87P994</td>
<td>2005</td>
<td>1986</td>
<td>-13</td>
<td>850</td>
<td>YMF</td>
<td>L,SH</td>
<td>R</td>
<td>MR</td>
</tr>
<tr>
<td>Julyprince</td>
<td>BY93P3427</td>
<td>2005</td>
<td>1992</td>
<td>-10</td>
<td>850</td>
<td>YMF</td>
<td>L,SH</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Sunprince</td>
<td>BY4-7521</td>
<td>1981</td>
<td>1963</td>
<td>+1</td>
<td>800</td>
<td>YMF</td>
<td>L,SH</td>
<td>G</td>
<td>R</td>
</tr>
<tr>
<td>Flameprince</td>
<td>BY81P584</td>
<td>1993</td>
<td>1980</td>
<td>+14</td>
<td>850</td>
<td>YMF</td>
<td>L,SH</td>
<td>R</td>
<td>MR</td>
</tr>
<tr>
<td>Autumnprince</td>
<td>BY85P325</td>
<td>1998</td>
<td>1984</td>
<td>+45</td>
<td>850</td>
<td>YMF</td>
<td>L,SH</td>
<td>R</td>
<td>MS</td>
</tr>
</tbody>
</table>

\(^z\)Relative to Elberta; for maturity + Redhaven add 30 days.
\(^y\)Hours below 45F.
\(^x\)Y=yellow, W=white, M=melting, F=free, C=cling, SF=semi-free when ripe, N=non-melting.
\(^w\)L=large, M=medium, S=small, SH=showy, NS=nonshowy.
\(^u\)R=reniform, G=globose, N=none.
\(^v\)R=resistant, M=moderately, S=susceptible.
Table 2. Comparison of 'Santa Rosa' plum with USDA plum varieties at Byron, Georgia.

<table>
<thead>
<tr>
<th>Name</th>
<th>Selection No.</th>
<th>Release year</th>
<th>Cross year</th>
<th>Bloom date⁡</th>
<th>Self-fertile</th>
<th>Pollen shed⁢</th>
<th>Ripen date</th>
<th>Fruit size (cm)</th>
<th>Skin color</th>
<th>Flesh color</th>
<th>Tree health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Satin</td>
<td>BY88Z1092</td>
<td>2000</td>
<td>1987</td>
<td>+1</td>
<td>no</td>
<td>M</td>
<td>-15</td>
<td>1.9</td>
<td>R-B</td>
<td>Y-R</td>
<td>Good</td>
</tr>
<tr>
<td>Robusto</td>
<td>BY68-317</td>
<td>1980</td>
<td>1967</td>
<td>-1</td>
<td>no</td>
<td>L</td>
<td>-13</td>
<td>1.7</td>
<td>R</td>
<td>R</td>
<td>Very good</td>
</tr>
<tr>
<td>Segundo</td>
<td>BY68-971</td>
<td>1984</td>
<td>1967</td>
<td>-3</td>
<td>no</td>
<td>L-M</td>
<td>-10</td>
<td>1.8</td>
<td>Y-R</td>
<td>R</td>
<td>Very good</td>
</tr>
<tr>
<td>Santa Rosa</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>partly</td>
<td>H</td>
<td>0 (6/12)</td>
<td>1.8</td>
<td>R</td>
<td>Y-R</td>
<td>Poor</td>
</tr>
<tr>
<td>Rubysweet</td>
<td>BY69-350</td>
<td>1989</td>
<td>1968</td>
<td>-2</td>
<td>no</td>
<td>M</td>
<td>+3</td>
<td>2.0</td>
<td>BZ</td>
<td>DR</td>
<td>Good</td>
</tr>
<tr>
<td>Black Ruby</td>
<td>BY7404-1</td>
<td>1994</td>
<td>1973</td>
<td>0</td>
<td>partly</td>
<td>M</td>
<td>+7</td>
<td>2.0</td>
<td>R-B</td>
<td>Y</td>
<td>Good</td>
</tr>
<tr>
<td>Byrongold</td>
<td>BY7401-5</td>
<td>1985</td>
<td>1973</td>
<td>-4</td>
<td>partly</td>
<td>H</td>
<td>+12</td>
<td>2.0</td>
<td>Y</td>
<td>Y</td>
<td>Good</td>
</tr>
<tr>
<td>BY69-1637P</td>
<td>BY69-1637P</td>
<td>1984</td>
<td>1968</td>
<td>-6</td>
<td>yes</td>
<td>L</td>
<td>+15</td>
<td>2.0</td>
<td>B</td>
<td>Y-O</td>
<td>Fair</td>
</tr>
<tr>
<td>Explorer</td>
<td>BY4-401</td>
<td>1980</td>
<td>1963</td>
<td>+1</td>
<td>no</td>
<td>M</td>
<td>+15</td>
<td>2.1</td>
<td>P-B</td>
<td>A</td>
<td>Good</td>
</tr>
<tr>
<td>Ruby Queen</td>
<td>BY8155-70</td>
<td>2005</td>
<td>1981</td>
<td>0</td>
<td>no</td>
<td>M</td>
<td>+25</td>
<td>2.0</td>
<td>R-BZ</td>
<td>R</td>
<td>Fair-Good</td>
</tr>
</tbody>
</table>

⁡Bloom date relative to Santa Rosa (about March 11, similar to a peach rated 750 chill hours).
⁢Pollen shed: L=light, M=medium, H=heavy.
⁣Color: Y=yellow, R=red, B=black, O=orange, G=green, P=purple, A=amber, BZ=bronze,DR=dark red.
Insect Management Programs for Peach in New Jersey

Dean Polk, Statewide Fruit IPM Agent, Rutgers Fruit R&E Center, 283 RT 539, Cream Ridge, NJ 08514

Introduction

This paper will review the key pests found in NJ peach production, and a summary of the types of materials and programs used. Even with good pest management programs, pests damage can occur. As part of the NJ Fruit IPM program, we regularly take post harvest samples to track fruit quality, which is also reviewed. Finally, I would like to summarize the costs associated for various grower programs.

Key Pests in NJ

Only key pests that drive the spray program are covered here.

Oriental Fruit Moth (OFM):

The adult is a small grayish, mottled moth about ¼" long, with its wings held roof-like over its body. Young larvae are cream colored with a black head, and grow to about 5/16" long. Older larvae have a brown head capsule, and are slightly pink. Full grown larvae overwinter in bark crevices, ground cover, and in fallen or mummified fruit. After pupating in March, the first adults are found by mid to late April (southern NJ). There are 4 to 5 generations per year with flight peaks occurring during the first week of May, mid-June, mid-July, and late August. Female moths lay eggs on the young leaves of terminal growth. After egg hatch, first and second brood larvae bore into new growth stems, and emerge several weeks later. Larvae may feed up to 6 inches down the shoot, or they may exit and enter a new shoot before maturing. During this process, the growing shoot and terminal leaves will wilt and bend over. After larval emergence, the entire tip and its leaves dry up, with the tip completely bent over. This flagging injury stimulates lateral growth below the point of injury. This can inhibit good scaffold formation in young trees, and provide wound sites for pathogens.

Fruit injury is more critical than flagging, and may occur either early in the season on young fruit, or later after pit hardening to final swell. Larvae will usually enter the fruit from the shoulder to the stem. As the larva bores into the fruit, gum and frass are exuded from the wound area. As the gum ages, a sooty mold may form on it, turning the entire wound area black. Larvae may occasionally enter fruit through the inside of the stem, and therefore leave no wound area, except for a small mark at the stem end of the picked fruit.

Tarnished Plant Bug (TPB) and Other Catfacing Insects:

TPB is the most important catfacing insect in the mid-Atlantic region. Other principal catfacing pests include the green, brown, and dusky stink bugs. TPB nymphs are pale yellow-green insects from 3/16" to 5/16" long. They are about the same size as aphids, but may be distinguished by the segmented abdomen, and the presence of wing pads. Adults are about 1/4" long and 1/8" wide, flattened and oval in shape. Wings are folded flat over the body, and are a mottled brown, with some yellow. On the back side of each wing there is a yellowish triangle with a brown to black spot on the posterior tip. Adults overwinter under bark and leaves, and around alfalfa and other legumes, or around a number of other weeds. There are three or more generations per year. The insects feed with piercing, sucking mouthparts, sucking plant juices from the feeding site. Adults become active in the spring as buds begin to swell. They first feed on expanding buds, and to a minor degree on terminal shoots. Adults continue to feed during bloom and after fruit set.
Prior to shuck split, feeding injury is in the form of bud or flower drop. Very little fruit drop is seen after shuck split to shuck fall, but the fruit is injured.

Injury takes several forms. Early season "catfacing" injury results from tissue death at the feeding site, while the fruit continued to grow around the site leading to a deformed fruit. Injured areas may be fuzzless, corky, and depressed, and may have a small amount of dried gum in the center. As fruit matures, additional injury can appear as scarring, gummosis or bleeding, and shallow water soaked areas at the feeding site.

**Plum Curculio (PC):**

Adults are about 1/4 inch long, small grayish brown weevils with long snouts about 1/4 to 1/3 the length of the body. There are mottled gray markings on the back, and 2 prominent humps on the backs of the wing covers. Larvae are curved, yellowish-white to cream colored, with a brown head capsule, and a light brown shield behind the head. Fully grown larvae are 1/4 to 3/8 inch long. Adults overwinter in and around orchards, hedgerows, nearby woods, and other protected places. They become active in the spring, usually just prior to bloom. Activity and mating is temperature dependent. They are seen when average temperatures reach 50 to 60°F for at least 3 to 4 days or above 75°F for at least 2 days. Adults first feed on developing buds, flowers, shucks and setting fruit. Eggs are laid from 1 to 2 weeks after emergence, usually at shuck fall and shortly thereafter. The female eats a small hole in the fruit, deposits an egg in the hole, and makes a crescent-shaped cut below the egg. This creates a "C" shaped egg scar. Eggs hatch in 2 to 12 days, with larvae feeding in the fruit for 1 to 3 weeks. Full grown larvae exit the fruit, and burrow 1 to 2 inches into the soil where they construct cells in which to pupate about 2 weeks later. About 2 weeks after pupation (1 month after entering the soil), new adults emerge. Egg laying may extend through June and July in some areas of NJ.

**Tufted Apple Budmoth (TABM):**

Tufted apple budmoth is a major pest of apples, and is being more commonly found in peach. TABM overwinters as a partially grown larva on the orchard floor. It pupates in April, with adults emerging in early May. There are 2 generations per year. The first flight lasts through June and early July, while the second flight starts in late July, and goes through August to early September. Egg laying occurs through most of June and August. Eggs are laid on the tops of leaves in masses of 80 to 100. Egg masses appear like a section of fish scales, are green when freshly laid, but gradually turn light brown to copper. Larvae are olive-brown with a bark brown head, and a brown to black shield just in back of the head. Adults are mottled gray to gray-brown, 1/2 to 9/16" long, and have snout-like tufts by their mouthparts with additional tufts in the middle of each wing.

There are three kinds of larval feeding in peaches. Larvae will feed on the foliage, but usually only by the youngest stages. Fruit feeding may take two forms - 1)Larvae may feed by webbing a leaf to the side of a fruit, and feed on the fruit under that leaf, and 2)Larvae will enter an area between the fruit and fruiting wood, or between two opposite fruits. There they will feed on the surface by the stem. As the feeding progresses, the fruit will soften, which helps move the larvae to a deeper level. On some varieties there is a slight separation of the flesh from the pit. In these cases, the larvae can "fall" down in between the flesh and the pit, and appear as an internal feeder. In other cases larvae may be feeding on fruit with split pits, and fall into the internal parts of the split pit, where it can then move out to the flesh surrounding the pit. Damage has been most common in late varieties, which ripen in late August to early September, and therefore are being damaged by late second brood larvae.

**San Jose Scale (SJS):**

Overwintering SJS are covered with an ashy gray wax secretion. Females are round, with a raised nipple at the center, and are about 1/12 to 1/16 inch in diameter. Males are elongate or oval, about 1/24 to 1/25 inch long. Males emerge shortly after bloom, and search for mature females with which to mate. Males are small yellow two winged insects. After mating, females give live birth about 4 weeks after initial male emergence. The young crawlers may be found on the bark for 4 to 5 weeks. They appear as small
yellow mites or lice with well developed but small legs. Individual crawlers move around for one day before settling down on bark tissue to feed on plant juices. A waxy secretion can be seen after several days, and enlarges as the insect matures. There are 2-3 generations per year in the northeast. As the life cycle repeats in the growing season, crawlers may settle on developing fruit and even foliage.

Insects are more commonly found on the wood in bumpy gray masses. SJS may also damage the fruit, becoming a direct pest. Infested fruit will have gray, bumpy patches especially on the stem and calyx ends. Individual or small groups of scales will also cause a red mottling where inflamed areas are present over much of the fruit. Heavy infestations will debilitate or kill branches or trees. Any infestations on the fruit will render it unmarketable.

Green Peach Aphid (GPA):

Overwintering eggs are laid on the bark and are shiny black, and oblong. Young Nymphs are pale yellowish-green. Most adults are wingless, and look like the nymphs, except for the size. The head and thorax of winged adults are dark brown to black, but the remainder if the insect is yellow-green. Eggs start to hatch near the pink bud stage of bloom development. Emergence continues on through bloom and petal fall. Hatch is usually completed by petal fall to shuck split. Reproduction by live birth to females continues for 2 to 3 generations in the spring on peach trees. Winged forms migrate to peppers, tomatoes, potatoes, and other vegetables and weeds. During the fall true sexual females and males are formed. These forms fly back to the peach tree where mating and laying of overwintering eggs takes place.

Light infestations are not harmful on mature peach trees, and in most cases, preventative treatments are not needed. Curled leaves may be seen where colonies are growing. Heavy infestations are undesirable on young, second year trees, since they can cause terminal abortion, and excessive branching. Under heavier infestations, especially in warmer springs, leaf curling can spill over to the bloom, aborting the flowers. Nectarine fruit can be directly injured by aphid feeding. We use an action threshold of 5 colonies per tree on young peach trees and 1 colony per tree on nectarines.

Other pests like European red mite, lesser peachtree borer, flower thrips, white peach scale, and Japanese beetle are also found. Both species of borers have to be regularly treated in the late summer. Thrips have become a routine problem on nectarines. Japanese beetle, although not a problem on every variety, is a routine problem during the last 2 weeks before harvest on redhaven and following varieties that ripen through mid August.

Pesticide Use

Dormant to delayed dormant sprays have traditionally been skipped, but due to a resurgence of scale insects, more applications of oil + diazinon or esteem have been used. Pink sprays have historically been Guthion or Asana and targeted catfacing insects, but recent cost increases have led to more pyrethroid use (Asana, Warrior, Ambush/Pounce). Unless pest pressure is unusually high, growers are generally discouraged from using insecticides at pink for catfacing insects, since any resulting damage is negligible. Azinphos-methyl or Guthion has been the principal insecticide used from petal fall through early covers. With the cancellation of Guthion, Imidan (or Diazinon) will likely become the materials of choice for most growers to control plum curculio. Other insects at petal fall include green peach aphid (Provado, Actara, or Lannate) and thrips (Spintor, Lannate or Carzol). OFM sprays are timed based on a degree day model, with the first application occurring close to shuck split. Other key pests at shuck split can be PC, various catfacing insects, and possibly thrips. Blocks with known deposits of red mite eggs may also receive an early season miticide. If oil was used earlier, miticides would not be needed. During early covers, if OFM alone is treated, then Intrepid may be used. If other insects are present then a broader spectrum material such as Imidan or a pyrethroid is used. Since early cover sprays may occur from late May to early June, scale crawlers are monitored with black sticky tape if infestations are suspected. By the second cover period, tufted apple Budmoth (TABM) is a problem in most areas of southern NJ. TABM has 2 generations per year and is treated based on a degree day model. TABM is resistant to many OP’s and to some degree, Lannate. Pyrethroids are used by some growers to control TABM and other insects. Spintor may be used for TABM alone, or Intrepid for both OFM and TABM. If scale crawlers are present then Diazinon has been used. Mid season (3rd-4th covers) will usually target OFM and catfacing insects if present. Japanese beetles emerge by
mid to late June, and treated with Sevin or Provado if needed. Late cover sprays are usually targeting OFM and Japanese beetle if still present. TABM will be sprayed throughout much of August. Insecticides are normally chosen based on their efficacy and timing for OFM vs. TABM or both. As growers move away from Guthion and OPs, they have seen that new replacement materials are not only expensive, but narrower in spectrum. This often results in the use of multiple materials, further increasing costs. As a result, a number of growers have increased their use of synthetic pyrethroids, then work around the edges to fill the gaps for PC control, increased scale populations, and/or increased mite levels.

Difficult pests – What turns up in post harvest sampling

The IPM program has done a post harvest quality survey since 1991. Samples consist of 100 fruit sampled just at picking from field bins or sampled in storage prior to sorting and packing. We have taken roughly 175-200 (17,500 – 20,000 fruit) samples per year for each of the last 3 years. In 2005 the most common injuries resulted from cat-facing insects, plum curculio, Japanese beetle, and TABM. High thrips injury was found on one farm. Cat-facing injury is common on many farms, and is the one complex, which gives NJ growers problems on a regular basis. Injury on farms with weed middles has been consistently higher than on those farms with maintained sod. Given moth (worm) pressure in peaches, we consistently see low levels of OFM injury, but higher injury levels from TABM. With label restrictions and the loss of materials, growers have stopped using methyl parathion and reduced the use of other OP materials. This has led to an increase in pyrethroid use, and a decrease in scale control. This is borne out in increased scale injury starting in 1998. Penncap-M was phased out and last used in 1999. From 1999 through 2004 we experienced high levels of San Jose scale injury. Previous to that time growers grew accustomed to not using oil on a regular basis. When scale started to appear, oil and materials targeted for scale crawlers were again used. During the last few years PC has also become problematic. In 2005 PC injury was present on 69% of the farms sampled. Decreased use of OPs and increased use of pyrethroids is one of the major causes.

The Role of IPM Programming

As insecticides change, the role of IPM becomes more critical. Sprays for OFM and TABM are timed by degree day models combined with monitoring with pheromone traps and plant sampling. Without the use of monitoring for proper timing, sprays can be wasted and extra costs incurred. Resistance management is also important with respect to rotating different pesticides and chemical classes. Of major importance though is the regular monitoring of all orchard pests, and the maintenance of those records. Monitoring records can be compared to pesticide use records, so pesticide costs can be justified and adjustments made to the spray program for the following season. During the last several years, growers have made increased use of mating disruption for OFM, combined with clean sod ground cover management to minimize populations of cat-facing insects. This has resulted in decreased insecticide use and fruit injury on those farms.

Pesticide Use and Costs

In 2004, growers spent from $95 to $300/ac for pest control chemicals, not including herbicides. Historically growers spend more for fungicides than for insecticides. In recent years that has started to change, with some growers spending 25% or more on insecticides. This is a direct result of the loss of OPs, and their replacement by newer more expensive products. This is not to say that we are in a never ending upward spiral of increased costs. Costs can still be controlled by the careful use of materials, monitoring, timing, and ground cover management.