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POLK COUNTY AVOCADO NURSERIES

ESTABLISHED 1917



Catalogue of Leading Guatemalan, Mexican and West Indian Avocados 1923-1924

W. D. CARRIER BABSON PARK Polk County FLORIDA

THE AVOCADO

PAST, PRESENT, AND FUTURE.

It is only since 1900 that the avocado has been planted commercially in Florida. Already there are more than 2000 acres devoted to this crop in Dade County alone. Avocado culture promises to become one of the most lucrative and important horticultural industries yet developed in the United States. Wilson Popenoe, who has devoted many years to investigating the subject on behalf of the U. S. Department of Agriculture, says:

"North American horticulturists are accustomed to view the avocado as one of the greatest undeveloped sources of food which the tropics offer at the present day. From their standpoint they are correct, but the inhabitants of Mexico and Central America would consider it more logical to assert that the Irish potato is a new crop deserving of extensive cultivation. North Americans view the avocado as a possibility, but to the aboriginal

inhabitants of tropical America, it is a realized possibility.

"Four or five tortillas (corn cakes), an avocado, and a cup of coffee

—this is a good meal," say the Indians of Guatemala.

"It is precisely this condition—the importance of the avocado as a food in those parts of tropical America where it has been grown since immemorial times—that has led students of this fruit in the United States to predict that avocado culture will some day become more important than citrus culture in California and Florida.

"To a certain extent, the avocado takes the place of meat in the dietary of the Central Americans. It is appetizing, it is nourishing, it is cheap, and it is available throughout most of the year. When these last two conditions have been reproduced in the United States, will not the avocado

become a staple article of diet with millions of people?"

The native home of the avocado is not exactly known, but in all probability it was on the mainland of tropical America. Previous to the discovery of the new world, it was cultivated and highly esteemed by the inhabitants of those regions now falling within the confines of Mexico, Central America, Colombia, and Ecuador. Only a short time before the arrival of the Spaniards it was carried to Peru, and the Spanish conquerors themselves took it to the West Indies. The predominance of pear-shaped varieties (avocados occur in many forms, from round to long and slender), has given rise to the name "alligator pear", by which the avocado is popularly known. This, as well as the name "avocado", is derived from the Aztec name "ahuacatl", still current as "aguacate" in many parts of Latin America. In Peru and Chile the fruit is known as "palta", while in Colombia it is called "cura".

The fruit derives its high food value mainly from its fat content, which commonly ranges between 10 and 25% of the flesh. Occasionally varieties of the Mexican race contain as much as 30% of fat, while the

large fruited sorts of the West Indian race rarely contain more than 16 or 18%. The protein content, which averages about 2% and occasionally exceeds 4%, is higher than that of any other fresh fruit. The percentage of carbohydrates is low (6 to 10), since the avocado contains practically no sugar. Mineral matter is present in greater quantity than in most other fresh fruits, the range being between 1 and 2%. Soda, potash, magnesium, and lime are the principal elements. The total dry matter in the avocado (about 30%) is higher than in any other fresh fruit, the nearest approach being in the banana, which contains about 25%.

As to the caloric or energy-producing value of the avocado, one pound of the flesh represents an average of 1,000 calories. This gives the avocado nearly three-fourths of the caloric value of cereals and about twice that of lean meat. It should not be assumed, however, that the avocado has a total food value greater than that of lean meat, since the latter far exceeds the avocado in protein content. The evaluation of foodstuffs in terms of calories shows only their usefulness in furnishing human energy and heat; proteins build up and repair the tissues of the body, and are essential in every dietary. The avocado, while not a perfect food because it does not contain sufficient protein to meet the requirements of the human organism, is superior to nearly all other fruits in food value, and more properly comparable with the cereals.

The late Parker Earle, an eminent American horticulturist, wrote as follows concerning the possibilities of the avocado along the line of food production:

"An acre of land can produce, let us say, one guarter of a ton of beef, or other animal food, per year. It can produce one ton, or possibly two tons, of food in wheat, or corn, or rice. It can produce five, ten or twenty tons of an incomplete food ration in the form of apples, or grapes or bananas. And there may be from one to two tons or more of very rich food in the form of nuts—notably pecans—from one acre of land. But with avocados there would seem to be a possible yield of food of very high nutritive value, in tonnage equal to apples with their low nutritive value." Mr. Earle goes on to say that if men can produce many tons of food of high value from an acre of land in trees that can only yield a fraction of a ton in the form of animal food, it is pretty certain that they are going to plant trees. The crowding together of men in dense population will compel this. "In primitive conditions men turned to animals for food. It was a state of savagery. We are outgrowing it. Very soon there will be no room for animals that are grown to be eaten. It is compulsory. It is nature's way. We must get our food in greatest quantities from a minimum area of land. And we must have food containing the same elements that animals have been giving us. Among possible substitutes does not the avocado offer itself as one of large potential importance?"

For those who are unfamiliar with the avocado, the following recipes, taken from a publication of the California Avocado Association, will be suggestive:

HORS D'OEUVRE

Avocado Served in Skin. Cut the fruit in half. Carefully remove the seed. Serve a half to each person with any of the following dressings, as personal taste directs: 1. Lemon or lime juice. 2. Salt. 3. Sugar. 4. Tomato catsup. 5. Mayonnaise. 6. French dressing.

Avocado on Toast. Remove the flesh with a spoon and mash with a fork. Spread thickly on a small square of hot toast. Add a little salt and

pepper. This is one of the nicest ways of serving avocado.

Avocado with Caviar. Prepare as the above recipes direct. Spread a small quantity of caviar on top of each piece. This is a very delicious

appetizer.

Avocado Cocktail. Cut the fruit into dice. Place in small cocktail glasses, cover with a good cocktail sauce. Tomato catsup with lemon juice and salt and pepper is excellent. Serve very cold, or packed in ice.

SALADS

Celery and Nuts. Fill seed cavity of a half fruit with chopped celery

and nuts mixed with a small quantity of mayonnaise.

Apple and Celery. Take equal parts of chopped celery and apple. Heap in a lettuce leaf, cover thickly with avocado meat well beaten with a little mayonnaise. Lemon juice may be used if preferred.

Combination Salad. Make a good combination salad of green vegetables—peas, beans, tomatoes, cucumbers, celery, hard boiled egg, lettuce. Mix with one-half as much avocado meat. Season with French dressing.

Avocado on the Half-Shell. This is only practicable with the thick-skinned variety. Divide fruit in half, carefully remove meat, add yolk of a hard-boiled egg and one tablespoon of French dressing for each fruit. Press through a sieve and pile back in the shell of the avocado. Garnish with boiled whites, finely chopped with parsley.

Cuban Salad. In the cavity of a small fruit place three stuffed olives, add lime or lemon juice. A teaspoon of sugar dissolved in the lime or lemon

juice is very nice.

If You Care for Onions. Cut the flesh of the avocado in cubes, mix with chopped onions, lime or lemon juice and salt. A finely chopped

boiled egg sprinkled on top makes it very pretty.

Aspic Jelly made with Avocado. One-half box gelatine, one-half cup cold water, one cup boiling water, two cups mashed avocado, juice of half a lemon, salt, cayenne. Soak gelatin in cold water one-half hour. Dissolve in boiling water. Strain and add avocado meat which has been flavored with salt, cayenne and lemon juice. Place on ice to harden. Serve with mayonnaise.

With Bananas and Apple. Take one chopped apple, one sliced banana and three medium-sized avocados. Mix in a bowl with either French

dressing or mayonnaise. Serve on lettuce leaf.

Sandwiches. A good hostess appreciates the value of an original and delicious sandwich. With rye bread—Mash the flesh of three large or six small avocados, season with lemon juice, salt and pepper. Spread between very thin slices of rye bread. A lettuce leaf may be used in the sandwich if desired. This makes about twenty sandwiches.

With Chili Pepper. Chop the fruit with chili pepper. Season carefully and spread between buttered bread, with or without lettuce leaf. The above recipe can be used with nuts or olives in place of the pepper or

onions.

An Original and Delicious Dessert is: Avocado and chopped dates

beaten in whipped cream slightly sweetened.

Avocado Ice Cream. Yolks of five eggs, one quart milk, green Maraschino cherries, two cups sugar, four medium-sized avocados, almond or vanilla extracts. Make a boiled custard with the milk, egg and one cup sugar, flavor with almond extract. When the custard is cool add the fruit and freeze. Serve with green Maraschino cherries on top of each dish.

Avocado with Sea Foods. A most appetizing form of serving the avocado is to mix equal parts of cold salmon or lobster with the diced fruit, and serve with mayonnaise.

In Soups. The avocado is used extensively in the tropics in all kinds of meat soups. Cut in small cubes and add to the soup just before serving.

For Invalids. The avocado is recommended by physicians as a most desirable form of food for invalids. It is highly nutritious, containing as high as 25 per cent of fat in the best varieties, according to Government statistics, and yet is very easily digested, so that the most delicate person can eat it freely.

A FEW CULTURAL HINTS

Prior to planting prepare the soil thoroughly by spading a space four or five feet in diameter and work in a bushel of well rotted stable or cow manure. When the holes that have been prepared are allowed to stand for sometime before planting, it is best to mulch them in order to stimulate bacterial activity in the soil. At planting time use a pound of organic fertilizer such as blood and bone or tankage and mix thoroughly with the soil immediately around the tree. Mulch and water well when planting and shade during the first summer, as this is very essential to protect young avocado trees from sunburn and also to help conserve moisture. Trees not long set are easily injured by prolonged droughts, hence it is VERY important and necessary to water at regular intervals during dry periods.

Avocados that are grown in boxes may be successfully planted any month of the year provided proper attention is given, of course; but there is a choice of seasons. We consider fall and winter months the best time.

Upon receiving trees water thoroughly before removing from boxes and if they have been badly shaken up on arrival and the soil loosened by rough handling, set in a cool shady place and allow to remain long enough for the soil to become settled again. Dig holes just before planting, first pry off bottom strip with spade or any handy tool, then each side, leaving the last strip to hold and set plant easily in position. Plant trees so that the bud joint will drop a little below the surface, and when this is completely healed or grown over, the soil can then be drawn over the connection or place of union, thereby saving the bud in case of severe freezing, even though the trees were not banked.

Some plant box and all, removing box 30 days after, but we prefer removing box in the beginning because of possible woodlice. On thirsty soils it is well to set trees in a basin five or six inches deep and about 18 inches across, since the cups thus formed hold the water better and make watering more satisfactory during the dry seasons. The cups or basins can be filled in after trees are a couple of years old. Bear in mind young avocados must be kept in a moist condition while getting established, for if allowed to dry out, it usually means death, or a severe shock to say the least, from which considerable time is required to recover.

The avocado is a gross feeder and requires more fertilizer than most fruit trees of the same age and size. Several applications the year can be made with good results. The amount of fertilizer used each application varies of course with size of tree, quantity of fruit it is carrying and the analysis of the fertilizer. When animal manures are not available, we consider the next best—and are pleased to recommend The Wilson & Toomer Avocado Brands.

In regard to fertilizing, we daresay there is no regular practice, for as a rule, each grower has his own ideas on the subject; however, opinions generally agree that nitrogen should be derived from an organic source. For trees one and two years old use about two lbs. each application three or four times a year, increasing the amount from year to year as the trees demand and require it.

Plantings vary as to distance, same as citrus, some preferring closer settings while others prefer more space. In the Glades growers usually plant their trees more closely together for protection from winds, whereas we in the Highlands allow greater space for maximum growth; however, would suggest a distance of 25 feet each way for general plantings, which plan requires 70 trees to the acre.

THE THREE RACES OF AVOCADOS

The prospective planter should familiarize himself, as promptly as possible, with the three horticultural races, viz., West Indian, Guatemalan, and Mexican. These differ in respect to frost-resistance, as well as season of ripening and characteristics of foliage, flowers, and fruit.

The simplest rule to follow is this: crush the leaves, and if they smell of anise or sassafras, the tree is a Mexican, or at least has Mexican blood. If they do not have an aromatic odor, but smell like bruised grass, then the tree belongs either to the West Indian or Guatemalan race. To determine between these two, it is necessary to know the season of ripening, and the character of the fruit; if the latter has a thick, woody, brittle skin, coarsely granular in texture, and ripens during the winter or spring, the variety belongs to the Guatemalan race; if, on the other hand, the fruit has a leathery, pliable skin, and ripens in summer or autumn, then the variety belongs, in all probability, to the West Indian race. The differences between the West Indian and Guatemalan races are slight, and in some cases it is scarcely possible to classify a variety with accuracy. Furthermore, crosses or hybrids between these two races are commencing to appear in Florida; as would be expected, they are intermediate in character between the two parent races.

The following brief characterization of the three horticultural races may be of value to those who are not yet thoroughly familiar with avocados:

West Indian, sometimes termed the South American. This is the race which has been cultivated in southern Florida for many years, the first seeds having come, in all probability, from Cuba. It is the predominant race in the lowlands of tropical America, and the most susceptible to

frost injury. It should not be planted commercially in Polk County, but has proved valuable in Dade and Lee. The fruits, which mature from June or July to October or November (a few, of certain varieties, remaining on the trees until January), are sometimes very large, the maximum weight being about three pounds. They vary from slender pear-shaped to round, and in color are usually bright green or maroon-purple. They have a soft, leathery, but thick skin, from which the flesh separates readily. The seed is large, and often loose in the cavity.

Guatemala, where it is grown at elevations between 3000 and 9000 feet. It withstands somewhat more frost than the West Indian, and in consequence can be planted, with less risk, in those portions of southern Florida where frosts are likely to occur with frequence. Certain varieties of this race will stand 3 to 5 degrees more frost than the West Indians; others are nearly as tender as the latter. Commercially, this is a valuable group, as the fruits ripen during the autumn and winter months, when prices are high in northern markets, and the demand keen. The fruits, which are usually of excellent quality, have a thick, hard skin, coarsely granular in texture and often rough on the surface, which may be either dull green or dark purple in color. The flesh is frequently less watery than in the West Indian race, and the seed smaller, and always tight in its cavity. The oil content of the fruit is, on the average, higher than in the West Indian race.

Mexican. This race is so distinct from the other two as to be considered by some botanists a separate species. It is native to the highlands of southern Mexico, and it is the most resistant to frost, as well as to drought, of all avocados. Mature trees have withstood temperatures of 20° above zero without injury. Unfortunately, its fruits are usually small, and less valuable commercially than those of the other two races; there are a few varieties, however, which bear fruits of marketable size, and excellent quality. The oil content is higher than in the other races, and the fruits are of very rich flavor. Usually they are four to eight ounces in weight; they are oval or pear-shaped, and green or glossy dark purple in color. The skin is scarcely thicker than that of an apple; the flesh is yellow and oily, and the seed usually large, and commonly tight in the cavity. For the northern edge of the avocado belt this is the race to plant; in southern Florida it has little value.

In addition to these races, a new group has sprung into being, that of Hybrids: several varieties are now propagated and planted in Florida. In character, they partake of both parents, and some of them seem very promising for commercial planting. Because of the fact that their parentage is unknown, it is often impossible to classify with accuracy certain varieties which appear to be of hybrid origin, and they are therefore retained in the group to which the seed-parent appertained. Thus, Collinson and Winslowson, while believed to be crosses between the Guatemalan and West Indian, are both seedlings of Guatemalan varieties, and are therefore listed with the other varieties of that race.

VARIETIES OF AVOCADOS PROPAGATED AND OFFERED FOR SALE BY THE POLK COUNTY NURSERIES, BABSON PARK, FLORIDA.

WEST INDIAN RACE

TRAPP. For many years the standard commercial variety of southern Florida, where it still retains much of its prestige, though many promising varieties have vied with it for the honor of heading the list. It is a heavy and regular bearer, and carries its crop until late autumn in some instances; these advantages are in part offset by the fact that the tree is not a strong grower, and very susceptible to frost injury, sunburn, and disease. On heavy soils, and under good cultural conditions, it has proved an extremely profitable sort. The fruit is roundish oblate, 14 to 20 ounces in weight, yellowish green in color; the flesh is deep yellow, of excellent quality; seed very large, sometimes loose in the cavity. Season October to December in southern Florida.

Pollock. Now being planted extensively in southern Dade County, where it has been found a profitable sort to cultivate. It matures in late summer—August being its principal season—and is one of the largest fruited avocados known. Specimens three pounds in weight are not uncommon. The form is broadly pear-shaped, the color light green. Flesh rich yellow, smooth, free from fiber discoloration, of rich flavor and excellent quality. Seed rather small, and practically tight in the cavity. The tree is a fairly strong grower; considering the large size of the fruits, it bears good crops, except on certain soils. This variety has gained in popularity during the past few years.

GUATEMALAN RACE

TAFT. A variety of California origin, which has proved valuable in the Homestead region of Dade County, and should be tried commercially elsewhere. Taft is the best orchard tree of all the Guatemalans—shapely, a vigorous grower, with abundant foliage to shade the ground beneath it. The fruit is pear-shaped, about a pound in weight, the surface light green in color, smooth except around the neck where it is slightly warty. The skin is not thick as in some other varieties of the race; the flesh is cream-colored, smooth, free from fiber, and of rich flavor. The seed is medium sized, tight in the cavity. The ripening season in southern Florida is February and March. The trees do not usually come into bearing as early as those of some other varieties, though they have been satisfactory in this respect at Homestead.

NIMLIOH. Introduced from Guatemala by the U. S. Department of Agriculture. A fine large fruit, of good quality. It has not yet been tested commercially. The tree is a vigorous grower, and shapely in habit. The fruit is oval or oblong oval, and weighs two to three pounds. The surface is heavily pebbled, dark green in color. The flesh is yellow, smooth and buttery, the seed very small and tight in the cavity. The season of ripening in southern Florida is midwinter.

Panchoy. Introduced by the U. S. Department of Agriculture from Guatemala. A fruit of very fine quality, and a tree of unusual vigor and fine habit. Commercially the variety has not yet been thoroughly tested in Florida, but for some regions it looks very promising. The fruit is slender, pear-shaped, distinctly necked, and weighs 14 to 20 ounces. The surface is heavily pebbled and dark green in color; the flesh deep yellow, very smooth and of fine texture, and of unusually rich flavor. The seed is medium sized, and tight in the cavity. This variety has done well at Winter Haven, though it has not borne as heavy crops as would be desirable.

LINDA. Introduced from Guatemala. This variety has proved highly satisfactory in several parts of Florida. It is one of the largest Guatemalans in cultivation. The tree is a strong grower and good bearer. The fruit which weighs from two to three and a half pounds, is broadly oval in form, slightly rough and bronze-purple in color. The flesh is free from fiber, and of rich flavor. Seed small. The season of ripening in southern Florida is during February and March.

Itzamna. Introduced from Guatemala by the U. S. Department of Agriculture. The latest to ripen of all Guatemalan avocados so far tested in Florida. The tree has shown itself, at Miami, a strong, upright grower, of excellent bearing habits. The fruit is slender, pyriform, about 14 ounces in weight, the surface slightly pebbled, and rich green in color. The flesh is cream-yellow, smooth, very dry in texture, and of unusually rich flavor. The seed is medium sized, and tight in the cavity. The ripening season at Miami is from March to May. Itzamna is recommended for trial wherever the Guatemalans are known to succeed.

Collinson. Originated at Miami, Florida, as a seedling of the Collins, which is a small, extremely hard-shelled Guatemalan avocado introduced by the U. S. Department of Agriculture. Collinson is believed to be a cross between the West Indian and Guatemalan races. The tree is unusually vigorous, and an erect, shapely grower. It has borne good crops up to the present, and is recommended for commercial planting by nurserymen in Dade County. The fruit is broadly pyriform, nearly round; weight 16 to 20 ounces; surface smooth, bright green; skin rather thin for a Guatemalan; flesh cream colored, of good flavor and quality; seed large, tight in the cavity. The season of ripening in southern Florida is from December to February.

MEXICAN RACE

Puebla. Introduced from Mexico in 1912. The best of the Mexican varieties, and highly recommended for home use in central Florida, as well as for commercial plantings on a limited scale. The tree is vigorous, making a great abundance of foliage; it bears regularly and heavily in most regions. The fruit is broadly pyriform to obovate, not necked, ten to twelve ounces in weight, with a smooth, dark purple surface. The skin is thicker than in most Mexicans, the flesh smooth, of yellow color,

nearly free from fiber discoloration, and of unusually rich, nutty flavor. The seed is rather large, tight in the cavity. It ripens in Florida from September to December.

Gottfried. Originated as a seedling at the Plant Introduction Garden in Miami. A larger fruit than Puebla, but scarcely as fine in quality. The tree is a strong grower, and bears well, though not quite so heavily as most Mexicans. It is hardy, having withstood 20° above zero without injury. It should not be expected, however, that very young trees will do this. The fruit is slender pyriform, up to 18 ounces in weight, smooth on the surface and shining dark purple in color. The flesh is rich yellow, with numerous fiber markings but little real fiber, and the flavor is rich and nutty. The seed is medium sized, tight in the cavity or sometimes loose. The season of ripening at Miami is from October to November.

Northrop. Originated as a seedling at Santa Ana, California. This is a very hardy and vigorous tree, whose small, richly flavored fruits are produced regularly in great abundance. It merits cultivation principally for home use, or as a door-yard tree, in regions too cold for most other avocados. The fruit is pear-shaped to obovoid in form, about six ounces in weight, shining blue-black in color. The flesh is yellow, with fiber markings and a little fiber, the flavor rich and nutty. Seed moderately large, tight in the cavity. The ripening season in southern Florida is from August to September.

HYBRIDS

Introduced into California from Atlixco, Puebla, Mexico, in 1911. A remarkable fruit, the only one of its class, believed to be a cross between the Mexican and Guatemalan races. It is nearly as hardy as the Mexican, and unusually vigorous in growth. It makes a tree of good habit, and bears a fruit which is commercially valuable. Its behavior, both in Florida and California, has been somewhat puzzling, the trees maintaining vigorous growth throughout most of the year and bearing very little fruit, though they flower in great profusion. With proper cultural conditions, it is believed good crops will be produced, once the trees have attained a certain age and hardened up their growth. The fruits are very susceptible to avocado scab, however, and the variety should not be planted in moist regions. In form, size and many other characteristics the fruit is rather variable, this variability being taken as one of the evidences of the hybrid origin of the variety. The form is oblong to slender pear-shape, the weight from 10 to 24 ounces. The surface is very lightly pebbled, gray green in color. The skin is leathery, firm not coarsely granular as in true Guatemalans. The flesh is yellow, extremely smooth and buttery, containing more fat than almost any other variety (as high as 30%), and of excellent rich flavor. The seed is small, and tight in the cavity. The season of ripening in southern Florida is from January to April.

REVISED PRICE LIST FOR 1924

	Each	20-50	50-100	500-1000
TRAPP	\$2.00	\$1.75	\$1.50	
POLLOCK	2.00	1.75	1.50	
TAFT	2.00	1.75	1.50	1.25
V NIMLIOH	2.00	1.75	1.50	1.25
√ PANCHOY	2.00	1.75	1.50	2.20
ITZAMNA				
COLLINSON	2.00	1.75	1.50	
√ PUEBLA		1.75	1.50	1.25
GOTTFRIED	2.00	1.75	1.50	1.25
NORTHROP	2.00	1.75	1.50	
LINDA	2.00	1.75	1.50	1.25
✓ FUERTE	2.00	1.75	1.50	1.25

Above price on 500-1000 trees is at nursery UNCRATED

Other very choice varieties of Wilson Popenoe's Guatemalan and Ecuadorean collections not listed, in limited quantity. Prices on application.

All trees grafted and budded on West Indian stock and grown in cypress boxes. Weight 20-30 lbs. when crated for shipment. Trees will range in height from 3-24 inches. As orders are received best plants available will be placed in reserve until supply is exhausted. Prices subject to change without notice.

W. D. CARRIER.

November first, 1923. Babson Park, Fla.

TERMS OF SALE

Cash with order if for immediate shipment. For future delivery 25% in advance, balance due at time of shipment.

REMITTANCES

Remit by express, post office money order, bank draft or registered letter.

GUARANTY

Stock is guaranteed to be strong and healthy, true to name, properly packed and shipped according to instructions. (All trees when not otherwise instructed, will be shipped by express collect.) After delivering goods to carriers we cannot hold ourselves responsible for any loss or injury to trees which have been carefully packed and crated. When errors have been made on our part, it is mutually agreed we shall not be held responsible for a greater amount than the purchase price. The greatest care is used in propagation, budding, labeling and shipping our trees, but we give no guaranty except that if the trees sold by us de not prove true to name, we will upon proper proof of error, either return original purchase price or replace them at our option. Stock is grown, crated and shipped in small cypress boxes made for this purpose and can be transplanted during any season without disturbing the root system, which is essential to avocado plantings; the less roots disturbed the better, and because of this method of propagation one need not suffer loss from dried out or broken roots upon arrival of trees. We ask that customers please advise if substitutions are desired when out of varieties ordered.

