Fundación Chile

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ARCHIVO

Estimado Carlos.

Te envío algunos antecedentes sobre el tema "Guellema" que pueda ser de tu interés.

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10

Filberts

Filberts (*Corylus avellana* and *C. maxima*) grow wild in Europe, particularly in the Mediterranean region and the Balkans. By selection and hybridization of these, many improved cultivars have been secured which are the basis of the commercial filbert industry. This had spread through western Europe into England and east through Turkey.

The American hazel (*Corylus americana*) and the beaked hazel (*Corylus rostrata*) are native to the northeastern and middle western part of the United States. The plants are sprawling shrubs, and are scattered in the margin of woodlands and fence rows. The nuts from the wild plants, with few exceptions, are small and hardly worth gathering. The nuts are abundant and furnish food for wildlife. The American hazel has the valuable characteristic of being extremely hardy, its range extending into the far north of Canada (MacDaniels 1964).

Wild hazelnuts were used extensively by the Indians in the Pacific northwest. The nuts, while small and very hard-shelled, produced more edible food than chinquapins or beechnuts. The wild hazelnut trees are quite variable in size, and grow on dry rocky hillsides, never exceeding 8 ft in height. They are being replaced by the (cultivated) European filberts.

HISTORY OF FILBERTS

The terms filbert and hazelnut are apparently used interchangeably to include all plants in the genus *Corylus*. Groeschke (1887) in his monograph on *Corylus* used the term hazelnut. The L.H. Bailey (1949) and Rehder (1956) manuals of cultivated plants give hazelnuts as the preferred common name for the genus. In Great Britain a distinction is made between filberts, which have the husk longer than the nut, and cobnuts in which the husks are shorter than the nuts (Howes 1948). In the United States filbert is commonly used to designate nuts derived

from European species while native American sorts are called hazelnuts (Slate 1930).

The most important sources of commercial cultivars are *C. avellana* and *C. maxima*, both of European origin. The American species *C. americana* has been hybridized with the European filberts to produce hardy cultivars of some commercial promise. The beaked hazel, *C. cornuta*, a very hardy species, is widespread in North America and its counterpart on the Pacific coast has apparently not been used. The Turkish hazel, *C. colurna*, native to southeastern Europe and western Asia, grows to be a tree 80 ft in height and, because of its non-suckering habit, has been used experimentally as a stock for filberts. Several other species in China, Japan and temperate parts of Asia have apparently not been used in commercial nut production though nuts undoubtedly find local use.

Courtesy of Oregon Filbert Commission

FIG. 10.1. A BEARING FILBERT ORCHARD

Filberts date back to ancient times. Old Chinese manuscripts indicate that their use is as old as agricultural history, going back nearly 5000 years (Peker 1962). Filbert culture was known to the ancient Greeks and Romans and the nuts were supposed to have medicinal qualities in addition to their food value. Through centuries of selection, cultivated types and clones have been secured and propagated in various countries where the European hazels have been native, and the culture extended to areas beyond their natural range where climate and soil conditions are favorable.

The name filbert is supposed by some to have originated from "full beard," referring to the fact that in some cultivars the husk entirely covers the nut. By others, it is thought to have been derived from St. Philibert, as August 22 is dedicated to him, a date that corresponds in England to the ripening of the earliest filberts (Anon. 1963).

Fairchild (1939) reported that Istria was noted for its filberts, and he secured different leaf-spot resistant cultivars grown in that region for importing into America. None of the Istrian species fruited well in California, although *C. tubulosa* proved to be an excellent pollen-producing cultivar and was used for this purpose in Oregon and Washington.

COMPOSITION OF FILBERTS

Data on the composition of filbert kernels, shells and oil are shown in Tables 10.1 and 10.2. The Barcelona and DuChilly filberts are grown in Oregon (85%) and Washington (15%), and were introduced from Europe in 1885 by Felix Gillette. For comparison a few determinations of European filberts are shown (Fang and Bullis 1949). Additional data on composition and nutritive value of filberts are shown in Table 10.3.

TABLE 10.1

FATTY ACID COMPOSITION OF BARCELONA AND DUCHILLY FILBERT OIL (IN PERCENT)

	Barcelona		DuChilly	
Content	Solid Acid Fraction 35.61%	Liquid Acid Fraction 63.99%	Solid Acid Fraction 63.03%	Liquid Acid Fraction 36.62%
Saturated				
Palmitic	0.49	1.80	0.04	0.46
Stearic	1.57	0	0.77	0
Arachidic	1.41	0	3.05	0
Unsaturated				
Oleic	24.42	31.78	47.38	17.45
Linoleic	2.77	14.05	5.29	9.94
C_{20} mono-ethenoid	4.97	15.98	6.49	8.76
C_{22} mono-ethenoid	0	0.40	0	0
Unsaponifiable	0	0.40	–	0.35

AREAS OF PRODUCTION

The areas where filberts are grown commercially are relatively small compared with the very large areas in which the plants grow wild. In parts of Yugoslavia, for example, there are thousands of acres of hazel scrub producing very small, thick-shelled nuts, but commercial culture in Yugoslavia is restricted to climatically favorable areas along the Adriatic

coast. At the present time the greatest production of filberts is in Turkey along the south shore of the Black Sea (Schreiber 1947; Serr 1964). Other exporting areas are southern Italy and Spain. Considerable quantities are also produced in parts of Germany, France and Kent, England (Anon. 1916), but are consumed mostly in the countries where they are grown. During the past half century a commercial filbert industry has developed on the Pacific coast of the United States in Oregon and Washington, producing about 10,000 tons of unshelled filberts a year which is only about 6% of world production of filberts. Filberts account for about 20% of the world production of all tree nuts (Groder 1963).

TABLE 10.2

CHEMICAL COMPOSITION OF BARCELONA AND DUCHILLY FILBERT SHELLS AND KERNELS (IN PERCENT)

Content	Shells		Kernels	
	Barcelona	DuChilly	Barcelona	DuChilly
Moisture	7.08	7.81	3.43	3.58
Total ash	0.997	1.297	2.53	2.69
Hot water insoluble ash	0.416	0.645	1.09	1.50
Hot water soluble ash	0.581	0.652	1.44	1.19
Alkalinity of insoluble ash	0.87	1.36	2.02	1.90
Alkalinity of soluble ash	0.34	0.92	0.78	1.29
Crude protein N · 6.25	1.35	1.70	17.1	15.6
Ether extract	nil	nil	65.5	63.1
Reducing sugars	0.98	1.15	0.12	0.18
Sucrose	0.20	0.75	4.79	5.57
Starch	nil	nil	3.54	4.16
Pentosans	27.0	67.7	–	–
Crude fiber	–	–	2.09	1.94

Much of the world's filbert production comes from plants of local origin which are seedling types developed in the area rather than named clones. Thus there are groups of clones of Turkish, German or Spanish origin which have recognizable characteristics but are not definite clones. There is much confusion in cultivar names except where preference is given to some clone of proven value. In Oregon, the Barcelona is the one clone that is grown commercially in any quantity except for Daviana and DuChilly which are used as pollinizers (Zielinski 1959). In Turkey, the Tombul is reported as the leading cultivar with Sivri and Badem used as pollinizers. In Great Britain, Kentish Cob (Lambert's filbert) is the chief commercial cultivar with Cosford, Daviana and others as pollinizers. Extensive cultivar tests have been made and are now in progress at the Oregon State Experiment Station. The industry there is based on the cultivar Barcelona (85%) and its pollinizers and, though some other cultivars appear to have promise, there seems to be no move to replace this cultivar with anything else (Zielinski 1959).

Over the years 1968-74 the tonnage of filberts in-shell increased from 203,000 to 306,000 metric tons. The major portion of this is from Turkey which now ships approximately 82% of the world's tonnage.

TABLE 10.3

WORLD FILBERT IN-SHELL PRODUCTION

Country	1971	1972	1973	1974	1975	1976
			(1000 metric tons)			
Italy	95.0	75.0	80.0	103.0	80.0	95.0
Spain	20.0	20.0	15.5	33.0	14.5	25.0
Turkey	150.0	190.0	240.0	240.0	320.0	270.0
U.S.	10.3	–	11.1	6.1	10.8	7.0
Total	275.3	294.2	346.6	382.1	425.5	397.0

Source: Foreign Agric. Serv., FN 4-76.

TABLE 10.4

WORLD FILBERT IN-SHELL EXPORTS

Country	1972	1973	1974	1975	1976
			(1000 metric tons)		
Italy	62.8	50.7	47.0	75.0	55.0
Spain	18.5	15.6	8.4	22.1	8.0
Turkey	145.3	185.4	250.2	161.7	225.0
U.S.	0.7	0.8	0.9	0.8	0.9
Total	227.3	252.5	308.5	269.6	288.9

Source: Foreign Agric. Serv., FN 4-76.

The Willamette Valley of Oregon and corresponding territory in Washington have proved suitable for filbert growing. In the Willamette Valley filberts have been grown for about five decades, and results show that production on suitable sites and soils is a commercial success.

Tests made in various other sections of Oregon for the past few years indicate that filberts can be commercially grown, more or less profitably, in certain districts outside of the Willamette Valley.

The fact that filbert catkins when fully dormant are killed at a temperature of about 26.1°C (15°F) prohibits commercial production in most parts of eastern Oregon. In some areas of eastern Oregon, however, hardier cultivars survive and bear a few nuts. Along the coast the success of filbert growing has not yet been fully demonstrated, although in the Coast Range some orchards are doing very well.

In the Umpqua Valley a few orchards on good land are profitable. Near Scottsburg the oldest and largest filbert tree in the Pacific Northwest is located. It is more than 100 years old, with a spread of more than 50 ft. South of the Umpqua Valley filbert growing has not proved successful. Considerable experimental work and testing must still be done before the value of this fruit can be definitely determined for many sections of Oregon.

SUITABLE SOILS

The importance of good soils cannot be overemphasized. Too often the owner is encouraged by growth and production, so maintains the trees until the 8th or 12th year. At this time, having exhausted the productive capacity of the soil, tree growth and nut production become stationary instead of increasing as expected.

With trees on mediocre soils, production does not increase with increasing age, and size of trees and extreme fluctuations in crop yields occur. A good crop one year may be followed by several years of low production. In a year of heavy production, new shoot growth is very short and unproductive and it may require two or more years for the tree to develop the strong shoot growth that precedes heavy production. When orchards reach this condition, because of the soil on which filbert trees are growing, there is little that can be done to improve production. Natural physical conditions associated with fertility and moisture-holding capacity of the soil strictly limit its productive capacity.

The exact type of soil best suited to filberts varies in different districts, but in all cases it should be deep, fertile and well drained.

Good filbert soil should be 8 to 10 ft or more in depth. Recent investigations show that it is doubtful whether a soil 6 ft deep will maintain a mature orchard in regular, heavy production. Deep soils naturally afford a large supply of water and plant nutrients during the dry season. The effective depth of any soil is determined by the distribution of tree roots in it. If roots can grow to a depth of only 3 ft, effective soil is shallow regardless of what is below. The idea that filbert trees are shallow rooted has practically been discarded since investigations have shown that under favorable soil conditions roots readily grow to a depth of 8 to 11½ ft. Root penetration is stopped by rock, impervious hardpan, water table, sand or gravel, and lack of aeration in the soil. All of these conditions except lack of aeration can be located in the field by boring with a soil tube to a depth of 8 to 10 ft. Aeration of soil can be determined only by laboratory methods. Compact subsoils with a mottled color, indicating poor drainage, are often found. Besides affording few or no openings large enough for roots to enter, this kind of subsoil layer often supports a water layer that further restricts or inhibits root development.

Fertile soil is essential to proper development of filbert trees. As the fruit is largely borne laterally on one-year-old wood, plant food materials should be present in the soil in sufficient quantity so that, with a plentiful supply of moisture, good vegetative growth can be obtained each season. Attempts to obtain this growth by means other than high soil fertility usually meet with failure.

Filberts will not thrive in waterlogged soils. Trees will survive very adverse conditions, but tree growth and yields of nuts will be better in optimum conditions. In soils where the water table, lying on a heavy impervious subsoil, comes close to the surface for long periods of time during rainy seasons, filbert trees may survive for years. Some trees 25 years old are still growing on such soil, but they are little higher than a man's head and have produced few nuts.

Filbert orchard soils should be well drained during the entire year, yet should be capable of storing a large quantity of water for the trees during the dry season. Filbert roots make a very extensive growth during winter in western Oregon, but if the soil is waterlogged this growth is retarded or entirely inhibited. Growth of tree tops is dependent on the formation of new roots. As a result of lack of root growth, when the demand comes during the growing season for large amounts of plant food materials and moisture, the root system is not extensive enough to provide for a good, vigorous growth of the top (Anon. 1963).

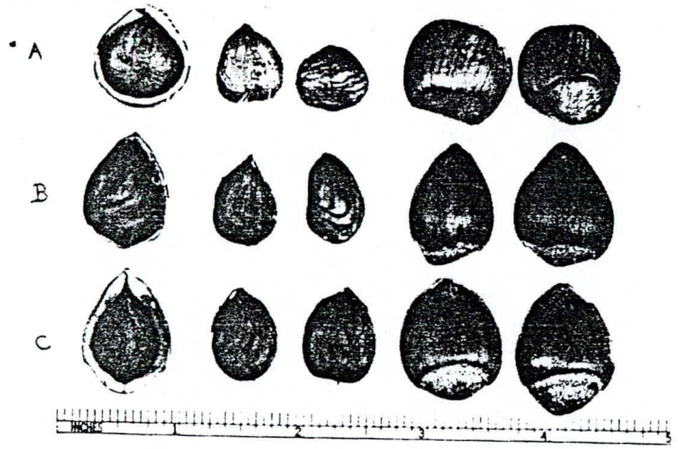
FILBERT CULTIVARS

A number of filbert cultivars have been grown and tested in the Pacific Northwest. Some individual collections now contain more than 80 named cultivars. In addition, a large number of seedlings have been under observation, and a few have been recognized.

Barcelona and its pollinizing cultivars are grown in nearly all commercial orchards in Oregon. Brixnut has been planted to a limited extent. In Washington, the DuChilly cultivar has been planted commercially as a companion cultivar to Barcelona in some sections and as the sole commercial cultivar in others.

In the future new cultivars will undoubtedly be introduced to the public. Thousands of seedling trees are fruiting; from these, promising ones are being selected and named. Some of these seedlings have such qualities as large size, thin shell, and white kernels, which make the nuts appear attractive. Any new cultivar, however, before becoming established commercially, must be grown for years under orchard conditions. Growers may be justified in planting a few trees of a new cultivar as a test, but those wishing the safest investment will plant principally the

old standard cultivars. Since any list of new cultivars now being put on the market will be out-of-date within a very short time because of the elimination and addition of cultivars, no list of such cultivars is given.



Courtesy of L.H. MacDaniels

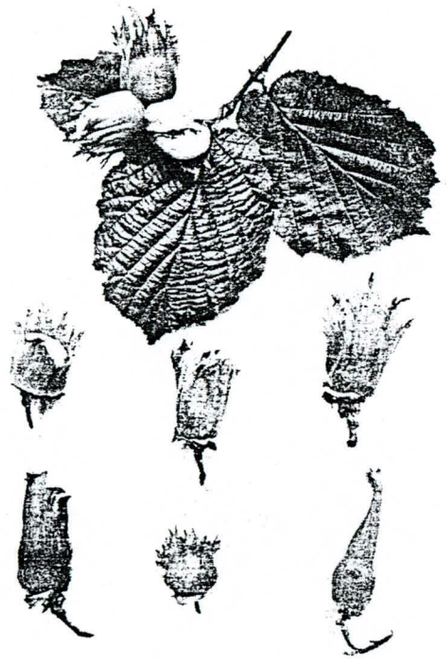
FIG. 10.2. THREE CULTIVARS OF FILBERTS, SHELLED AND UNSHELLED

(A) Barcelona—thick shell; (B) hybrid with *C. americana*—thin shell; and (C) hybrid with thick shell.

Cultivar tests have been made also at the New York State Experiment Station at Geneva, New York, in an attempt to find cultivars that are adapted to the eastern United States. Of 120 cultivars tried, none was sufficiently promising to warrant commercial culture. Because of their hardiness, Cosford and Medium Long were the most successful. Barcelona and Italian Red were the most productive, but were badly damaged by winter cold.

Attempts have been made to increase the hardiness of the filberts by crossing them with the wild hazel (*C. americana*). Early hybrids produced were the Bixby and Buchannon made by Mr. J. F. Jones of Lancaster, Pennsylvania, who crossed the filbert Cosford with the wild hazel, Rush. More recently the U.S. Department of Agriculture has released two promising clones, the Reed and the Potomac (Reed and Davidson 1958). Also, at the Geneva, New York Station, several hybrids have been produced by Slate (1930) and are under test. These are promising for growing in the eastern United States at least on a non-commercial basis.

Although the Chinese and Turkish hazels are good sized trees with a single trunk, the species from which the commercial filberts are derived grow normally as bushes with many trunks coming from a common root system. Left to itself the plant soon forms a thicket of many trunks which crowd each other and result in unfruitfulness. In orchard culture, one of the most difficult problems is to maintain a single trunked tree that can be properly managed.



Courtesy of Cornell Agric. Exp. Stn.

FIG. 10.3. FILBERT LEAVES, AND FRUIT OF DIFFERENT CULTIVARS, SHOWING DIFFERENT TYPES OF HUSKS

POLLINATION OF FILBERT TREES

Self-sterility of filbert cultivars makes interplanting a necessity in order to provide cross-pollination. An orchard of one single cultivar invariably produces a few scattering nuts; therefore self-sterility cannot be said to be absolute, but in a commercial sense it is so nearly complete that it may be considered so. This has been proved true by experiments and by the experience of growers.

Under normal conditions the blooming season of the filbert extends over a period of at least three months, counting the time from the beginning of pollen shedding by early cultivars to full bloom of pistillate flowers of late cultivars. Within this period there is (for many cultivars) a

natural sequence of blooming. Considerable variation occurs ... the sequence from season to season and in the length of time during which a cultivar may be in bloom. These variations are caused by climatic conditions. Seasons have been noted where late blooming cultivars have shed pollen at the same time as normally early blooming cultivars.

Proportionately, one pollinizer tree to eight trees of the main cultivar has been the regular practice. The use of one pollinizer to five trees is not out of proportion when orchards are young, or in unfavorable seasons after they are more fully grown; in favorable seasons and in older orchards, use a smaller number of pollinizers, in the ratio of 1 to 15 or 1 to 24. It is in unfavorable seasons, which occur frequently, that greater number of pollinizers will undoubtedly prove their worth.

If any change in pollinizers is considered, it is recommended that early and late blooming cultivars be included.

Grafting one limb in every tree to a pollinizing cultivar provides the best distribution of pollen but presents several difficulties unless nuts from these limbs are very similar to those of the commercial cultivar or so small they will not be picked up. If all nuts are harvested together, tolerance in grading rules may be exceeded. Grafting pollinizing cultivars in the trees will delay production as the blossoming of grafted limbs will be behind the main part of the tree. The difficulty of obtaining a good stand of scions often still further delays nut production. In some cases several years have been required to graft in the required number of pollinizers.

In an orchard lacking pollination, it can be provided by bringing in limbs with unopened catkins of the proper cultivar. If this is done just as the first pollen is being shed and the limbs are put in buckets of water suspended in the trees, considerable viable pollen will be shed that will aid in setting a number of nuts. This procedure is not practical on a large scale, but it can be used in a limited way until the trees planted or grafted for pollination purposes begin to produce pollen.

Many growers have attempted to pollinate their filbert trees by bringing native hazel branches into the orchard at the time pollen is being shed. This has failed in every case noted, since the pollen of native hazel is incompatible with filberts (Anon. 1963).

The pistillate flowers which develop into the nuts are borne within lateral and terminal buds on the previous season's growth. The staminate flowers which produce pollen are borne in naked catkins on short stalks either laterally on the previous season's growth or terminal on short spurs which may also bear leaf or fruit buds. In normal development, after a short chilling period in the fall, these catkins will respond to temperatures above freezing by elongating to twice their dormant length and shedding their pollen. In mild climates such as Oregon this may occur

in January or perhaps earlier. In colder climates, without warm weather during the winter, pollen shedding may be delayed until late February or early March. At the same time the pollen is being shed, the pistillate flowers extend their red stigmas through the tips of the buds where they are exposed to the wind-borne pollen. After pollination the stigmas dry up and are not conspicuous. Fertilization takes place within the bud which remains apparently dormant until the warm weather of spring promotes bud break and leaf development. The fertilized pistillate flowers develop very slowly at first and do not become conspicuous until late spring. The shell of the nut then develops rapidly to full size and becomes filled with white endosperm. The embryo, which, up to this time, has remained small, now develops rapidly into the kernel of the nut which fills the shell cavity at harvest.

Courtesy of L.H. MacDaniels

FIG. 10.4. FILBERT FLOWERS THAT COME OUT IN WINTER

(A) Dormant catkins; (B) catkins shedding pollen; and (C) buds containing pistillate flowers.

The limits of the commercial culture of the filbert are, for the most

part, determined by the nature of the plant itself, particularly in relation to low winter temperatures, late spring freezes and drying winds. The naked staminate catkins are particularly susceptible to winter cold. Although killing temperatures will vary with cultivar and condition of the plant, 9.4°C (49°F) is critical for killing dormant catkins (Schuster 1944) and lower temperatures may damage trunks and crotches as well. Serious damage occurs when warm weather which causes pollen shedding is followed by freezing temperatures. Both pistillate and staminate flowers will withstand some frost but temperatures around 9.4°C (49°F) are critical. Cold damage may be greatly increased if there are drying winds. Filberts are temperate zone plants and their culture is limited in the south by lack of chilling and too early pollen shedding and probably other factors.

PROPAGATION OF FILBERTS

Although filberts are easily raised from seed, nuts from the resulting plants lack uniformity and the practice is little used commercially. A possible exception is the Turkish Hazel (*C. colurna*) which is raised experimentally for use as a non-suckering stock. Standard nursery procedure is to propagate cultivars by some form of layerage. In mound layering the parent plant or stool is cut to the ground. This forces many suckers into growth and after these are well started, earth is mounded up to a depth of 1 ft or more over their base. If this is done in late spring and the soil kept damp, roots will, in most cases, form at the base of each sucker and it may be removed from the parent plant in the fall. These rooted cuttings or suckers will not be good nursery trees and are usually planted out in the nursery row for another year when they are dug and sold (Schuster 1944).

In continuous layering, the stool plant is cut to the ground and the suckers allowed to grow for open season. The next spring these suckers are bent radially away from the stool and staked down in shallow trenches. As shoots grow upright from the buds on the layered sucker, the earth is filled in around their bases and kept moist. In the fall the new shoots will have rooted at their base and are cut with a part of the original sucker attached. These are grown in the nursery for a season and when dug the parts of the original sucker are trimmed off to reduce new sucker formation.

If only a small number of plants are wanted, tip layering is used. In this method vigorous suckers on the parent plant are bent in the form of a V and the point of the V is covered with about 8 in. of moist soil, leaving 1 ft or more of the tip of the sucker beyond the V exposed. After a season's growth under good conditions most of these tips will have rooted and

may be dug and set in the nursery row for another season's growth. Basal suckering on the nursery tree can be reduced by cutting off the lower part of the rooted sucker.

FILBERT CULTURE

Filbert cultivation practices are essentially the same as for other kinds of fruit trees. Under conditions prevailing in filbert growing districts of the state, cultivation is primarily for the purpose of conserving moisture during the growing season. During the past few years the tendency has been for growers to reduce the frequency and depth of cultivation. This tendency is in line with results obtained in soil investigations, which show that cultivation that destroys all weed or cover-crop growth and maintains a shallow mulch is sufficient.

In maintaining soil fertility, a program that ensures the incorporation of large amounts of organic matter into the soil is of first importance. Growing cover crops is the cheapest and usually the most satisfactory method of supplying organic matter. Vetch such as hairy, Willamette, or common, with some grain such as wheat, oats, or rye is the most commonly grown cover crop and the one most generally suited to various soils. Vetch seed should be sown in early September at the rate of 40 to 50 lb per acre with an equal or variable amout of grain. In many cases the greatest growth occurs in late spring after the time that crops should be turned under to avoid loss of soil moisture. There is a tendency to delay turning vetch under in order to obtain a greater quantity of green manure.

Quickly available fertilizers like nitrate of soda are of little value applied in the fall as they leach out so quickly that plants obtain only a small part of the nutrient. Applied in late winter or early spring, they have been more successful. Ammoniated phosphate 16-20-0 and ammonium sulphate as sources of nitrogen applied either in the fall or in late winter have been most satisfactory, and when combined with the other necessary materials listed above have given the best returns. Regardless of the exact materials used, however, amounts have been adjusted so that approximately 100 lb of nitrogen have been applied per acre, with 135 lb of phosphorus as P_2O_5, 50 lb of sulfur, and 100 lb of potassium as K_2O—varying a few pounds according to the materials used.

Lime added to the soil is of value only for leguminous crops and only in a few districts having high soil acidity. As a soil amendment or fertilizer for filbert trees themselves, it is of questionable value (Anon. 1963).

For satisfactory commercial production filberts require deep, well-drained soils of good fertility and moisture holding capacity. It is true that wild hazels persist on poor soil and in some countries that produce

filberts, they are planted on poor, rough land or in hedgerows and out of the way places where they receive little care. However, in situations like Oregon and Washington where land and labor costs are high, profitable production can be secured only on good soil. Neutral or slightly acid soils about pH 6 are favorable to filbert culture. The site chosen for filberts should also have good air drainage and some protection from drying winds.

Standard planting distances for filberts in Oregon has been 20 to 25 ft on the square or diagonal system. At these distances on good soil the trees. if lightly pruned, become crowded. With a better understanding of renewal pruning it is now considered possible and profitable to use the 20 ft distance or even less. Planting distances chosen depend on intention to grow intercrops or plant filler trees. In the filbert producing areas of Turkey the filberts are planted in clumps with centers 16 to 24 ft apart and little pruning is done (Serr 1964).

In Oregon, filberts are planted in early winter or spring. Holes are dug 18 in. across and 8 in. deep at the sides leaving a firm mound or cone of soil in the center about 4 in. below ground level. The tree is set on this mound with the root extending outwards and downwards toward the outside of the hole. Topsoil is firmed over the roots, and the area around the tree is mulched with sawdust or loose soil. making sure that the tree is well supplied with water. Shallow planting after this pattern is done to reduce the number of suckers and to make their removal easier (Sander 1963). Newly planted trees are headed at 20 to 30 in. and the trunks protected from sunscald by covering them with white paint or wrapping them with white paper.

In the mechanized orchards of the western United States, intercropping is rarely done. In the Mediterranean region and elsewhere where more intensive use is made of the land, various intercrops are used. In some places the filbert trees serve as posts to support wires in vineyards. Weeds are usually controlled by pasturing with sheep and goats.

The soil management problems in the orchards of the northwest are complicated by the practice of mechanized harvesting. In general, the cultural requirements of filberts are the same as with other tree crops, involving cultivation during the early growing season to release nitrogen and reduce competition with the ground cover.

Where mechanical harvesting is to be done, the ground surface must be kept free from weeds during the growing season so that at harvest this surface is smooth and relatively hard. Sowing the cover crop is delayed so that the seedlings will not interfere with the harvest. Obviously sod culture is not adapted to mechanical harvesting. However, limited experience in Oregon showed good growth and production of filberts in orchards with more or less permanent cover pastured by sheep. In other countries where labor is cheap and hand harvesting practiced, grazing is common practice.

In growing single trunk orchard trees, the removal of suckers which form at the base of the trunk is a very important practice. The filbert plant is basically a shrub or bush and left to itself will form a thick mass of trunks that is unmanageable in the orchard. Much can be done to reduce suckering by root pruning at time of planting, cutting off the basal part of the rooted nursery tree from which most of the suckers arise and leaving only the upper part of the root system. Covering the base of the tree with only 4 or 5 in. of soil in planting, as described above, will not only reduce the number of suckers formed but will also make it easier to remove the earth from the base of the tree in the suckering process. For effective sucker control it is essential to remove them 3 or 4 times a season for the first several years after the tree is planted. The buds or primordia from which the suckers grow are formed on the underground base of the nursery tree and on the bases of the suckers which grow from these. It is therefore important to remove the new suckers as close as possible to their point of origin. To do this the new suckers are removed as soon as they appear by digging the soil away from the base of the newly planted tree and pulling the suckers off before the wood has hardened. This should be done 3 or 4 times during the first 3 or 4 years after planting or until the suckers cease to appear. More recently, weed killers, 2-4,D, amine and several others, have been used with some success (Parker 1955). Pasturing with sheep also serves to control suckering.

Courtesy of L.H. MacDaniels

FIG. 10.5. FILBERT ORCHARD IN OREGON, WITH GROUND PREPARED FOR MECHANICAL HARVESTING

In common with other orchard trees filberts pass through several stages in pruning practice. At planting time, root pruning is done at the base of the nursery tree to reduce suckering and the tree is headed at the height of 20 to 30 in. During the next few years the purpose of pruning is to shape the tree and build a strong framework. The modified leader tree with three main branches is the pattern usually sought. Removal of suckers is also important at this stage.

In the eastern United States, so-called filbert blight is caused by a fungus which occurs frequently on the wild hazels and causes damage to filbert plantings. Control measures other than cutting out dead and diseased branches are not practiced (Anon. 1965).

The most important insect pest of filberts is the filbert worm or filbert moth. Sevin, 80% wettable powder 2 lb to 100 gal. water, has given good controls and replaces Arsenate of Lead and DDT. Sevin and Guthion were also effective in controlling filbert leaf roller and filbert aphids. There is growing concern for the filbert budmite, but to date no effective control has been worked out (Jones 1964).

Filbert yields vary greatly according to age and vigor of trees, planting distance, soil, cultural practice and many other factors. Exceptional yields may be up to 4000 lb per acre (Engler 1953), good yields 2000 lb (dry basis), and on the average about 1000 lb can be expected. Yields in mature orchards fluctuate greatly from year to year. Heavy production one year is usually followed by a light crop in the year following. Frost, rain and other factors may cause reduced crops or crop failure. It is thought that heavy renewal pruning may correct or modify the natural alternate bearing tendency (Painter 1962).

HARVESTING AND DRYING

Filberts are picked up after they are fully mature and have dropped to the ground. Cultivars that do not naturally free themselves from their husks must be husked out by hand or machinery.

Many different types of field harvesting machines are now in use and the cost of harvesting has been drastically reduced by the use of these machines. There are some machines that pick nuts up off the ground, hull them, remove blanks, dirt and stones, and pour them into sacks. The most commonly used machines, however, are really field cleaners. Nuts are hand raked into piles or windrowed by a side delivery type sweeper. Then nuts, leaves and litter are dumped by hand into a hopper on the machine and the cleaned nuts are run into the sacks. The blanks, leaves, twigs, dirt and stones are discarded by the machine.

Husking the nuts is also done mostly by hand although some simple huskers have been developed (Serr 1964). In the Pacific Northwest,

where labor costs are high and mechanization possible, various machines have been devised to do all or part of the harvesting work. An essential part of mechanized harvesting is the preparation of the land to have a smooth, hard surface free from weeds at harvest time. Nuts fall naturally or are shaken from the trees, then hand raked or mechanically swept into windrows along with husks and leaves. From the windrow they may be picked up with a vacuum picker and taken to a processing shed where they are raked into piles from the windrow and then picked up mechanically or shoveled into containers. Although commercially built machines are available, some growers devise their own. A recent invention is a blower which separates the leaves from the nuts in the orchard before they are picked up (Anon. 1966). In the filbert country there are commercial firms and co-ops that will clean, husk, dry and sack nuts as they come from the orchard, and shell and sack the nuts after drying. The handling of filberts is apparently not standardized in the field or the processing plant and various types of field containers are used. In the move toward mechanization, bulk handling is increasing, replacing sacks and boxes both in the field and processing plant (Anon. 1958).

Prompt harvesting of the filbert crop is desirable. Nuts should be gathered 2 or 3 times during the season. Filberts lying on the damp ground for two weeks gradually darken. Rainy weather increases the discoloration of shells.

Damp or undried filberts should not be stored in sacks or large containers for more than two weeks, because kernels become moldy or off-flavored even if such a condition is not evident from the appearance of the shells. If nuts cannot be dried promptly, it is better to leave them in the field as they will not mold as easily when spread out on the ground. Delay in harvesting, however, does not produce the best product. Since present market requirements demand that nuts must be clean, washing is a general practice. Only under exceptional seasonal conditions will nuts be clean enough to market when brought in from the field without being washed. Various types of washing machines and equipment are used for this purpose.

Artificial drying at temperatures of 32.2° to 38°C (90° to 100°F) is used in practically all cases. It is only with small crops or in very dry seasons that filbert nuts can be dried without artificial heat by being spread out in a thin layer. As nearly all filberts are shipped to out-of-state markets, if too much moisture remains there will be loss in weight and spoilage before they are consumed. To avoid any possibility of this loss, nuts should be dried until their moisture content is reduced to 8 to 10%. Kernels containing 8 to 10% moisture snap if bitten when cold.

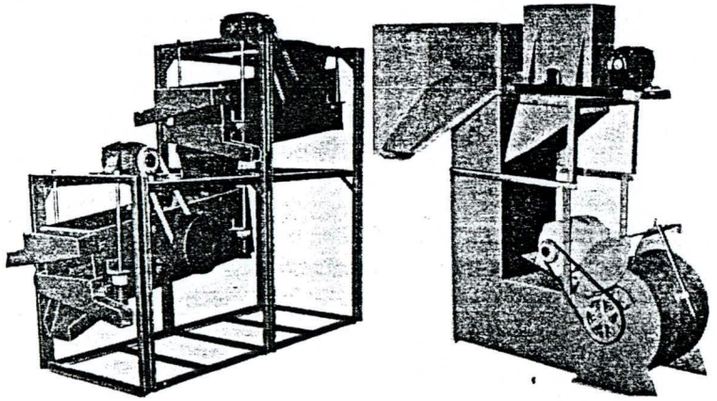
Driers of various types are in use—prune driers, hop driers, and bin driers. The amount of heat necessary to dry filberts to the required

standard is so small that expensive equipment is not needed. Speed in drying is not essential except where large crops are to be handled.

Many inexpensive, fairly efficient driers have been made by remodeling old buildings already on the ranch. The heating unit should be placed 8 to 10 ft below the floor on which filberts are spread and sufficient openings made in the lower side walls to allow entrance of cold air. The drying floor is made of wire cloth laid on strips 1 × 2 in. or 2 × 3 in. so that at least 50% of the floor space is open, allowing air to pass upward. Outlets in the roof of sufficient size to allow free upward movement of air should be provided. Few growers maintain drying temperatures continuously for 24 hours a day. Aid in designing new driers or in remodeling old buildings for drying purposes can be obtained from the Oregon Agricultural Experiment Station, Corvallis.

Small lots of filberts can be dried by spreading them out only a few layers deep on the floor in a dry room. The nuts should be stirred frequently.

In small lots of nuts, those containing no kernels can be searated from the good ones by pouring all of them into water and then picking out the ones that float high. This is a slow process but with a little experience can be well done (Anon. 1963).



Courtesy of The Wave Company

FIG. 10.6. FILBERT GRADER AND FILBERT WINNOWER

The grader separates filberts and similar nuts into five grades by size, and additional screens with different size holes are available. The winnower separates nutmeats after cracking.

STORING FILBERTS

For export for year-round consumption, filberts must be stored for one

year, and to tie-over a short crop it may be desirable to store them two years. It is well to estimate the probable storage period at harvest time, then grade and store the lots under conditions which would assure adequate storage at minimum cost.

After the filberts are dried to an in-shell moisture content of 7 to 8%, or a shelled moisture content of 3½ to 4½%, they should be closely graded, fumigated and sealed in plastic lined boxes, bags or bins. The purpose of the plastic is to stabilize the moisture and prevent the absorption of flavors from other products. They should not be allowed to change weight by substantial gain or loss in moisture. The storage life depends largely upon the temperature.

At 21°C (70°F), or lower, filberts will keep in good condition for 14 months. They should be inspected at intervals for insects, mold and other forms of deterioration. Redrying, refumigating or rebagging may be required.

At 0° to 1.7°C (32° to 35°F), with 60 to 65% relative humidity, filberts will keep for 2 years without insect or mold growth; also the bags or boxes need not be sealed.

At 3.9° to 2.8°C (25° to 27°F), with 60 to 65% relative humidity, filberts may be stored in bulk for 4 years. They should be removed to 1.7° to 4.4°C (35° to 40°F) for 24 hours before being brought to room temperature, to prevent moisture condensation.

MARKETING FILBERTS

In some of the producing countries of Europe, filberts are extensively used as food by the grower and his family and only the surplus gets into commercial channels. In areas of more intensive culture (for example, Turkey) small lots are carried to buyers in local collection centers, then to larger towns, and then to export centers in Istanbul, by boat. In this city there is a well-organized marketing organization that sells the crop mainly for export. The shelling and marketing situation in Italy and Spain is about the same as in Turkey (Schreiber 1947).

In the United States, marketing problems are of the greatest importance and are apparently more difficult to solve than those of production. The filbert exporting countries of Turkey, Italy and Spain have been growing filberts for centuries and have well organized export facilities. Exports from these countries to the United States were well entrenched before growing filberts commercially here was even begun. Because of low labor costs and generally favorable growing conditions the Mediterranean countries are able to sell filberts on the world market at a price below that which the U.S. growers consider necessary to maintain the industry. This has led to giving much attention to reducing pro-

duction costs through mechanization and cultural efficiency and to formation of the Oregon Filbert Commission and the Filbert Control Board. The Filbert Commission is concerned with price protection through tariffs on filbert imports and the promotion of filbert sales through advertising, packaging and increased utilization in the new products (Ward 1965). The Filbert Control Board, working through a Federal Marketing order, is concerned with balancing supply with demand. The domestic in-shell demand for filberts appears to be stabilized at about 5000 tons yearly, and the Board works to divert yearly production in excess of this into carryover to the next year of limited quantities of in-shell nuts, to shelled nuts which may bring a smaller return to the grower or to export (Duncan 1965). The problems of marketing filberts appear to be about the same as with almonds and Persian walnuts. On a world basis, filberts compete with all other nuts including peanuts for the market.

TABLE 10.5

FILBERT IMPORTS INTO UNITED STATES

Country of Origin	1968-69	1969-70	1970-71	1971-72	1972-73	1974-75
			(metric tons)			
			In-Shell			
India	–	–	–	–	–	5
Italy	2	–	–	–	–	–
Turkey	12	–	–	–	–	20
Total	34	–	–	–	–	25
			Shelled			
Europe						
Greece	–	15	10	45	–	–
Italy	66	34	156	65	47	6
Turkey	3642	1865	3010	1809	3645	5769
West Germany	25	67	5	1	1	–
Other	–	2	2	3	3	3
Total	3744	1985	3183	1928	3696	5778
Other countries						
Brazil	12	31	23	15	–	–
Canada	–	–	–	–	58	20
India	5	–	–	–	5	28
Mozambique	5	–	–	–	–	33
Other	–	–	14	2	2	–
Total	22	31	37	17	65	81
Grand Total	3766	2016	3220	1945	3761	5859

Source: Foreign Agric. Serv., FN 1-76.

Filberts appear in the retail stores mostly in pound cellophane bags of whole nuts or smaller lots of kernels, either whole or chips. They also form a part, though a relatively small part, of the in-shell mixed nut packs and mixed salted nuts. An extensive federal survey in 1957 (Weidenhamer 1957) showed filberts to be in relatively less demand than other tree nuts. This is borne out by examination of nut offerings in local supermarkets.

Filberts are used in various ways in different countries depending on their availability and the local customs. In Turkey filberts are roasted and sold by street vendors in the cities and towns. They are the nuts used most in confections, Turkish delight or locoum, which is much used in Turkey and Greece.

In the United States, in addition to the use of filberts as nuts, in-shell, shelled and chips, much attention has been given to developing other products such as filbert butter, filbert oil, filbert meal and making use of by-products, particularly shells (Wiegand 1950). The techniques of processing have been adapted from those used with other nuts but apparently because of the cost of producing filberts, relative to peanuts or other tree nut crops, these filbert products are not economically feasible (Miller and Devlin 1948). The use of filberts in ice cream and confections has apparently not been developed as successfully as with other nuts.

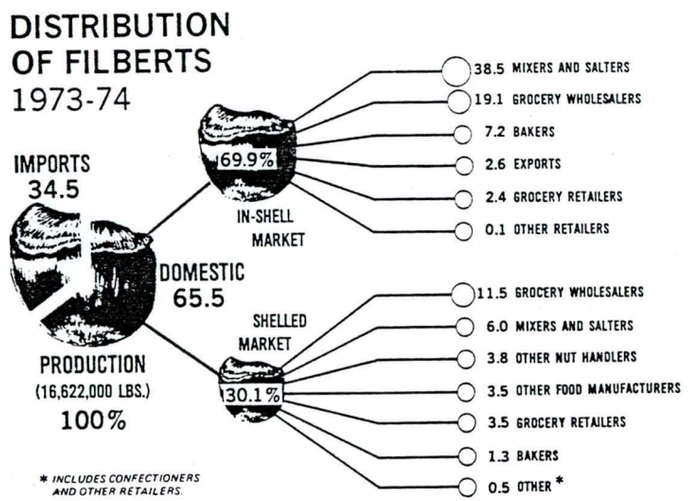


FIG. 10.7. DISTRIBUTION OF FILBERTS

HUMAN HEALTH AND THE FILBERT

Filberts have been used for food and as a medicine since earliest writings (Peker 1962). According to a manuscript found in China dating back to 2838 B.C., filbert takes its place among the five sacred nourishments God bestowed to human beings. So it is understood that the cultivation of filbert is as old as agricultural history.

Uses of Filberts

Following are the ways in which filberts are eaten in various countries (Peker 1962).

China.—Fresh filberts are roasted on the fire, then they are pounded and drunk with tea. In Peking, confectioners in the bazaar make various kinds of filbert candies. The filbert is consumed also as a dried fruit. They are also preserved in chests with salt sprinkled on them.

Italy.—The Romans used to eat filberts in both the fresh and dried state. They also roasted them.

In Italy today, filberts are used in chocolate manufacture and in confectionery. In some regions they are ground into powder and mixed with wheat and rye flour in order to make bread and cake.

Germany.—Filberts are mostly used in pastry chocolates but are eaten also as dried fruit. A delicious sauce is prepared from fresh filbert after it is pickled in bay leaf and vinegar.

England.—For Anglo-Saxons it is traditional to have filberts and figs at their Christmas feast. For that reason in November and December the exports of shelled and unshelled filberts from Turkey to England increases.

Arabian Countries.—The filbert is exported in large quantities. The domestic consumption is rather low and it is mostly eaten as an appetizer. In Giresun a kind of filbert paste, called merdane, is made by mixing roasted and mashed filberts with sugar which is considered healthful.

In Akcakoca, various kinds of candies are made from filberts. In Istanbul it is used in manufacturing soaps.

United States.—Since 1952 the Oregon Filbert Commission has maintained a long-range research program to develop new uses for filberts and improve existing practices of processing, storage and packaging. The following projects have been pursued at the Oregon State College Experiment Station: (1) development of a method of removing the pellicle from the filbert kernels; (2) the use of filbert nuts in ice cream and related products; (3) the effect of added filbert extracts on the rate of ripening and market quality of cheese; (4) the use of filberts in cheese, cheese food and dairy spread; (5) development of uses of filberts in food products; and (6) effect of storage and handling procedures on the keeping quality of filberts.

Blanching Filberts

In 1953 a method of blanching (removal of pellicles from filbert kernels) on a continuous basis was developed at Oregon State College. The method consists of first treating the kernels with lye, then with an acid solution. This chemical treatment loosens the pellicle so that it can readily be removed in a high-pressure water spray in the next step in the procedure. If the kernels are to be roasted immediately the moisture picked up during the blanching is removed during roasting. If the kernels are to be stored they need to be dried to 4½% moisture.

Under optimum operating conditions 90% of the kernels are completely peeled and remain whole. Only 5% remain unpeeled and only 5% split. There is no apparent effect of the process on the flavor of peeled kernels and keeping quality. The new blanching method widened the use and popularity of filberts.

Filbert Flavor

The filbert flavor is apparently not present in the fat of the kernels (as in peanuts, pecans and other high fat nuts), and the pellicle seemingly imparts little else than brittleness to the flavor of unblanched kernels. Many consumers prefer the slightly bitter unblanched kernels to the more bland blanched kernels.

There is a qualitative similarity associated with heat-induced volative flavors in most nuts. The interaction involves the carbohydrates, protein and lipids, which are responsible for development of the flavors. Forty flavor components were identified in roasted filberts, and 11 components were listed qualitatively in the oil from nuts roasted for different periods of time (Sheldon *et al.* 1972).

Roasting develops more flavor in filberts—a flavor that is basically very similar to that of the raw nuts. Chopping or grinding the kernels also appears to develop more flavor. A significant fact about filbert flavor is that it can be extracted and concentrated. This suggests a possibility that such a flavor concentrate might be made commercially and used widely in such food products as ice cream, cookies, other baked goods, and candies. Alcohol appeared to be the best solvent for extracting filbert flavor (Anon. 1954).

The occurrence of bitter flavor and shriveled nuts is serious among filberts; and this, connected with wormy and moldy nuts, constitutes a real problem in quality. It has been determined that much of the low quality is connected directly or indirectly with insect attacks, and can be controlled in part by spraying with insecticides (Gilpin and Dawson 1953).

Filberts in Ice Cream

New ways of preparing filberts for use in ice cream have been developed. The problem involves: (a) suitable roasting of the kernels to develop desirable flavors, (b) providing the most acceptable particle size, and (c) treating the particles to retain their crispness in the ice cream.

Correct end-point in roasting can be determined by measuring the temperature of the nuts, also observing the color of the cavity of the nuts. Cutting rather than grinding provides the best particle size and shape with the least "flouring." Coating the particles with sugar by the "panning" method appears to help prevent loss of crispness and enhance flavor. Best filbert flavor in ice cream is attained when about half of the roasted nuts are finely ground into butter (Anon. 1955).

Splitting of Filberts

This is a serious problem in some years. Splitting may be due to the particular cultivar and other causes, but is primarily due to too rapid drying. Nuts with low moisture content which dry slowly do not split.

FILBERT SHELLS

Filbert shells are used in making artificial wood, plywood and linoleum. The mixture with powdered coal and lignite is used for making cinder blocks. Their smoke is very dense, and it is used in making poisonous gases and for gas masks. Two of the common uses are for fuel and mulching. They contain 13.2% phosphorus, 14.8% calcium, 13% moisture and 1.75% ash. The nitrogen is very low (Peker 1962).

RECIPES FOR FILBERTS

Filbert Chocolate Taffy

½ cup filberts
1 cup sugar
½ cup molasses
½ cup corn syrup
½ cup water
2 squares chocolate
2 dashes cinnamon
½ tsp salt
1 tsp vanilla

Chop filberts coarsely and set aside. Combine all other ingredients, except vanilla, in a saucepan. Mix thoroughly. Cook slowly, with occasional stirring, until in firm ball state, 124°C (256°F). Remove from heat and pour at once onto a well-buttered shallow pan. When the edges stiffen and mixture is cool enough to handle, pour the vanilla into the center. Fold the corners to the center, remove from the pan and pull. Pull into a long roll, using the thumb and fingers rather than the whole hand. Continue folding and pulling until candy begins to lose its gloss. Add nuts in the folds of the taffy and continue pulling. When hard to pull, twist into a rope and cut in pieces. Turn rope half over before cutting next piece. Drop pieces on a buttered plate or wrap each in waxed paper.

Viennese Filbert Coffee

½ cup filbert praline powder[1]
1 cup heavy cream, whipped
5 measuring cups strong hot coffee
Chopped toasted filberts

Fold filbert praline powder into whipped cream. Serve on top of hot coffee. Garnish top with chopped toasted filberts, if desired.

To Toast Filberts.—Spread whole filberts in shallow pan. Bake in 204.5°C (400°F) (hot) oven 10 to 15 min. Stir or shake nuts occasionally during baking.

To Grind Filberts.—Place nuts in electric blender jar. Run blender until nuts are finely ground. Or put nuts through food grinder, using medium-fine blade. One cup whole filberts yields about 1 ¼ cups ground nuts.

Filbert-Stuffed Pork Chops

½ cup each chopped filberts
1 tbsp each chopped onion and green pepper
2 tbsp butter or margarine
1 tsp grated orange peel
1 cup diced orange
1 cup small bread cubes, cut from day old bread
2 tbsp raisins
Salt
Dash each pepper, ginger
4 double-bone center cut pork chops, with pocket

In large oven-proof skillet, saute filberts, celery, onion and green pepper in butter until filberts are toasted. Combine filbert mixture with orange peel,

[1]Filbert Praline Powder: In small saucepan combine ¼ cup granulated sugar, ¼ cup water and 1 tsp light corn syrup. Cook over medium heat, stirring constantly until sugar is dissolved and mixture boils. Stir in filberts. Cook over high heat without stirring until mixture is the coloring of molasses. Pour onto oiled cookie sheet. Cool. Break into pieces and whirl in electric blender until powdered, or place pieces of praline in a clean folded towel and crush with a rolling pin until powdered. Store in covered jar and use as needed as a topping or flavoring for desserts. Makes 8 servings.

orange, bread, raisins, 1 tsp salt and spices; toss lightly. Stuff into chop pockets; secure with toothpicks. Sprinkle chops with salt. In same skillet, brown chops on both sides. Add orange juice. Bake covered in 176°C (350°F) (moderate) oven 1 hour; uncover, bake 15 min longer or until fork-tender. Remove chops to serving platter. Skim off excess fat from pan juices; serve over chops. Makes 4 servings.

Filbert-Camembert Round

1 box (8 oz) Camembert cheese, or 6 individually wrapped pieces (1⅓ oz each)
1 cup dry white wine
½ cup butter or margarine
1 to 1½ cups toasted chopped filberts

Soak Camembert in wine overnight, turning occasionally. Drain; scrape any discolored parts off cheese but do not remove rind. In small bowl of electric mixer cream butter; gradually add drained Camembert and beat until smooth. Chill about 1 hour. Place Camembert mixture on waxed paper and shape into a ball. Cover with part of chopped filberts and shape into a flat round about 5 in. in diameter. Turn upside down onto serving plate, remove waxed paper and coat top with remaining chopped filberts. Chill. Remove from refrigerator about ½ hour before serving time. Serve with French bread or heated crackers as an hors d'oeuvre or with fruit as a dessert. Makes 8 to 10 servings.

Filbert Rice Cream

3½ cups cold cooked rice
1¾ cups sifted confectioners' sugar
2 tbsp vanilla
2 envelopes unflavored gelatin
⅔ cup cold water
2½ cups heavy cream, whipped
1 cup toasted finely chopped filberts
Fresh or frozen strawberries or raspberries

Mix rice with sugar and vanilla in large bowl. Soften gelatin in cold water in small saucepan, then stir over low heat until dissolved. Stir into rice mixture. Cool, stirring occasionally. (Mixture should be thickened slightly.) Fold in whipped cream and filberts. Spoon into a 2-qt mold; chill until firm. Unmold, garnish and serve with strawberries or raspberries. Makes 8 to 10 servings.

Filbert Creme Brulee

1 pint (2 cups) heavy cream
⅓ cup firmly packed brown sugar
⅛ tsp salt
7 egg yolks
1 tbsp sherry
½ cup sliced toasted filberts
Brown sugar

Scald cream with ⅓ cup brown sugar and salt in top of double boiler. Beat egg yolks with sherry. Gradually stir hot cream into egg yolks. Cook in double boiler, stirring constantly, until mixture thickens to the consistency of a medium cream

sauce. Pour into 1 large or 6 individual oven-proof dishes. Chill at least 12 hours. About 2 hours before serving, sprinkle top of cream with filberts; sift enough brown sugar over top of cream to cover evenly about ¼-in. thick. Make sure the surface is smooth. Broil 2 to 3 min, or until sugar melts and begins to brown. Watch carefully so that sugar does not burn. Chill until serving tme. Makes 6 servings.

Kugilhoff Mit Haselnuss

½ cup milk
1 package activated dry yeast
¼ cup warm water
2⅔ cups sifted all-purpose flour
1 cup seedless raisins
1 cup boiling water
⅔ cup butter or margarine
½ cup sugar
4 eggs
2 tsp light rum
¾ tsp salt
2 tsp grated lemon rind
¼ cup graham cracker crumbs
⅔ cup whole toasted filberts
1 cup toasted chopped filberts
Confectioners' sugar

Scald milk, cool to lukewarm in bowl. Meanwhile, dissolve yeast in warm water. Add yeast mixture to milk; beat in 1 cup flour. Cover bowl with towel; let rise in warm place, about 1½ hours. Plump raisins in boiling water; drain. In mixing bowl, cream butter and sugar until light and fluffy; add eggs, one at a time, beating well after each addition. Stir in rum and salt. Stir in yeast mixture and remaining 1⅔ cups flour; beat until smooth. Stir in lemon peel and raisins. Beat batter until shiny and elastic, about 10 to 15 min. (Batter may be beaten in electric mixer.) Generously grease a 2-qt mold; coat with graham cracker crumbs and arrange the whole filberts on bottom of mold. Carefully pour in ½ of batter; sprinkle with half of the chopped filberts. Add other ½ of batter. Cover mold and let rise in warm place about 1 hour. Bake in 176.6°C (350°F) (moderate) oven 55 to 60 min, or until cake tests done. Let cool in pan 15 min. Remove from pan and sprinkle with confectioners' sugar, if desired. Serve warm or cool. Makes 1 cake.

Filbert-Stuffed Chicken

¾ cup chopped filberts
⅓ cup chopped celery
3 tbsp chopped onion
3 tbsp butter or margarine
3 cups small bread cubes, cut from day-old bread
⅓ cup shredded peeled apple
¾ tsp salt
½ tsp monosodium glutamate
⅛ to ¼ tsp crushed rosemary
⅛ tsp pepper
⅓ cup chicken broth
6 lb roasting chicken
Melted butter or margarine

Sauté filberts, celery and onion in butter until filberts are lightly toasted. Toss lightly with bread, apple, giblets, seasonings and broth. Stuff chicken and truss. Roast on rack in shallow roasting pan 190°C (375°F) oven 2 hours or until chicken

tests done. Baste frequently with melted butter, then with pan drippings during roasting. Makes 4 to 6 servings.

NOTE: Double recipe for 12-lb turkey.

Filbert Meringue Crinkles

6 egg whites
⅛ tsp salt
2¾ cups firmly packed light brown sugar, sifted
1 lb toasted filberts ground
1 tsp vanilla
Granulated sugar

Beat eggs and salt together until soft peaks form. Gradually add brown sugar, about 3 tbsp at a time, beating well after each addition. Fold in filberts and vanilla. Drop by teaspoonfuls into bowl of granulated sugar. Lightly shape into 1-in. balls. Place on greased baking sheets and bake in 162°C (325°F) oven 20 to 30 min or until lightly browned. Makes about 5 dozen.

Vanilla Strips

4 egg whites
1 lb confectioners' sugar, sifted
1 lb toasted filberts, ground
1½ tsp vanilla
Additional confectioner's sugar

Beat egg whites until frothy; gradually beat in 1 lb confectioners' sugar; continue beating 15 min. Divide mixture in half. To one-half of mixture stir in filberts and vanilla. Roll filbert mixture to ¼-in. thickness on a board, using additional sifted confectioners' sugar to prevent mixture from sticking; cut into 3 × ¾-in. strips. Place strips on lightly greased baking sheets. Frost each strip with remaining half of egg white mixture. Bake in 163°C (325°F) oven 20 min, or until edges are very lightly browned. Makes 6 dozen.

Spiced Filberts

3 to 4 cups filberts
1 egg white, slightly beaten
2 tbsp cold water
½ cup sugar
2 tbsp cinnamon
¼ tsp cloves
⅛ tsp nutmeg
½ tsp salt

Toss nuts in bowl of egg white mixed with the water. Pour nuts into a sieve to drain off excess egg white. Place dry ingredients in paper bag and mix. Put nuts into bag containing spice mixture. Shake bag to coat nuts. Remove excess seasonings and place nuts on a baking sheet. Bake in slow oven 148°C (300°F) for about 20 min.

English Filbert Fruit Cake

The English Filbert Fruit Cake is dark and rich with fruit and nuts.

Make the cake well in advance and give it a chance to mellow and age in a cool place.

Wrap the cake in cheesecloth or some other porous cloth that's been soaked in brandy. Then every once in a while during the mellowing process, re-soak the cloth with brandy.

One of the things that's distinctively English about this cake, in addition to having about 90% fruit and nuts, is the filberts or, as they are known in England, hazelnuts.

The word hazel comes from the Anglo-Saxon "hasil," meaning hat or helmet, and refers to the husk of the nut.

English Filbert Fruit Cake

1 cup butter or margarine
2 cups firmly packed dark brown sugar
6 eggs
½ cup each currant jelly and molasses
Grated peel and juice of 1 orange and 1 lemon
3 cups sifted all-purpose flour
1 tsp each baking powder, salt, cinnamon, nutmeg
½ tsp each mace, cloves, baking soda
¾ cup cognac
1 lb each dark seedless raisins, mixed candied fruits
½ lb each chopped dates, golden seedless raisins
½ lb toasted coarsely chopped filberts
Cognac glaze
Halved filberts

Cream together butter and sugar until fluffy; beat in eggs one at a time. Blend in jelly, molasses, the orange and lemon peel and juice. Sift together flour, baking powder, salt, spices and baking soda. Add to creamed mixture alternately with cognac. Combine fruits and chopped filberts; mix with batter. Turn into greased and foil-lined 10-in. tube pan or two 9 × 5 × 3-in. loaf pans. Bake in 148°C (300°F) oven about 2½ hours for 9-in. loaves and 3½ hours for 10-in. cake, or until cake tests done.

Filbert Chocolate Pudding

⅓ cup butter or margarine
⅓ cup granulated sugar
¼ cup light brown sugar
2 eggs
1 tsp vanilla
2 squares (1 oz each) unsweetened chocolate, melted and cooled
1½ cups sifted cake flour
2 tsp baking powder
½ tsp salt
¾ cup milk
1 jar (8 oz) red maraschino cherries, well drained and chopped (save juice)
⅓ cup chopped filberts
Creamy eggnog sauce

Cream together butter and sugars. Beat in eggs one at a time, beating well after each addition. Stir in vanilla and chocolate. Sift together flour, baking powder and salt. Stir in half of flour mixture; then milk. Toss fruits and nuts with remaining flour mixture; gently stir into batter. Turn into well-greased 1½-qt

mold. Cover with foil and tie with string. Place on trivet in large kettle. Fill ¾ full with boiling water. Boil gently 3 hours. Serve with Creamy Eggnog Sauce. Makes one pudding.

Creamy Eggnog Sauce.—Beat one egg until thick and lemon colored. Gradually beat in ½ cup confectioners' sugar, 2 tbsp reserved cherry syrup and 1 tbsp cognac (optional). Whip 1 cup heavy cream; fold in egg mixture. Makes about 2½ cups.

Filbert Cherry Rum Pudding

1½ cups sifted all-purpose flour
½ cup firmly packed dark brown sugar
½ tsp each baking soda, salt, cinnamon, ground allspice
¼ tsp ground ginger
1½ cups fine soft bread crumbs (day-old bread)
¼ lb ground suet
1 cup quartered red glaze cherries
1 cup chopped dates
½ cup raisins
½ cup chopped filberts
¼ cup diced lemon peel
¼ cup marmalade
4 eggs
½ cup milk
⅓ cup rum or apple juice
Cherry hard sauce

Sift together flour, sugar, baking soda, salt and spices. Add bread crumbs, suet, cherries, dates, raisins, filberts and lemon peel; toss lightly until fruits are coated with flour mixture. Beat marmalade with eggs, stir in milk and rum. Stir egg mixture into flour mixture without beating. Turn into well greased 1½ qt mold. Cover with foil and tie with string. Place on trivet in large kettle. Fill ¾ full with boiling water. Boil gently 3 hours, adding extra boiling water if necessary. Pipe cherry hard sauce around pudding and garnish with stemmed red maraschino cherries and holly, as desired. Makes one pudding.

Filbert Drops

1 egg
1 egg white
½ cup sugar
½ cup chopped mixed candied fruits
¾ cup finely chopped filberts
⅓ cup sifted flour
Candied cherries

Beat egg, egg white and sugar with rotary beater until well blended. Add fruit and nuts. Stir in flour. Drop from a teaspoon onto greased cookie sheets. Top each cookie with a small piece of candied cherry. Bake at 160°C (325°F) for about 12 min or until lightly browned, about 10 min. Remove from cookie sheets and cool; put together in pairs with currant jelly. Makes about 4 dozen cookies.

Filbert Cookies

½ cup butter or margarine
¼ cup sugar
½ cup ground filberts
1 cup sifted flour
¼ cup currant jelly

Cream butter and sugar together. Add nuts and flour. Shape into roll 1 in. diameter. Chill for several hours, wrapped in waxed paper. Slice thin and bake at 176°C (350°F) until lightly browned, about 10 min. Remove from cookie sheets and cool; put together in pairs with currant jelly. Makes about 4 dozen cookies.

Filbert Crescents

1 cup soft butter
¼ cup sugar
2 cups sifted flour
1 cup filberts, ground (or finely chopped in blender)
1 tsp vanilla

Cream butter and sugar until light and fluffy; add remaining ingredients, and mix well. Chill until firm. With hands, shape small pieces of dough into tiny rolls. Twist on cookie sheets to form crescents. Bake in moderate oven, 176°C (350°F), about 10 min. Store in airtight container. Will not ship well. Makes 8 to 10 dozen.

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