

ANR-1131

Asian Pear Culture in Alabama

Origin and History

Asian pears originated in China and Japan and have been grown in these countries and certain other Asian nations for at least 3,000 years. Records indicate that Chinese immigrants introduced Asian pears to the west coast of the United States during the 1800s. The greatest concentration of current commercial production is in California and Oregon. Asian pears are often referred to as apple-pears because of their crisp and juicy texture and applelike flavor. However, Asian pears are not crosses between apples and pears. They are primarily selections derived from **Pyrus ussuriensis** (Ussuri pear) and **Pyrus serotina** (Japanese sand pear, formerly **Pyrus pyrifolia**) or complex hybrids of the two species. Asian pears differ genetically from European pears (**Pyrus communis**) and the southern hard pears. In Alabama, European pears are grown to a very limited degree because of their high susceptibility to fire blight, which is a bacterial disease caused by **Erwinia amylovora**. Some producers in northern counties have had limited success growing more recent European-type pears including Harvest Queen, Harrow Delight, Warren, and Moonglow. Generally, the most successful of these plantings are located on high elevation sites and receive little to no fertilizer. Studies are under way in the state to evaluate

a number of "old" European-type pears found on rural home sites that seemingly have withstood fire blight problems and fruited quite well.

Hard pears, also called sand pears, are grown extensively across the state and are much more tolerant of fire blight than European pears are. Most varieties of hard pears, such as Orient, Kieffer, and Garber, are generally considered crosses of European and **Pyrus serotina**, a Japanese pear. Flesh of these selections varies from extremely hard to very firm, with varying levels of grittiness. They are mainly used as processing fruits, although with proper storage, some may be consumed fresh.

Fruit Types and Varieties

Asian pears can be divided into the Japanese varieties, which have round fruits and are somewhat similar to an apple in size and shape, and Chinese varieties, which produce fruit that is more pear-shaped (pyriform) like the European varieties. Most of the varieties showing promise in Alabama are of Japanese origin. Japanese varieties can be categorized on the basis of their skin texture, which is either smooth or russeted. Skins of smooth-skinned varieties range in color from green to greenish yellow, and russet-skinned varieties range from brownish green to brown or copper (Figure 1).



Figure 1. The two types of fruit skin texture and color of Japanese origin (apple-shaped fruits) are shown above. Left, 20th Century has yellow, smooth skin; right, Housi has golden-brown, russet skin.

Another difference between Asian and European pears is that fruit of European selections are harvested and ripened off the tree during storage, while Asian pears are allowed to ripen on the tree before they are harvested. A ripe European pear has a soft, melting texture and creamy flesh, while Asian pear fruits are very firm, crisp, juicy, and sweet (low acid).

Alabama A&M University and Auburn University have conducted variety evaluations of Asian pears. Applied research as well as grower variety demonstration studies have been conducted by Auburn University fruit specialists, county Extension agents, and commercial producers. Most of these evaluations have been made during the last 5 to 10 years. During this period, a number of commercial fruit producers have also made personal evaluations of a number of varieties established in orchards. The varieties that have been under evaluation for the past several years at one or more locations include Chojuro, Daisu Li (12-44UC), Doitsu, Erishinge, Housi, Ishiwase, Kikusui, Kosui,

Kumoi, Megeitsu, Niitaka, Okusankichi, Seigyoku, Seuri, Shinko, Shin Li (12-43UC), Shinseiki, 20th Century (Nijiseiki), and Ya Li. Table 1 lists the characteristics of a number of these varieties.

Shin Li and Daisu Li are selections from California. Ya Li is the only Chinese-type Asian pear in these studies. To date, evaluations are fairly clear on several matters involving varieties but still have not provided all the answers needed for making solid recommendations for commercial production. Seuri and Ya Li flower too early for consistent production in northern and central Alabama counties because of damage from freezes. Ya Li also has poor fruit quality (flavor). Among the varieties that have been evaluated in research trials and grower plantings over the past 5 to 10 years, so far only a few have proved valuable for commercial use. Housi and Shinko are recommended for commercial and home use. Both varieties produce large, attractive, and flavorful fruit with 12 to 14 percent soluble solids (sugar). Housi is considered by many to

have the best flavor of all varieties tested thus far. However, Housi requires special treatment to minimize fire blight problems; otherwise, growers will be sorely disappointed because of potential branch or tree loss. This variety is naturally vigorous, so nitrogen application may need to range from little to none (depending on soil fertility), and excessive pruning should be avoided to minimize fire blight damage. Thus far, Shinko has been less subject to severe fire blight damage, perhaps due in part to its less-vigorous, spur-type growth habit.

Other varieties that may prove suitable for commercial and/or home plantings include Shinseiki, Doitsu, Megeitsu, and Chojuro. Some evaluations indicate that Doitsu could prove to be a promising variety because the fruit have an ideal balance of sugar and acid and are not too sweet. Grower evaluations of two other varieties, Ichiban Nashi and Korean Giant (A-Ri-Rang), have been promising. Ichiban Nashi (referred to as Early Asian by some producers) is the earliest-ripening Asian pear available and has good flavor. Its origin is unknown. During the most recent grower evaluations, it now appears that Ichiban Nashi may be too susceptible to fire blight for long-term commercial success. Korean Giant (also known as Olympic Giant or Starking Hardy Giant) appears outstanding, with extremely large fruit and 14.5 percent soluble solids. It ripens very late (mid- to late September), after other selections are well past harvest, has an excellent flavor, and stores well for at least 3 to 4 months. Although not tested in this area, Tsu-Li has been shown to be very fire blight resistant in other regions.

In summary, it appears that Shinko and Korean Giant may be the two most promising varieties for commercial or home plantings because of their higher level of fire blight resistance, good tree

Table 1. Characteristics of Asian Pear Varieties¹

Variety	Skin Type ²	Harvest Season ³	Fruit Size
Ichiban Nashi	smooth, greenish yellow	very early	medium
Kosui	russet, brown	early	small to medium
Shinseiki	smooth, greenish yellow	early/mid	medium to large
Housi	russet, brown	early/mid	large
Doitsu	smooth, green	mid	medium to large
Seuri	mostly smooth, green	mid	small to medium
Shinko	some russet, brownish green	mid	large
Chojuro	russet, brown	mid	large
Erishinge	smooth, green	mid	small to medium
Ya Li	smooth, green	mid	small to medium
20th Century	smooth, green	mid	small
Megeitsu	some russet, brownish green	mid/late	medium
Kikusui	smooth, green	mid/late	small to medium
Korean Giant	some russet, greenish yellow	late	very large

¹These varieties have been evaluated in research studies or grower trials in Alabama. All are the Japanese type (apple-shaped) except Ya Li, which is the typical pear-shaped Chinese type.

²Observations in extreme south Alabama indicate that some of the smooth-skinned varieties may develop a partial russetlike finish in some years.

³Harvest season usually begins in mid-July in extreme south Alabama and ends in mid-September in northern counties.

characteristics, yielding ability, and quality fruit. Housi should certainly be included in commercial and home orchards, but special attention must be given to managing fire blight. Because the variety picture is dynamic and continually being evaluated, growers can expect additional changes in the future as Asian pears become part of the Alabama fruit scene.

Rootstocks

Four different rootstocks for Asian pear have been evaluated at Alabama A&M University. They include European pear (**Pyrus communis**) and three Asian pears (**Pyrus betulaefolia**, **Pyrus calleryana**, and **Pyrus ussuriensis**). Because it imparts greater fire blight resistance to varieties budded onto it, in addition to other desirable characteristics, **Pyrus calleryana** is the preferred rootstock for Asian pears grown in the Southeast. This is the same rootstock used for hard pears and European selections grown in the Southeast. Many nurseries typically graft Asian pears onto other pear rootstocks such as OH x F selections, Quince, **Pyrus communis**, and **Pyrus betulaefolia**. These rootstocks are not recommended for Alabama.

General Culture

Chilling Requirements/ Hardiness

In general, Asian pears can be grown using the same type of cultural program as that used for European pears. Trees are quite winter hardy and have somewhat lower chilling requirements than most European varieties do. However, additional work is needed to determine more precisely the chilling requirements of varieties at temperatures of 45 degrees F and lower. It appears that many varieties have chilling requirements in the 750- to

850-hour range, with some having lower. For example, Housi can grow and fruit reasonably well with 550 to 650 chilling hours, while Shinko tolerates lower chilling, although it actually requires at least 800 or more hours for best performance. Close observations in research studies and commercial grower plantings indicate that locations within 5 to 10 miles of the shores of Mobile Bay do not receive adequate chilling in some years for optimum fruiting and overall tree performance.

Fire Blight Susceptibility

Asian pear varieties vary in their susceptibility to fire blight, but observations to date indicate that most are as susceptible as apples, such as Golden Delicious, but are somewhat less susceptible than European pears are. Fire blight sprays (such as streptomycin or copper) **must** be used annually during bloom on both commercial and home plantings. Most growers have used minimal additional sprays for insect, mite, and disease control, and only time will tell how much more intensive cover sprays will have to become to handle problems as they develop. In commercial plantings, a spray program similar to that used on European-type pear or apple orchards will most likely be needed, but hopefully not as many sprays will be required.

Fruiting/Tree Spacing

Asian pear trees easily begin bearing in the third or fourth growing season, although some may require another year or so, and are producing several bushels per tree by the sixth growing season. Most varieties need to be spaced a minimum of 10 to 15 feet in the row, with rows spaced 16 to 20 feet apart. The closer spacings (such as 9 by 16) as practiced in some western states appear to be somewhat too close for southeastern conditions.

Mature trees will yield at least 5 to 10 bushels per tree.

Training/Pruning

The training/pruning program for Asian pears is similar to that for European pears. Although they can be trellised, Asian pears do best as free-standing trees because of their vigor and ultimate size on **P. calleryana** rootstock. Because of fire blight, using a modified-leader, multiple-scaffold (4- to 6-branch) tree form is probably more sensible than using single-trunk, central-leader training, although both will work. Some training of scaffold branches, much like that practiced with apples, is desirable in attaining ideal tree form. Branch spreaders, weights, or other training aids can be used to spread branches to wider angles and a desirable growth habit (Figure 2). Growers are encouraged to also try open-center training as is used for peaches (Figure 3). This form of training may prove to be one of the best for Asian pears. Because the trunk area of Asian pears is so easily infected by fire blight, growers should make every effort to keep all shoot growth, including spurs, removed from the trunk. More mature Asian pear trees are shown at dormancy in Figure 4 and at harvest season in Figure 5.

Fertility Program

Fertilization is suggested during the first 2 or 3 years to develop the desired tree structure. Applying ½ pound per tree of a fertilizer such as 13-13-13 in March of the year following establishment, plus ¾ to 1 pound of the same fertilizer in early summer, should be adequate for the first season. The same type fertilization can be used during the second season, using no more than 1 pound per tree at each of the two applications. However, once trees begin fruiting, only



Figure 2. These three year Asian pear trees show the central-leader form of training, a method also used for apple trees. Notice the limb spreaders being used.



Figure 3. This third year peach tree shows the open center or vase structural training form (as used for stone fruits). This method also works well with Asian pear trees. Because of fire blight, the open center form of training is generally best for Asian pears, although the central leader form may be okay for blight-resistant varieties.

very moderate amounts of fertilizer should be used. This may involve from none up to 30 pounds of nitrogen per acre per year, depending on tree vigor, cropping, and previous history. Trees in home plantings should be fertilized to a minimum also. Depending on the tree vigor, crop load, and soil fertility, large bearing trees may only need from none to 2 pounds per tree of 13-13-13 applied in late winter each year.

Fruit Thinning

Asian pears are similar to other pome fruits such as apples and pears in that excessive crops are often set (unless late freezes thin the flowers or fruits). Therefore, it may be necessary to thin small fruits some years to

allow for optimum fruit size and quality, for consistent annual cropping, and to prevent limb breakage. Because ideal chemical thinning has not been developed, it is usually best to hand-thin fruits to one per cluster or one every $\frac{3}{4}$ to 1 inch in diameter and after the freeze period has passed. Observations to date indicate that most Asian pear varieties tend to bear crops on an annual basis rather than biennially, as is true for some apple and pear varieties. However, good fruit thinning, as needed, is essential to good annual cropping. Observations also indicate that Shinko, Kikusui, and 20th Century require fruit thinning (unless thinned by freezes) to prevent trees from running out (becoming dwarfish with poor growth).

Pollination/Fruitfulness

Many Asian pear varieties are considered partially self-fruitful, meaning that they can produce up to a 15 percent crop from self-pollination, but it is always best to plant at least two varieties to ensure cross-pollination and full cropping potential. Ya Li is the earliest variety to bloom, followed closely by Seuri and Niitaka. To date, Seuri has been able to pollinate Ya Li, resulting in at least moderate crops. The latest-flowering variety is Okusankichi, with Kumori next to latest. Housi, 20th Century, and apparently a number of the other varieties, are self-incompatible and will always need pollinizers. Niitaka and Seigyoku have sterile pollen and cannot be used as pollinizers. Shinseiki is a good pollinizer for a number of



Figure 4. Fourth year 'Shinko' Asian pear showing central leader development.



Figure 5. Fifth year Asian pear at harvest showing tree structure (central leader).

varieties (except Seigyoku) and has been reasonably self-fruitful. It blooms midseason. Some varieties are not cross-fruitful with other varieties, such as the Shinseiki/Seigyoku combination just noted. Housi and Shinko are good pollinizers and work well together. Korean Giant appears to be a good pollinizer for most varieties. Flowering time for most Asian pears is slightly after peaches and before apples, but it varies from year to year.

Harvesting and Marketing

The ripening period for Asian pears begins in mid-July in southern counties and can last through early to mid-September in northern counties. Fruits are harvested as they become ripe on the tree (ready for immediate consumption). Asian pears should be harvested gently because they have a tender skin that is

susceptible to bruising and discoloration. Overripe fruits are especially sensitive to damage, so do not delay harvest.

Fruits can easily be stored in conventional refrigeration at 32 to 35 degrees F (optimum temperature is about 32 degrees F) and 90 to 95 percent relative humidity for 1 to 3 months (longer for some varieties). However, most fruits are sold fresh and stored for only short periods. As a general rule, the later a variety ripens, the longer it will store. Fruits usually keep for 1 to 3 weeks at room temperature before turning soft or spongy. One of the harvest season problems growers have experienced is that winds and rain easily dislodge fruits from trees when they are ripe, creating possible crop loss. Depredation by birds can also be a problem.

Marketing the limited supplies of Asian pears now being produced in the state through roadside retail farm markets has been only partially successful and reflects the somewhat slow acceptance of this fruit by consumers in the Southeast. One of the problems confronting this fruit is that it ripens when some of the finest-flavored peaches are available, and the peach is usually favored by most of the public. However, Asian Americans in general are strong purchasers of Asian pears. Hopefully, consumers will eventually find the Asian pears to be as desirable as peaches and early apples being marketed during the same time frame. Asian pears certainly afford the consumer greater variety. In spite of the commercial problems, the Asian pear clearly gives the home producer a fine alternative crop.

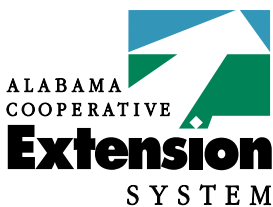
Summary

Asian pear now appears to be an alternative fruit that can be grown successfully across most of Alabama except the extreme southern counties. Some problems remain to be solved before a completely satisfactory cultural program can be developed, but the potential for the crop is promising. Among the major obstacles to successful production of Asian pears are: developing cultural programs to minimize fire blight and crop loss from late freezes; developing ideal variety combinations for each area of the state (cropping can be poor in extreme south Alabama in low chilling years); developing a strategy to lessen problems of premature fruit droppage; and enhancing the market acceptance of this fruit.

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