However they are pollinized and fruit compatible with plums and not cherries and have been misclassified as cherries. A few cultivars of the pure species have been named, but there are many hybrid cultivars available as a result they are frequently confused with the only plums that are hardy enough for the northern US and Canada. Sand cherry was used extensively by Hansen in South Dakota to develop cold-hardy plums, with more than a million seedlings grown (Hansen, 1937). ‘Sapa’, his most important release, was a hybrid of sand cherry Sultan (Japanese plum) and has been used as a parent of many other hybrids and for rootstock development. Sand-cherry hybrids with plums are often called “cherry plums”, a term also used to refer to P. cerasifera. In California, ‘Hiawatha’ (a seedling of ‘Sapa’) is looking promising as a semi-dwarfing rootstock for peaches.

Prunus besseyi may have been more widely hybridized than any other Prunus, partly due to its wide compatibility. All the breeding work appears to have been done with western forms of P. besseyi, as they had better fruit quality and larger fruit than the region that the country was too cold to grow most other Prunus. Unfortunately, the species has high sensitivity to bloom and twig blight caused by Monilia sp., making them short-lived in humid climates. P. besseyi also is native to the shores of Lake Michigan as well as the inland sandy barrens of central Michigan. The species also ranges into the Northeastern United States and south to Virginia. These eastern forms of the species may be useful in breeding plums and rootstock better adapted to the humid regions. They are much smaller-statured plants than western accessions even in good soil, sometimes growing as a ground cover rather than an upright shrub, and plant health at Byron seems good so far. The most blooming characteristic of P. besseyi is at least partly due to higher post-rest heat accumulation, enabling them to fruit well in lower-chilling zones than would be expected (Werner et al., 1988). Use of this species to develop cold-hardy plums continues in the USA only recently. University of Wisconsin-River Falls in Wisconsin.

Chinese Bush Cherries A second misclassified “cherry” is P. japonica and relatives P. glandulosa and P. humilis. These shrubs are from China (Ingram, 1948). This group is best known in Europe and North America as the double-flowered ornamental form of P. glandulosa called ‘Flower almond’. These shrubs grow as multiple stems, and are easy to propagate using rooted cuttings or root suckers. As a result they are frequently misclassified around old homestead sites. The flowers are borne singly or in pairs, and come in pink or white, single or double. Fruit are red to dark red, about 1 cm diameter on a 1 cm stem, edible raw but often cooked due to their acidity. P. japonica accessions from China are quite prolific and have crossed readily with plum to produce a range of fruitful hybrids. This species appears to have some resistance to plum curculio, though not as much as P. avium accessions from Europe. This plant is a bushy shrub with grey, irregular bark, and pink flowers followed by small purplish fruit. It is hardy enough for the short growing season in North Dakota and West Dakota but is not well adapted to the short growing season in the Midwest. Most of the hybrids with Japanese plum at Byron have been highly productive.

Nanking Cherry Prunus tomentosa is a common trade ornamental/fruited shrub which is hybrid of P. glandulosa and P. humilis. This plant is at least partly due to higher post-rest heat accumulation, enabling them to fruit well in lower-chilling zones than would be expected (Werner et al., 1988). Use of this species to develop cold-hardy plums continues in the USA only recently. University of Wisconsin-River Falls in Wisconsin.

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due to high heat requirement rather than strictly to high chilling requirement. Late
bloom, but with a low chilling require-
ment, would be a desirable addition ... to utilize this species for fruit, jelly,
wildlife food, and ornamental use hav-
recently been revived in the Northeast by

American Plum  
Plum species with germplasm worthy of exploitation. Bolded species are represented in NRSP-5/IR-2 or NRSP-Davis collections.

<table>
<thead>
<tr>
<th>Species</th>
<th>Common name</th>
<th>Origin</th>
<th>Subspecies/synonyms</th>
<th>Varieties extant</th>
</tr>
</thead>
<tbody>
<tr>
<td>P. alleghaniensis</td>
<td>Allegheny plum, sloe</td>
<td>Northeastal U.S.</td>
<td>davus</td>
<td></td>
</tr>
<tr>
<td>P. americana</td>
<td>American plum, wild goose plum, hog plum</td>
<td>Central + eastern U.S.</td>
<td>Anderson's Early, Bircher, Golf, Hazel, Kilbeyta, Montrose, Red Colt, Underwood, Wall</td>
<td></td>
</tr>
<tr>
<td>P. andersonii</td>
<td>Desert peach</td>
<td>California, Nevada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. angustifolia</td>
<td>Chokechew plum, sand plum, sandhill plum</td>
<td>Southern U.S.</td>
<td>variane, waltzoni</td>
<td>Bruce, Six Weeks</td>
</tr>
<tr>
<td>P. besseyi</td>
<td>Sand cherry</td>
<td>Canada, northern U.S.</td>
<td>cuneata, depressa, pumila, supranasentiae</td>
<td>Black, Black Beauty, Conroy, Deep Purple, Hinswithe, Menor, Mirrors, Sapa, Sioux</td>
</tr>
<tr>
<td>P. floribunda</td>
<td>Desert almond, desert peach bush</td>
<td>Northwestern U.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. floribunda</td>
<td>Wild apricot, desert apricot</td>
<td>Southern California</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. geniculata</td>
<td>Shrub plum</td>
<td>Florida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. glaberrima</td>
<td>Chinese bush cherry</td>
<td>China, Japan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. hexandra</td>
<td>Hewertt wild almond</td>
<td>Texas, Mexico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. hortulana</td>
<td>Wild goose plum, hortulan plum</td>
<td>Central U.S.</td>
<td>miner</td>
<td>Hiiner, Wayland</td>
</tr>
<tr>
<td>P. hortulana</td>
<td>Fowering alment, Japanese bush cherry</td>
<td>Eastern Asia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. maclura</td>
<td>Beach plum, shore plum</td>
<td>Coastal northeastern U.S.</td>
<td>Hancock, jersey, Patria, Randtack, Squinoblet</td>
<td></td>
</tr>
<tr>
<td>P. mexicana</td>
<td>Big tree plum, Mexican plum</td>
<td>South central U.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. minutiflora</td>
<td>Texas wild almond, small flower peach bush</td>
<td>Texas, Mexico</td>
<td>Late Goose, Whitaker</td>
<td></td>
</tr>
<tr>
<td>P. mawsoniana</td>
<td>Wild goose plum</td>
<td>South central U.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. nigra</td>
<td>Black plum Canada plum</td>
<td>Northern U.S., Canada</td>
<td>Althen, Assiniboine, Bantley, Gewinnik, Northern, Pembrose</td>
<td></td>
</tr>
<tr>
<td>P. salicina</td>
<td>Japanese plum</td>
<td>China</td>
<td>bonsai, fumosum, gymnosum</td>
<td>Abundance, Bubkin, Kelsey, Saituma</td>
</tr>
<tr>
<td>P. subcordata</td>
<td>Pacific plum sienna plum</td>
<td>Northwestern U.S.</td>
<td>salicrui, oregano</td>
<td>G.H. Clark, Kelly unre #6</td>
</tr>
<tr>
<td>P. texana</td>
<td>Texas almond cherry, Texas peachbrush</td>
<td>Texas, Mexico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. umbellata</td>
<td>Ratanswood plum, hog plum, sloe</td>
<td>Southwestern U.S.</td>
<td>injucrula, mitria, sarda</td>
<td></td>
</tr>
</tbody>
</table>

that the river carries. According to our local guide, the river is sometimes also
called "The Mother River" since its color is the same as Chinese skin color.

China is a united multietnic nation with a population of 1.3 billion people or 20% of the world’s population. Sixty-
four percent of the population is still rural, but there is a constant shift of people away from agriculture to the cities where better employment opportunities exist and where average

incomes are four to six times greater than
in rural areas. China is attempting to
control the migration to cities by
requiring residence permits for city
dwellers without which people cannot
access government jobs, schools, or
health services. Despite this, cities have
large numbers of " illegals " who operate
an underground economy of sorts.

For 27 years, since the death of Mao and the beginning of the reign of Deng Xiaoping, China has practiced

"Capitalistic Communism" (economic freedom and growth while still maintaining political control of the people). Apple growers were among the first to be allowed to freely market their crop. Under this system, growth in GNP has leap from 3% annually in the early 1970s to 8% in the 80s and 9% in the 90s. This is a fantastic growth rate compared to the U.S., which has averaged 3% annual growth in GNP in recent years. While the overall GNP per capita of China is a fraction of that in the U.S., the high level of growth in China, if maintained, will cause them to surpass the U.S. about 2037. However, as China struggles with infrastructure, pollution, and foreign exchange rates, it is doubtful that they will maintain this 9% growth rate.
According to our hosts, China has approximately 10 million apple growers with 5 million acres. Some of these growers are organized for research, demonstration and marketing purposes into village cooperatives such as the villages of Guo Dong, Feng Jia Yuan, Lei, and Fangxiang that we visited. Land is owned by the government and leased to the grower with 50-70 year contracts depending on the way the land will be used. In 2004, Shandong, the leading apple producing province, had approximately 790,000 acres, down from its peak of just over 1.6 million acres in 1998 (Figure 6).

Even though acreage has fallen sharply, production continues to rise as new plantings made in the 1990’s begin to bear and horticultural practices continue to improve. Production in 2004 in Shandong reached an all time high of 350 million bushels (443 bushels/acre) most for the fresh market (Figure 6).

Shaanxi produced about 288 million bushels in 2004 on 599,000 acres (291 bushels/acre) This province now leads the nation in production of apple juice concentrate. Together Shandong and Shaanxi produced approximately 560,000 metric tons of concentrate in the 2004/5 season. China’s export of juice concentrate comprised 46% of the world’s total.

TABLE 1

<table>
<thead>
<tr>
<th>Province</th>
<th>Acreage (1000 acres)</th>
<th>Production (millions bushels)</th>
<th>1991</th>
<th>2000</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shangdong</td>
<td>1030</td>
<td>1110</td>
<td>8%</td>
<td>85</td>
<td>339</td>
</tr>
<tr>
<td>Shanxi</td>
<td>545</td>
<td>990</td>
<td>82%</td>
<td>26</td>
<td>204</td>
</tr>
<tr>
<td>Henan</td>
<td>298</td>
<td>518</td>
<td>58%</td>
<td>20</td>
<td>125</td>
</tr>
<tr>
<td>Hebei</td>
<td>538</td>
<td>820</td>
<td>52%</td>
<td>28</td>
<td>95</td>
</tr>
<tr>
<td>Liaoning</td>
<td>550</td>
<td>489</td>
<td>-13%</td>
<td>30</td>
<td>65</td>
</tr>
<tr>
<td>Shanxi</td>
<td>268</td>
<td>445</td>
<td>66%</td>
<td>9</td>
<td>85</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>280</td>
<td>430</td>
<td>47%</td>
<td>13</td>
<td>36</td>
</tr>
<tr>
<td>All other</td>
<td>613</td>
<td>845</td>
<td>36%</td>
<td>30</td>
<td>122</td>
</tr>
<tr>
<td>Total</td>
<td>4,157</td>
<td>5,636</td>
<td>36%</td>
<td>238</td>
<td>1,071</td>
</tr>
</tbody>
</table>

Source: China State Statistics Bureau, Adapted from World Apple Report.

The average Chinese “orchard garden” is 4 mu which is equivalent to 2/3 of an acre. This results from government policy that allocates 1-2 muper family to grow orchards. This policy was introduced to help feed China’s hungry nation in production of apple juice concentrate. Together Shandong and Shaanxi produced approximately 10 million acres. Some of these growers are organized for research, demonstration and marketing purposes into village cooperatives such as the villages of Guo Dong, Feng Jia Yuan, Lei, and Fangxiang that we visited. Land is owned by the government and leased to the grower with 50-70 year contracts depending on the way the land will be used. In 2004, Shandong, the leading apple producing province, had approximately 790,000 acres, down from its peak of just over 1.6 million acres in 1998 (Figure 6).

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but fruit size is small. Breeding programs in the Southern Hemisphere include South Africa and Australia. These programs are development of large fruits, high quality plums with resistance to bacterial spot and bacterial canker, and the ability to store without internal breakdown. Storability of four weeks is crucial to exporting the fruit by ship. Japanese plum breeding in Europe is relatively new, but will be important as demand continues to increase for the large, firm Japanese plums. Breeders at Rome and Forli are seeking smaller trees to reduce production costs in combination with large size, dark skin, and good eating quality. At Florence, goals are to develop self-fertile, late blooming plums with high quality, particularly yellow skinned types. Recently a breeding program has begun near Avignon in Southern France where poor weather during pollination is a major problem. Sharka resistance is also important.

Genetic Resources

Much native United States plum germplasm exists (Little, 1976; Little, 1977; Okie, 2001). No native fruit was as extensively collected and selected by early settlers in the United States as plums, primarily because of the wide range of native species readily at hand and the shortage of suitable alternative fruits. Wright (1915b) lists 623 named plum cultivars derived solely from American species. Nearly all are from Iowa, Minnesota, Nebraska, and South Dakota from P. americana, P. hortulana, P. nigra, P. munsoniana, or a combination thereof. Unfortunately for modern plum breeders, only a handful of these native cultivars are still available, since cultivation of these species is now rare. The National Research Service Project (NRSF-5, formerly IT-2) has about five species and some hybrid varieties, while the NCGR has about 13 American plum species, mostly as one or two accessions each (Table 1). These small numbers are surprising considering there are about 20-25 native North American plum species, depending on the taxonomic treatment (Mason, 1913; Wight, 1915a; there is no comprehensive reference for North American Prunus species). For语种 nursery trees, taro, and/or a variety of species of ornamental nursery stock before they fill the available space (Figure 10). Mature orchards often had clover or other nitrogen-fixing groundcover planted.

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Chickasaw Plum

The Prunus described here can be loosely grouped into three sections: wild plum species, mainly in North America (Table 1); bush cherries, which are mostly fertile and productive. Hybrids have also been made with P. japonica, Chinese bush cherry. The plum species and relatives

Plums can have quite an allure for the breeder, for several reasons. They have high potential as a commercial crop in regions outside of California. Cultural management is similar to that of peaches, which are already widely grown, and consumers are familiar with the fruit. Fruit quality exceeding that commonly available in the supermarket is preferred by the consumer. The range from current Texas, Kansas to Maryland and New Jersey, and as far south as Central Florida. It grows well as a small twiggy tree or in a thicket, since it produces root suckers readily. Leaves are lance-shaped, often rolling slightly at the margins to form a rough-leaved type. The flowers are 1-2 cm across, usually red or yellow with yellowish white. The fruit is firm, is edible, with a waxy skin and tastes sweet from tart to tart. It is easily propagated by root sprout, budding or seed. Birds and animals, usually the household pet, eat it, but its survival relates to its ability to re-fruit profusely when the above-ground plant is destroyed. The Chinese, Americans, and later European settlers, selected larger, more palatable types particularly from the western range of the species. Some of these are still grown in the Midwestern USA for jelly. In many areas local people eat the fruit fresh. Hybrids with Japanese plum, such as ‘Bruce’, had better size but only slightly better fruit quality, and became the predominant plums in the region because they were able to survive local disease pressure. Unfortunately, disease resistance tree-variety closely linked with small fruit size and poor fruit quality. This hybrid material has continued to be used to breed adapted plums, such as ‘Robusto’ and ‘Byngold’ developed at USDA, Byron, Georgia. In China, there is a market for “green plums” which are local varieties picked while green and prized for their sour flavor. Perhaps this market reflects the Chinese preference for eating the wild plums green, before the “worms” got them.

Scrub Plum

One of the rarest as well as most southern-ranging plum species is P. cerasifera, which is localized in central Florida on very sandy areas known as scrub. This unique ecosystem follows a relict sand ridge, which is very inhospitable with sand to a depth 1.5-4 m. P. cerasifera was widespread in the area when originally described by Harper in 1911. Since that time much of the original habitat has been turned into citrus groves or housing developments, resulting in a federal endangered plant status.

Apple Varieties

The tremendous growth of the apple industry in China has occurred primarily through the planting of the Fuji variety (Figure 8). This has led to long-stor- ing variety has been an ideal fit with China’s lack of refrigerated storage and transportation facilities. The Fuji apple is the most widely grown variety in China. We told that strains included the Naganu series, the Fuji and Red Fuji. The latter includes Red Fuji, Red Naval and Red Delicious, which are all grown in China in 2000 and is probably 60% today. Shandong’s production is 70% Fuji with the remaining Gala, Jonagold, Golden Delicious and Red Delicious. Other varieties mentioned were Qinguan, Granny Smith, Lujia, and Fuyan.

Most apples are still consumed fresh in China (Figure 9). While Fuji has been a boon to the industry, it too has come to be a disadvantage as China tries to gain a larger share of the world market. To be successful in the world market, China will need to broaden its apple portfolio by adding other tart and semi-tart varieties. The Chinese currently lack the infrastructure (storage, packing, transportation, research, and informa-
Shandong are kept shorter than those in Shaanxi by using more intensive pruning (Figure 14). Growers are trying to keep tree heights down so that ladders are not needed for pruning, thinning, picking, or applying pesticides over the top of the continuous tree canopy. Consequently, trees in Shandong appeared greener, more vigorous, and had a denser canopy. The drier environment in Shaanxi, combined with less pruning, seemed to limit tree vigor in that province. Their orchards suffered from the same maladies common to orchards grown commercially.

Chinese officials and at least some apple growers are emphasizing “green” production systems. However, the “green” system in China is much different than in Europe. At several stops, officials emphasized that they were using “green” systems that required elimination of chemical fertilizers and use of only those pesticides that do not damage the environment. They substituted animal manures for chemical fertilizers. Both factors were important for reducing water pollution and making production systems more sustainable. It was not clear how many apple farmers are actually adopting green production strategies but even the “Experimental Farm” we visited indicated they had implemented black skin with red flesh, very tasty. Less vigorous tree and very attractive to deer.

Byron. GA

Spring Satin. Parentage: BY4-601 (=Queen Ann x Santa Rosa) x Frontier.

BY154-59. Parentage: BY69-123 op (=Mariposa x Methley). Ripens 1 1/2 weeks before Santa Rosa, about with Methley. Large, reddish-bronze skin with red flesh. Very good quality, sticky wax bloom. Consistent production not certain. Very good tree.

BY158-50. Parentage: BY69-409 op (=Mariposa x Morris). Ripens a few days before Santa Rosa. Attractive red color and firm flesh. Tends to overbear, dwarfing the tree.


Plum Breeding - Northeast

None of the historic public breeding programs developing cold-hardy plum hybrids are still active. Many cultivars were released before 1950, especially from South Dakota and Minnesota Agriculture Experiment Stations, using the most cold hardy plum species: P. nigra, P. besseyi, and P. salicina (from Manchuria) (Kadir and Proebsting, 1994). ‘Sapa’ (=P. besseyi x Sultan) and its many hybrid offspring, although poor in quality, are widely adapted (Anderson and Weir, 1967; Hansen, 1937). These hybrids are often called “cherry plums”; the same terms used for P. cerasifera, and are now used more for rootstock development than for fruit production. The University of Minnesota breeding program, long inactive, recently released an old selection as ‘Alderman’.

New York and Ontario, Canada have also had Japanese plum breeding as a minor adjunct to European plum breeding. ‘Vancer’, was released by Ontario in 1984. Neither program has continued much Japanese plum breeding. The most important northern variety has been ‘Early Golden’, a chance seedling found in Ontario over 50 years ago but still widely grown. Other programs developing cold hardy stone fruit were the Horticultural Experiment Station, Brooks, Alberta; Dominion Experiment Station, Mirvet, Manitoba; USDA Northern Great Plains Field Station, Mandan, North Dakota; and the University of Saskatchewan, Saskatoon, Saskatchewan (Okie and Weinberger, 1996). In general, these hardy plums lack size, firmness and quality necessary for more than local use. Modest efforts to improve northern plums have been continued by private individuals and Brian Smith at the University of Wisconsin at River Falls.

Unfortunately for modern breeders, only a few of the improved native American selections are still available, since cultivation of native American plums is obsolete. These species are discussed later.

Plum Breeding - Foreign

Although P. cerasifera is likely an ancestor of European plums, it is a diploid species, cross-fertile with Asian and American plum species. These “cherry plums” have not been used much in modern breeding outside Eastern Europe and the former USSR, although chance hybrids with P. cerasifera were produced ‘Methley’ in South Africa and ‘Wilson’ in Australia. This species provides earliness, cold-hardiness and probably self-fertility.
After Burbank, breeding was carried on by the University of California and USDA. In California, past emphasis of breeders has been on size and firmness for shipping, with a mild flavor preference. Black skin color became very popular with the introduction of ‘Frisia’ because it did not show bruises and was very productive. However, large, firm, highly colored fruit can be harvested prematurely resulting in reduced consumer quality. Plums showing some ground color may be easier to pick at the proper stage of maturity. Low prices and over production of black plums have increased interest in other colors. Current objectives include a wider range of skin color and better eating quality. Red or black skin color and yellow or red flesh color appear to be most acceptable although green skinned plums are shipped to Asian markets. Storage ability, particularly at the end of the season, is also important. Private breeders and growers in California have selected many important commercial plums (Table 2). Many of the commercial cultivars grown in California were found as chance or open-pollinated seedlings or mutations, rather than the result of hybridizations. Fred Anderson released ‘Red Beau,’ ‘Black Beau,’ and ‘Grand Rosa.’ John Garbaden developed ‘Angelene,’ still the major late plum. Floyd Zaiger has released ‘Joanna Red,’ ‘Betty Anne,’ ‘Hiromi Red,’ and ‘Autumn Beau,’ as well as ‘Citation’ rootstock having an interspecific hybrid, and numerous plum-apricot hybrids under the trademarked terms “Plumcot” and “Breeders’ Sun” (Zaiger, Sunnyside International formerly Superior Fruits) have named ‘Black Diamond,’ ‘Black Flame,’ ‘Black Gold,’ ‘Black Torch’ and ‘Sweet Rosa.’ Their ‘Black Flame’ is the largest of the private breeders, and as with most private programs, the releases are patented (Okie and Ramming, 1999).

With the advent of Burbank’s improved plums which were large and firm enough to ship long distances, a new industry developed in California where local industries in other states mostly died out. As local industries declined, breeding programs were closed. California-bred plum cultivars were tried around the world, with the exception of a few places like China and some parts of India, they have not thrived as well as they did in California.

Plum Breeding - Southeast

As a result of the poor adaptability of these improved California plums, they were crossed with local plums in other parts of the world. In the Southeastern U.S., the Japanese plums were crossed with the local P. angustifolia and P. stenophylla plums such as ‘Bruce’ and ‘Six Weeks.’ Current breeding objectives in the Southeast United States (Georgia, South Carolina, Texas, and Florida) are the same as those of California plus additional disease resistance. Fruit firmness is somewhat less important because many local markets are available. Resistance is required to thrice primary diseases: bacterial leaf and fruit spot and twig canker, bacterial canker, and plum leaf scald. The first two diseases are problems in many other countries that are trying to grow Japanese plums, such as Australia, New Zealand, Italy, and South Africa. Leaf scald is also a serious problem in Argentina and Brazil, and could cause problems in California if the glassy-winged sharpshooter vector continues to spread. In general, later bloom is more desirable but regions such as Florida and parts of Texas, Australia, and Brazil require even lower chilling requirements than those common in Japanese plums.


Rum Breeding - USDA-Byron

The United States Department of Agriculture (USDA) stone fruit breeding in Georgia began in 1937 at the Horticultural Fruit Laboratory in Fort Valley, which is located in the center of the main peach production area. John Weinberger was the peach breeder from 1937-1954, when he transferred to Fresno, California to begin the peach breeding program there. Victor E. Prince continued the breeding in 1954. In 1964, the program was moved 20 miles east from Fort Valley to the newly opened Southeastern Fruit and Tree Nut Research Laboratory in Byron. Prince began testing plums in 1958 and started making crosses in 1964 after moving to Byron. Much of the early work was for evaluating came from Weinberger in Fresno, who was also breeding plums at that time. This California plum germplasm was crossed with southern varieties such as ‘Morris’, ‘Methey’, ‘Bruce’ and the native wild plum, Pru. angustifolia. Unfortunately, the large attractive California plums would not survive in the humid climate of Georgia. In 1975 J. M. Thompson took over the plum breeding. Before he retired in 1986, Thompson released four plums – ‘Robusto’, ‘Segundo’, ‘Byngold’, and ‘Explorer’ – plus BY69-1637P plumcot. Three more plums, ‘Rubywees’, ‘Black Ruby’ and ‘Ruby Queen’ have been released since then, along with ‘Spring Satin’ plumcot. Since 1964 we have grown over 56,000 plum seedlings and named eight varieties, plus the variety per 7,500 seedlings. This ratio is higher for plums than peaches because a greater percentage of plum seedlings regress back to a weak tree or wild-type poor fruit quality. Some of the current plum selections are very promising if they stay alive, and should result in named varieties. Our current goals in both plum breeding are to combine good quality, large, firm fruit and disease resistance with a longer growing season. ‘AU-Rubrum’ is resistant to Pseudomonas syringae (bacterial canker), ‘AU Cherry’ (1988), ‘AU Amherst’ (1998) and ‘AU Rosa’ (1989) and ‘AU Rubrum’ (1989).
We were surprised to see so few pests in the orchards that we visited. It appears that pest control technology in China is far more advanced than the horticultural technologies being employed by Chinese apple growers.

Marketing and Export

In 2004 China became the number one fresh apple exporter in the world. The 775,000 metric tons they exported just edged out France, and is about 50% above the U.S. fresh apple exports. This amount is still less than 8% of their total production, which is a lower percentage than the U.S., but still an earth shaking number. Even though much of this fruit is second class quality destined for Mongolia and Russia, China also has high quality apples going to the EU and other quality driven markets. Desmond O’Rourke, publisher of the World Apple Report, predicts China’s exports could double in the next few years.

Most of these Japanese plums are commercial for Fresh Fruit. Production in the United States is concentrated in California, where the primary goals of increased size, firmness and quality have required no further use of primitive germplasm. Recent utilization of genetic resources of Japanese plum has been limited in the United States compared with that of many other crops. Difficulties in collection, importation and quarantine have necessitated the use of fruit imported from Japan. The term “Japanese plum” originally was applied to plums produced in Japan dating back to the Yayoi Era, about 2300 years ago. Japanese books dating back 1500 years mention cultivated plums. Japan is one of the most extensive mixing and matching of species. Use of exotic species for the other main stone fruits – peach, cherry, apricot and – has been minimal and mostly directed to rootstock development. So I will primarily address species mixing as it relates to plums, specifically Japanese plums.

In China, P. salicina may have originated in the Yangtze River Basin and now is found across eastern China. The history of ‘Zhai Li’ cultivar goes back 2500 years. Numerous local selections have since been developed, but plum has never been as important in China as peach, either commercially or culturally. Plums in Southern China are concentrated in seven provinces, but especially in Fujian and Zhejiang, with over 20 million plum trees found there and about 200 cultivars grown. Truly wild stands are rare but are reported to still occur in Hupei and Yunnan, where some trees in Zongdian County are over 100 years old. Low chilling types of P. salicina are found in Southern China and Taiwan. Cold hardy plums in Northern China have been classified as P. ussuriensis and P. gymnandra, but are otherwise very similar to P. salicina. Modern breeding programs vastly in USSR, have utilized this source of hardness (Okie and Weinberger, 1996).

Plums have great potential as a commercial crop in regions outside of California. The wide range of native plum species provides an untapped source of genetic material. Results from hybridizations are very unpredictable. This paper describes some of this intriguing germplasm maintained at Byron, GA, and summarizes our efforts to collect it and use it in scion and rootstock development.

Plum Breeding - California

Trees of improved P. salicina cultivars ‘Kelsey’ and ‘Abundance’ were introduced into the United States from Japan over 180 years ago. Luther Burbank himself imported a second lot of Japanese plum seedlings and from them named...