cause of its distinctly greater firmness and acidity, the fruit of 10C-18-33 can be kept in good condition longer in storage than Golden Delicious. However, in years favorable for the development of apple powdery mildew, the selection can be severely affected by the disease.

10C-6-25 (= Winesap x Golden Delicious) is a yellow apple of Golden Delicious parentage, but it does not resemble Golden Delicious in appearance or flavor (Figure 1). The tree of this selection is vigorous, very productive, and bears almost annually. The fruit is uniformly large, round, slightly conic, smooth. The storage life of fruit is long; fruit maintains good condition until April and May. It could be sold on the fresh fruit market after Golden Delicious. The selection has been found superior to Golden Delicious in processing as sauce, slices, or baked.

Deciduous Fruit Varieties for Tropical America

WILSON POPENOE*

Since the earliest days of European colonization, attention has been devoted to the establishment of temperate zone fruits in the highlands of the New World tropics. The efforts of the Spaniards in the West Indies and on the mainland are recorded in the early chronicles. Spanish peaches were successful in many regions; apples and pears, on a limited scale, in a few.

After a long period during which little progress seems to have been made, an impetus was given to this work through the arrival, in several countries, of colonists from Central Europe, as well as through an awakened interest on the part of local residents. In Guatemala, many trees brought from Europe during the last half of the XIX century are still alive. Then, in the 1950's, much help came to us through the visits of such outstanding pomologists as George M. Darrow, W. H. Chandler, Paul Dougherty, Robert Ticho and others. The meeting of the American Society for Horticultural Science, Caribbean Region (now the Tropical Region), which was held in Antigua, Guatemala, during the month of June 1962, focused attention on the possibilities of the apple, pear, plum and peach. Damon Boynton came forward with the first definite study of climatic adaptations; Ralph H. Sharpe contributed observations based on much work in a subtropical climate—that of Florida.

Much had been done in Guatemala about 1930. In the 1940's and 50's a collection had been established at the Escuela Agricola Panamericana in Honduras. In 1961 a considerable number of apple, pear and plum varieties were obtained from California by the Ministerio de Agricultura in Guatemala, and planted at Quezaltenango. Experimental plantings had been made in other countries, among which I would mention Mexico, Colombia, Ecuador, Peru, and the work of Francisco de Sola in El Salvador.

Since my own observations have been limited principally to Guatemala, El Salvador, and Honduras, I shall not attempt to cover the whole field. And before proceeding further, I would like to register a protest against what seems to be a lethargic indifference in some parts of the world to the inportance of systematic pomology. What would we have done, in our efforts to identify fruit varieties in tropical America, without such

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works as S. A. Beach's, "The Apples of New York," and the monumental series of monographs from Geneva published by U. P. Hedrick and his associates?

Here in Guatemala our recommendations regarding varieties are based mainly upon altitude, in other words, temperature. Topography, cloudiness, rainfall, length of day, and exposure are of course factors of some importance. But when a prospective planter wants to know what varieties to use in an isolated region where no apples have been grown, about all we can do at present is to advise him on the basis of experience at similar altitudes. We must, of course, also take quantity and distribution of rainfall into account.

Apples

Winter Banana is the leader at this time, and may remain so for years to come. It has a low chilling requirement, as pointed out by Chandler, and as demonstrated by tropical experience. It does fairly well in Guatemala at 6500 feet, and is still satisfactory at 8000, which is about as high as apples should be planted in Central America, especially if the region is one in which hailstorms are a hazard. Winter Banana grows about twice as rapidly as Delicious. It yields fine crops of large and attractive apples; and it should also be mentioned that to be popular in the tropical American market an apple must have plenty of color. It is hard to imagine anything more handsome than a basket of Winter Banana as grown at Quezaltenango—large yellow fruits, bright red on one side or perhaps over three-quarters of the surface. The eating quality is good, not up to McIntosh (which we have not yet grown successfully), Jonathan or Golden Delicious; but it is good enough to be popular on the market.

Wealthy. For years a small orchard in Chichicastenango, 6800 feet, has been famous for its apples. The owner, a fine old gentleman named Juarez, probably had lost the label (which happens about half the time), and so had given it his own name, by which it has been known, and probably will continue to be known. I had begun to think it was Ben Davis, until we took John Bregger to this orchard in 1967. He said it could not be that variety, because of its earliness and other characteristics, and he felt pretty sure it was Wealthy. A month later a young tree of this variety from the U.S., growing here at 5100 feet, matured its first fruit. I compared it with Juarez, and checked with Beach's description of Wealthy. No doubt was left in my mind. Trees in the Juarez orchard produce tremendous crops of excellent apples. There is considerable variation in size, and in color—but always plenty of red to make the fruit attractive. Truck-loads of this variety are carried to Costa Rica. It seems to be a good keeper. At 5100 feet it has shown delayed foliation, as would be expected, but it will almost certainly grow at about the same altitudes as Winter Banana.

Gravenstein. This also has a rather low chilling requirement, as pointed out by Professor Chandler. It ripens early—not yet an important factor here. Nobody thinks about season. To put apples on the early market, they are picked some weeks before full maturity. This variety has been planted widely but not in large numbers. It should be remembered that a bearing orchard as large as five acres, in Guatemala, is still rare.

Jonathan. Probably needs a little more altitude than the above-named three, but has done well at 7500 feet. Not a strong grower, but bears good crops of excellent fruit. Its color is greatly in its favor, although here we do not need to worry much about red color; Golden Delicious takes on a lot of pink where the fruit is exposed to the sun.

Other varieties which are attracting

attention are: **White Winter Pearmain,** which seems to have one of the lowest chilling requirements, and in the apple-growing regions of Guatemala has plenty of red color on the cheek. It is a strong grower. **Yellow Bellflower** does well at 7500 feet, but we have had little experience with it. **Delicious** is a rather weak grower but bears good crops. It has attracted much interest, probably because of its popularity in the United States. It should not be planted lower than 7000 feet. **Golden Delicious** is not a strong grower but bears good crops and the quality is excellent. Its future here is doubtful, however. **Jonwin** from California, a cross between Jonathan and Baldwin, is very promising. The tree is exceptionally sturdy, well-branched, and productive. Its chilling requirement is not well determined; it probably needs the same altitude as Jonathan. **Gloria Mundi** is grown on a small scale at 7500 feet. Although it is a large apple (size seems to be a rather important factor in tropical America), it does not bring a good price in the market because of lack of color, and poor quality.

In Ecuador and Colombia, **Blenheim Orange** (known as **Emilia** in the former, **Pennsylvania** in the latter) has for many years been the leading apple. Because of proximity to the Equator in those countries, its cultivation is limited to 9000 feet or a little higher; this is about equal to 7500 in Central America. In Peru, Winter Banana has been grown successfully right on the coast, a few miles south of Lima. The minimum temperature in this region is about 55 F., the maximum about 85 F. The latitude is about 15 degrees south. At this same latitude north, in Central America, Winter Banana is not successful below 6500 feet. The remarkable Humboldt current climate seems to be the answer. Very little sunshine, practically no rainfall. Water can be applied at the right time. These factors seem to compensate, to a satisfactory degree, for lack of cold.

Pears

Perhaps because of dry weather all through the blossoming season, fire blight has not been a serious problem in the Guatemalan highlands, although it has been present in this region for some time. Two *communis* (European) pears are cultivated on a small commercial scale. These are known locally as **Larga** (long) and **Redonda** (round). With the expert help of John Bregger, we believe we have identified the former as **Clapp Favorite,** the latter as **Lincoln.** How they reached Guatemala is a mystery. For a long time we did not think much of Larga, because it is nearly always left too long on the tree, and therefore is of poor quality, and develops "brown core" on the market. But the tree is a strong grower, highly productive, early ripening, and if properly handled, of good quality. Lincoln is not such a heavy bearer, and probably will not be extensively planted in the future. A third variety, known locally as **Tecpaneca** (because it is grown principally in the town of Tecpan, 7400 feet) answers Hedrick's description of **Summer Doyenné.** It is too small to have great commercial value. **Bosc, Anjou** and **Comice** (if we have identified them correctly) are seen occasionally in the highlands, but they are of such slow growth and such irregular bearers of rather small crops (perhaps a matter of pollination?) that they are not likely to be planted extensively, in competition with Clapp Favorite.

All of the varieties mentioned above are limited to 6500 feet and above—about 8000 maximum. Perhaps because **Bartlett** has a higher chilling requirement, it is rarely seen in Guatemala. Recent experience seems to indicate that it needs 8000 feet. At that altitude, it may have a chance to become important.

Much interest has developed recently in the Oriental pears, the *serotina* hybrids. **Kieffer** and **Pineapple** have been in Guatemala for years. Much of their interest lies in the fact that they can be grown at considerably lower elevations than the *communis* pears. In El Salvador, one of these *serotina* hybrids has grown and produced good crops at 3500 feet; in Guatemala, Pineapple has done well as low as 5000 feet. In general, however, it seems that 5500 is about as low as they should go. From this elevation they are good up to 8000.

Because of the difficulty in ripening Kieffer properly, and its poor eating quality, this variety has not become popular in Guatemala. Pineapple is liked for its large size and handsome appearance, but is not likely to acquire commercial importance. Two recent introductions, **Baldwin** and **Hood** seem promising, and are beginning to be planted on a small commercial scale. Both are vigorous growers, attaining large size and producing annually fine crops of fruit, sufficiently appetizing to be satisfactory as dessert fruits. Hood, the name of which seems to have been changed locally to **Kadman,** is perhaps slightly the better of the two, so far as quality is concerned. **LeConte, Orient** and one or two others of this group have been grown experimentally and discarded.

Plums

For a long time we thought we had one *domestica* (European) plum which was successful here. This was the **Reina Claudia** of Ecuador, assumed to be one of the Reine Claude group. But we have satisfied ourselves that this variety, like all the rest which are growing successfully in strictly tropical parts of America (in the highlands only, of course), is a Japanese plum. Ralph Vorhies of the California Polytechnic Institute believes that it is **Shiro.**

It is almost safe to say that any of the Oriental or Japanese plums listed by nurserymen in the United States will prove adapted to the tropical highlands. Some require a little more altitude than others. In Central America **Satsuma** is good from 5500 feet upwards; **Santa Rosa,** our best commercial plum, has grown satisfactorily at 5500, but is mainly planted at 6500 to 7500. **Mariposa** and **Kelsey** and one or two others are popular with some growers. **Methley,** which is known in Guatemala as **Española,** is the first to go on to the market—sometimes as early as April—but it is not as good as Santa Rosa, and will not stand rough handling.

Commercially, plums are not gaining much ground in Central America. Market demand is not strong. And it is worth noting that yellow plums (Shiro, for example) may net the grower only two or three cents a pound, while red ones (Santa Rosa and Mariposa) net him eight cents and sell for ten or twelve at retail.

Peaches

Undoubtedly peaches were among the first fruits brought to tropical America by the Spaniards. They are abundant today, almost always as seedlings, throughout the highlands from 3500 feet up to 7500. These limits are higher near the Equator. In recent years, many commercial varieties, such as Elberta, have been introduced from the United States, which have not been successful in Central America. Varieties from Florida, however, derived, in part at least, from the Honey or South China group of peaches, have proved highly satisfactory, as have some of the newer varieties from southern California which have the same genetic background.

The great abundance of "Spanish" peaches, large and small, white and yellow fleshed, clings and freestones, should have suggested long ago that

vegetative propagation of selected local seedlings is worthwhile. It is only recently that such work has been undertaken, with two objectives of which the production of good "canning clings" is the most attractive. There are hundreds of "melocotones" (large, yellow-fleshed clingstones) in the Central American highlands (and doubtless elsewhere in tropical America) which are suitable for canning as "halves." No horticultural varieties of these excellent peaches are available yet, but they soon will be.

New Muscadine Grape Varieties

N. H. LOOMIS*

Three new muscadine grape varieties were recently released by the U. S. Department of Agriculture.

Southland is a dark-fruited variety which ripens in mid-season, at about the same season as Hunt and Thomas. Its fruit is of medium size, averaging about the same size, number per pound, as Hunt. The sugar content of Southland ranges from 18-18.8 percent, or about 3 points higher than that of Scuppernong.

Among the perfect-flowered muscadine grape varieties, it is of superior fruit size and quality, and it is especially recommended for home plantings.

Southland originated from a cross of Thomas and a seedling of Topsail parentage. It was tested as Meridian Miss. No. 13.

Bountiful and **Chief** are rather small-fruited, dark-colored muscadine grapes; they have outstanding quality, and ripen in late mid-season, when most other muscadine grape varieties, excepting Yuga and Creek, are gone. The flavor of Bountiful is somewhat richer and more vinous than that of Chief. Bountiful tends to shatter at full maturity. Chief has done well in trials in central Florida.

It seems probable that these two varieties will be widely grown both commercially and for home use, because of their exceptionally fine fruit flavor and productivity, and because they mature when few other muscadine grapes are available. At Meridian, Mississippi, they were superior in flavor to all other dark-fruited, perfect-flowered varieties, and also to most of the imperfect-flowered varieties.

Bountiful and Chief are sister vines, seedlings of Creek and a Hopsail sibling. They were tested as Meridian Miss. Nos. 45-16D, and selection No. 18.

These varieties were developed at the U. S. Horticultural Field Station, Meridian, Mississippi, and are recommended for trial in the muscadine region. The Agricultural Experiment Stations of Louisiana, Mississippi, Alabama, Georgia, Florida, North and South Carolina have tested these selections in 16 locations.

For a number of years, A. P. S. published annual proceedings jointly with the state horticultural society with which it shared its annual meeting. The last of these proceedings was for the year 1955, its 70th meeting. From then on, annual reports and information dealing with annual meetings have been published in *Fruit Varieties and Horticultural Digest.*

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