Acorn Use as Food

David A Bainbridge
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History, use, recipes, and bibliography

Cooking acorn mush with a hot rock ©DAB

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Acorns as Food

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There is a growing recognition that tree crops can play an important role in sustainable food production. Trees can be grown with less annual disturbance of the agricultural ecosystem and their deep roots allow the trees to reach nutrients and moisture in the deep soil. Acorns are an excellent example of a grain that grows on trees. We must begin to consider these traditional crops that fit temperate and semi-arid climates rather than trying to change the environment to fit crops that require extensive inputs of fertilizer and water.

The acorns from oaks (*Quercus*) and tan oaks (*Lithocarpus*) have been used as food for many thousands of years. They occur in the archaeological record of the early town sites in the Zagros Mountains, at Catal Hüyük (6000 BC), and oak trees were carefully inventoried by the Assyrians during the reign of Sargon II. They have been used as food for thousands of years virtually everywhere oak trees are found. In Europe, Asia, North Africa, the Mid-East, and North America, acorns were once a staple food.

They were a staple food for people in many areas of the world until recently and are still a commercial food crop in several countries. The Ch'i Min Yao Shu, a Chinese agricultural text from the sixth century recommends *Quercus mongolica* as a nut tree. A large commercial harvest still occurs in China, and acorns are sold on the streets by acorn vendors. The commercial harvest in Korea (where 1-2.5 million liters are harvested each year) provides prepared acorn starch and flour that reaches the American markets. Some acorns are collected in Japan. Acorns are still harvested and used in several areas of the United States, most notably Southern Arizona and California. There is still some harvesting in Mexico. Historically acorns were particularly important in California. For many of the native Californians, acorns made up half of the diet and the annual harvest probably exceeded the current sweet corn harvest in the state.

While it is often thought that oaks were a "wild crop" it is now clear that the oaks were planted, transplanted, and intensively managed. Informants and traditional songs tell of the selection and planting of oak trees. The early travelers often remarked on the "orchard like" settings encountered. How surprised they would be to find they were indeed orchards.
Acorn food products are sold in the U.S. at many Korean delis, from both imported and locally processed acorns. In San Diego (2005) I can buy acorn flour from four different companies as well as acorn starch. Acorns may be also be sold as a block of acorn meal that resembles tofu and is used in cooking in much the same way.

A modest commercial harvest takes place each year in Southern Arizona and Northern Mexico and some acorns are sold at markets that cater to Native Americans and Mexican-Americans. Acorn foods also remain on the market in Korea, China, and North Africa.

An evaluation of the acorns from all 500+ species of oaks is long overdue. Although the acorns of some oaks are too small or hard to open for widespread use, there are many species that could find commercial use as food. Acorns are also valuable feed for domestic animals and birds and wildlife, especially deer and wild turkeys.

The factors that made acorns a major food source in the past make them attractive candidates for use in the future. They are easy to collect, often ripen all at once, and are simple to process. They store well and were kept by the native Californians for several years in simple storage bins. They are relatively simple to prepare, even for the varieties that need to be leached. Although most species are bland, as are corn and wheat, some trees have very good flavor and can be used in place of other nuts.

When the long-lived, deep-rooted oaks can reach sufficient water; acorn production can be very high, with yields of more than 6,000 pounds per acre. Acorn yields can be high on hilly lands where comparable annual "grains" such as corn and wheat cause severe soil erosion, Table 1.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Percent slope</th>
<th>Soil Loss tons/acre/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous corn crop, Wisconsin</td>
<td>16</td>
<td>89</td>
</tr>
<tr>
<td>Continuous corn crop, Missouri</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Corn, contour furrows, Iowa</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Oak forest</td>
<td>10</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Acorn Harvesting

The harvesting of acorns is very similar to the harvesting of other commercial nuts such as almonds or filberts. Wolf showed that it was possible to collect 50-300 pounds of acorns per hour with very simple hand tools. My own experience has been similar when harvesting black oak (Q. kelloggii) and canyon live oak (Q. chrysolepis). However, when
harvesting a small acorn such as *Q. gambelli* of *Q. emoryii* in an off year it may be possible to collect only a few pounds per hour.

Acorns should be picked from the tree if possible or gathered the same day they fall. Native Americans would knock them off with sticks and children would climb into the trees to shake the branches. This was a joyous time for the people as the entire family was usefully employed in the beautiful fall air. The ground was often cleared by annual burning after the grass seed was collected. Today, acorns can be knocked onto a large tarp and easily collected. Tree shakers, commonly used with pecans and almonds, should work very well on smaller oak trees. Collected acorns should be spread out in the sun on a clean surface and dried before they are stored in a well ventilated, cool, dry area.

**Acorn Food Value**

Acorns vary considerably between species. The range of composition of acorns in 18 species tested is shown in Table 2, much of the difference is related to water content when tested.

**Table 2: Acorn Composition**

<table>
<thead>
<tr>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
</tr>
<tr>
<td>Protein</td>
</tr>
<tr>
<td>Fat</td>
</tr>
<tr>
<td>Carbohydrate*</td>
</tr>
<tr>
<td>Tannin</td>
</tr>
<tr>
<td>KCAL/lb</td>
</tr>
</tbody>
</table>

* or N free extract

The structure of acorn starch falls between that of corn and potatoes, and like them, acorns have been used to brew alcohol. Acorns are also good sources of some vitamins, with 5-54.8 mg of Vitamin C per 100 gm of raw acorn. This compares favorably with the Negev lemon, with 58.1 mg per 100 g. Acorns are also an excellent source of Vitamin A, with 180 IU per gm in *Q. phellos*. Twenty-seven grams, or less than tenth of pound of acorns, would meet the suggested daily requirement of 5,000 IU for Vitamin A. This may prove of great benefit in poorer areas of the world where vitamin A deficiency is common.

Thorough testing may well discover other species with even higher levels of these and other vitamins and trace elements. Acorns include many essential amino acids. When acorns are cooked with hardwood ash, to neutralize bitterness, the acorns dishes should
also be a good source of calcium. The ash may also make more niacin available if the
tests Ruttle conducted on corn are applicable to acorns. It is not surprising that acorn-
based cultures prospered for thousands of years with this excellent food base.

Eating Acorns

The acorns from many species of oaks are edible raw, just as they are harvested. I
have found sweet acorns from *Quercus gambelii*, *Q. mongolica*, *Q. emoryii*, *Q. dumosa*,
*Q. virginiana*, and *Q. macrocarpa*. Other species reported to be sweet include: *Q.*
vaccinifolia, *Q. stellata*, *Q. garryana*, *Q. lobata*, *Q. pumila*, *Q. muehlenbergii*, *Q. alba*, *Q.*
michauxii, *Q. brandegeei*, *Q. gramuntia*, *Q. E’sculus*, *Q. aegilops*, and *Q. ilex var ballota*.
Undoubtedly, other species and varieties are equally sweet and more flavorful.

A careful worldwide search for good cultivars is long overdue because there is hope
of finding sweet acorns even in those species normally considered bitter. Some of these
include the best tasting acorns, with cashew and chocolate overtones. The more tropical
oaks with fist sized acorns that are reportedly sweet and flavorful are of special interest.

Using bitter acorns -- Acorn Leaching

It is also practical to harvest and use bitter acorns, but the bitterness must be removed.
Some cases of acorn poisoning have occurred when people have eaten too many untreated
bitter acorns during periods of mass starvation. But the tannin which causes the bitterness
can easily be leached from acorns with water. Hot water hastens the process. Ground up
acorns are easiest to leach (for small quantities they can be leached in a clean nylon
stocking tied to a faucet--it may take minutes or hours depending on the degree of
bitterness and water temperature) but with patience shelled whole acorns can also be
treated. Studies at Dong-guk University in Seoul, South Korea showed the tannin level in
one species of bitter acorns was reduced from 9% to 0.18% by leaching, without losing
essential amino acids. Virtually all of the acorns the native Californians used were bitter
and they were leached or soaked in water to remove the bitterness. They apparently based
their preference on oil content, storability, and flavor rather than sweetness.

Native Americans also sweetened bitter acorns with iron-rich red earth, wood ashes
(clean ash from oak is preferred), and other ingredients to neutralize the acids. These
practices were also followed in other areas, from Sicily to China. Cooking in a cast iron
pot will help remove the last vestiges of bitterness. Bicarbonate of soda can also be used
to remove tannins from foods, soak ground up acorns in water with 1 teaspoon of
bicarbonate of soda per quart for 12-15 hrs, then rinse well (see Higgins, 1985). Repeat if
necessary. Steaming or baking is sufficient for less bitter acorns.
Cooking with Acorns

Acorn meal can be substituted for corn meal in most recipes. Acorns can also be used in place of chickpeas, nuts, peanuts, and olives in a variety of dishes. Acorn meal and acorn pieces are especially good in soups and stews. Acorns can also be treated with pickle brines or the lye treatment used for olives.

Recipes

The proof of the pudding is in the eating, however, and it doesn't matter how nutritious the food is if you don't like it. I'm confident you'll like the flavor of acorns and will enjoy the recipes presented here. You can also explore new recipes on your own.

Acorn meal can be used in many ways. Some ideas to get you started: acorn meal in place of corn meal; whole acorns, acorn meal, or acorn flour instead of chestnuts or chickpeas; in most recipes in whole or part as a replacement for buckwheat groats or millet, and in some cases as total or partial replacement of bulgur, whole wheat, or wheatberries.

A Cautionary Note: All recipes are for sweet acorns, either those varieties that are naturally sweet or bitter varieties that have been leached or neutralized.

The considerable variation in acorn composition may make some adjustment in the recipes necessary, with less or more oil and less or more fluid. If your acorns are bland (many are) more spice may be added, or if the flavor is very good let it stand more on its own. Experiment to make recipes work with your acorns. Throw out spoiled acorns. They discolor and become a bit darker as they dry, but don't use ones with mold or decay. (Although some tribes enjoyed a special moldy acorn bread and treated acorns to maximize mold.)
Peggy Edward's Unleavened Acorn Bread
Grease 3 loaf pans. Mix thoroughly:
1 cup oil 3-3/4 cups leached and ground acorn meal
5 beaten eggs 1-1/8 cups whole wheat flour
1-1/4 cups honey 1-1/2 tsp. salt
1-1/2 tsp. vanilla 1/2 tsp. baking powder
1-1/2 tsp. cinnamon 1-1/2 tsp. baking soda
Add pine nuts, dried elderberries, currants and/or etc. Pour mixture into pans and bake at 350° for 1 hour or more.

Catherine Gearing's Leavened Acorn Bread
Ingredients:
1-2/3 cups milk 1 Tbsp salt
3 Tbsp sugar 1/4 cup shortening
3/4 cup warm water
2 packages active yeast or 2 cakes compressed yeast
4 cups flour 3 cups acorn flour
Combine milk, sugar, salt, and shortening and beat until bubbles appear and shortening melts. Cool to lukewarm. Put water in a bowl. Mix in yeast. Combine flour and acorn flour, then add to mixture. Beat until smooth; add enough remaining flour until dough is easy to handle. Turn onto a floured board. Knead 5 minutes or until smooth and elastic. Put dough in a large greased bowl. Turn over to bring greased side up. Cover with damp towel. Let rise at 85° for 1-1/2 hours or until doubled. Grease two loaf pans, punch dough down. Turn out onto board and knead to distribute air bubbles. Divide in half. Shape each half into a loaf, and place in loaf pans. Cover. Let rise 1 hour. Bake at 425° for 25-30 minutes. Above 3500' elev., set oven to 475°F.
Mediterranean Soup
8 oz. garbonzos
8 oz. acorn chunks or meal
1 1/2 cups water
2 cups chicken broth
1/3 cup olive oil
1/3 cup fresh mint leaves (1/2 tsp. dry) or basil
lemon juice from one lemon
1/2 to 1/4 cup parsley sprigs
3 tsp. chopped garlic
1 small onion, chopped fine
1/4 tsp. salt (optional)

Simmer beans and acorn chunks in broth until tender. In blender, combine olive oil, mint, parsley, lemon juice, garlic and mix with masher. Add 1/2 beans and acorns and reblend. (Chicken or turkey chunks can be added for more body).

(acorns work particularly well in soups and stews)

Pancakes
In a bowl, blend together:
1 egg
1 Tbsp. honey or sugar
1 Tbsp. of cooking oil
1/2 cup of acorn flour
Then add:
1/2 cup of cornmeal
1/2 cup of whole wheat flour
2 tsp. of double-acting baking powder
1/2 tsp. salt and a pinch of cinnamon

Stir enough milk into the above mixture to make a thin batter. Then pour the batter out onto a hot, greased skillet and fry the cakes slowly on both sides until brown. Serve with plenty of butter and honey.
**Muffins**

Beat together in a bowl:
- 2 Tbsp. of cooking oil
- 3 Tbsp. of molasses
- 1 egg

Stir in:
- 1/2 cup of milk
- 1 cup of acorn flour

Then add:
- 1 cup whole wheat flour
- 1 tsp. double-acting baking powder
- 1/2 tsp. soda
- 1/4 tsp. salt
- 1/2 tsp. of ginger

Stir quickly until all the dry ingredients are moistened and the batter is slightly lumpy. Then pour the batter into a greased muffin tin and bake at 425°F for 20 to 25 minutes. Remove the tin from the oven, allow it to cool five minutes, turn the muffins over and serve.

**E. S. O’Neils Acorn Pound Cake**

Blend together in bowl:  
- 1/2 cup cooking oil  
- 1 cup sugar  
- 2 eggs  
- 1/2 cups of acorn meal

In another bowl, sift together:
- 1-1/4 cups all purpose flour  
- 1/8 tsp. salt  
- 1/2 tsp. cream of tartar  
- 1/4 tsp. soda

Stir the second mixture into the first (a small amount at a time) alternately with 1/4 cup of milk. Add 1/2 tsp. of vanilla extract and 1/4 tsp. of mace and beat well. Pour the batter into an oiled and floured circular pan (8" inside diameter) and bake at 350°F for about one hour.(E. S. O'Neill, 1977).
**Datori Mook**

This Korean dish uses the acorn blocks (like tofu) available at Korean food stores.

- Acorn (oak nut) jelly--1/2 lb cut into cubes
- 2 large garlic cloves, chopped or mashed
- 4 scallions, chopped
- 1 green pepper, sliced
- Soy sauce (to taste)
- Black pepper (to taste)
- Ginger (fresh grated root--1tbsp or more)
- Beef strips 1/4 lb (optional)

Heat cooking oil in a wok or frying pan. Mix garlic and onions and cook until transparent. Add ginger, pepper, green pepper, soy sauce and acorn jelly.

**Preparing acorn gel the Korean Way**

1. Shell acorns
2. Crush acorns
3. Put in a big pot with a hole in the bottom with cheesecloth over the hole
4. Run water over the acorns for five days (or until sweet)
5. Put acorn mush in a mixer, add water and mix until creamy
6. Pour off excess water
7. Put mush in pot, add fresh water and boil
8. Put in refrigerator in a bowl of desired shape, maintain a little water on top to keep it from drying out.
9. Slice or cube jelled acorn mush, use like tofu.

The jelled acorn takes up sauce flavors very well and is very pleasant to eat.
Acorns have also been used to make a coffee substitute in many areas of the world. The quality of the acorn coffee depends on the particular nut and technique used. Most recipes call for roasting clean rough ground acorns. *Q. muehlenbergii* was especially favored for this purpose in the Midwest. *Q. robur* and *Q. frainetto* have been used in Europe where the resulting drink is referred to as "Eichel kaffee", or acorn coffee. A similar acorn coffee has also been used in Mexico. Raccahout, a spicy Turkish acorn drink more like hot chocolate, was included in the *Larousse Gastronomique* until recently.

**Acorn Oil**

Acorn oil can be extracted by boiling, crushing, or pressing. Acorn oil has been used as a cooking oil in Algeria, Morocco, and the eastern United States. It was used by the Indians of the eastern U.S. as a salve for burns and injuries. Some varieties contain more than 30% oil, comparable to the best oil olives. The oil is very similar to olive oil and has a comparable flavor. It is possible that acorn oil could be produced more economically than olive oil because acorns are not as sensitive to spoilage during harvest as the fleshy olives. The development of an American acorn oil industry might capture some of the $160 million dollars now spent on imported olive oil each year.

**Table 3: Acorn oil**

<table>
<thead>
<tr>
<th>Species</th>
<th><em>Q. agrifolia</em></th>
<th><em>Q. ilex</em></th>
<th>5 species, avg.</th>
<th>Olive</th>
<th>Corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity</td>
<td>0.917</td>
<td>0.909</td>
<td>0.910</td>
<td>0.914-.919</td>
<td>0.916-922</td>
</tr>
<tr>
<td>Refractive index</td>
<td>1.47</td>
<td>1.47</td>
<td>1.46</td>
<td>1.47</td>
<td>1.47</td>
</tr>
<tr>
<td>Saponification value</td>
<td>192.3</td>
<td>189.1</td>
<td>191.5</td>
<td>187-196</td>
<td>187-196</td>
</tr>
<tr>
<td>Oleic acid%</td>
<td>--</td>
<td>57.1</td>
<td>83.5-84.4</td>
<td>84</td>
<td>49</td>
</tr>
<tr>
<td>Palmitic acid%</td>
<td>--</td>
<td>12.4</td>
<td>6.9-9.4</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Linoleic acid%</td>
<td>--</td>
<td>30.5</td>
<td>4.0-4.6</td>
<td>4.6</td>
<td>34</td>
</tr>
<tr>
<td>Flash point</td>
<td>--</td>
<td>--</td>
<td>320°C</td>
<td>225°C</td>
<td>321°C</td>
</tr>
<tr>
<td>Flash point</td>
<td>--</td>
<td>--</td>
<td>360°C</td>
<td>343°C</td>
<td>393°C</td>
</tr>
</tbody>
</table>
Starting an acorn business

With current California prices for acorn meal of $0.90/lb wholesale and up to $30+ per gallon for specialty nut oils it seems possible that an entrepreneur could establish a profitable acorn business. This business will be easier to establish if processing techniques and palatability tests are conducted by University researchers. These studies could also refine acorn processing techniques and help refine products that can compete in the marketplace. I think a talented cook/marketeer could make a satisfactory entrance into the market with acorn oil, acorn chips and crackers, acorn breads and muffins, or pickled acorns.
### Acorn use: country or region and species (when known)

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Food, acorn oil, or drink</th>
<th>Species</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>Food</td>
<td>Q. aegilops?</td>
<td></td>
</tr>
<tr>
<td>Algeria</td>
<td>Food</td>
<td>Q. ilex var. ballota</td>
<td></td>
</tr>
<tr>
<td>Asia &amp; S.M. Asia</td>
<td>Food</td>
<td>Q. brantii, Q. leucotricophora, Q. ilex, Q. mongolica</td>
<td></td>
</tr>
<tr>
<td>Assyria (N. Turkey)</td>
<td>Food</td>
<td>Q. cerris?</td>
<td></td>
</tr>
<tr>
<td>Saudi Arabia and Yemen</td>
<td>Food, acorn oil</td>
<td>Q. ilex?</td>
<td></td>
</tr>
<tr>
<td>Barbary</td>
<td>Food, acorn oil</td>
<td>Q. ilex var. ballota</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>Food</td>
<td>Q. alba?</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Food</td>
<td>Q. cornea, Q. fenzelian, Q. acutissima, (leaves eaten), Q. liaotungensis, Q. gliva, Q. myrsinifolia, Q. mongolica, Q. silvicolarum (leaves eaten), Q. bambusifolia, Q. variabilis</td>
<td></td>
</tr>
<tr>
<td>England</td>
<td>Food</td>
<td>Q. robur, Q. petrea</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>Food</td>
<td>Q. rotundifolia, Q. petrea</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Primarily Q. ilex var. ballota, drinks, food</td>
<td>Q. aesculus, Q. robur</td>
<td></td>
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<tr>
<td>Greece</td>
<td>Food</td>
<td>Q. brachystachrys</td>
<td></td>
</tr>
<tr>
<td>Guatemala</td>
<td>Food</td>
<td>Lithocarpus cornea</td>
<td></td>
</tr>
<tr>
<td>Himalayas (N. India, Nepal, Bhutan)</td>
<td>Food</td>
<td>Q. glauca, Q. semecarpifolia, Q. dilatata (edible galls)</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>Food</td>
<td>Q. frainetto</td>
<td></td>
</tr>
<tr>
<td>Iraq</td>
<td>Food</td>
<td>Q. persica? Q. robur (Michaux gave the acorns sold in Bagdad his highest rating)</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>Food</td>
<td>Q. glauca, Q. cuspidata, Q. glabra, Q. mongolica, Q. paucidentata, Q. yaeyamensis, Q. phillyraeoides, Q. miyagii, Q. aliena, Q. nipponica, also Lithocarpus sp.</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>Food</td>
<td>Q. mongolica, Q. dentata, Q. aliena</td>
<td></td>
</tr>
<tr>
<td>Mediterranean Region</td>
<td>Food, oil</td>
<td>Q. ilex var. ballota, Q. fruticosa, Q. coccifera</td>
<td></td>
</tr>
<tr>
<td>Eurasia</td>
<td>Food</td>
<td>Q. robur, Q. macrolepis, Q. cerris (including &quot;manna&quot;)</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>Food, drink</td>
<td>Q. albicinata, Q. rhodophlebia, Q. brandeegi, Q. reticulata, Q. glaucoides, Q. oblongifolia, Q. durafolia, Q. emoryi, Q. watsonia; also leaves eaten, Q. durifolia, Q. epuleuca, Q. hypoleucoides, (also mentioned in Aztec period)</td>
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<tr>
<td>Morocco</td>
<td>Food</td>
<td>Q. ilex var. ballota</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>Food</td>
<td>Q. aegilops, Q. lusitanica</td>
<td></td>
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<tr>
<td>Palestine (now Israel)</td>
<td>Food</td>
<td>Q. persica, Q. brantii</td>
<td></td>
</tr>
<tr>
<td>Persia (now Iran)</td>
<td>Food</td>
<td>Q. ilex var. ballota, Q. fruticosa</td>
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</tr>
<tr>
<td>Portugal</td>
<td>Food</td>
<td>Q. suber, Q. pubescens</td>
<td></td>
</tr>
<tr>
<td>Southern Europe and North Africa</td>
<td>Food</td>
<td>Q. junghuhni, Q. lindleyana, Q. polystachya, Q. sootepensis, Q. thomsoni, Q. truncata</td>
<td></td>
</tr>
<tr>
<td>Siam (now Thailand)</td>
<td>Food</td>
<td>Q. ilex var. ballota, Q. gramuntia</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Food</td>
<td>Q. tauricola, &quot;manna&quot;, Q. brantii</td>
<td></td>
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<tr>
<td>S.W. Asia</td>
<td>Food</td>
<td>Q. aegilops</td>
<td></td>
</tr>
<tr>
<td>Syria</td>
<td>Food</td>
<td>Q. ilex var. ballota?</td>
<td></td>
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<tr>
<td>Tunisia</td>
<td>Drink</td>
<td>Q. cerris?</td>
<td></td>
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<tr>
<td>Turkey</td>
<td>Food and oil</td>
<td>Q. kellogii, Q. douglasi, Q. gambelli, Q. virginiana, Q. agrifolia, Q. wislizenii, Q. garryana, Q. chrysolepis, Q. lobata, Q. emoryii, Q. palustris, Q. oblongofolia, Q. alba, Q. phellos, Q. stellata, Q. mariandica, Q. prinus, Q. undulata, Q. michauxii, Q. muehlenbergii, Q. dumosa, Q. macrocarpa, Q. nigra, Q. vaccinifolia, Q. staderania, Q. prineides, Q. bicolor, Q. velutina, Q. ellipsoidalis, Lithocarpus densiflora</td>
<td></td>
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</tbody>
</table>
Oak trees also provide: fodder for animals, both acorns and leaves; cork for insulation (R-3.5 per inch), bottle corks, and many other products; a variety of hardwoods for use in furniture, building, and manufacturing; excellent fuel wood and charcoal; leaves high in nutrients widely used as a garden fertilizer; food for wildlife, especially game species (deer, turkeys, and bears); sugar from scale insects ("the manna from heaven" mentioned in the Bible); erosion control; excellent shapes and colors for use in landscaping and for shade; and food for silkworms. Oaks are also involved in several types of mushroom and fungi production, including shiitake mushrooms and truffles.

Oaks should be more widely used for land reclamation and sustainable food production in many areas of the world. They provide a opportunity for growing "grain" on dry, steep slopes and poor soils. Oak species with edible acorns are suitable for a very wide range of climatic and soil conditions including very hot or cold climates, very saline or alkaline soil, and wet or intermittently flooded ground.

For more access to the literature of agroforestry and sustainable agriculture see:


My apologies for incomplete references. When I began this work in the late 1960's I was unaware of where it would lead and I kept less complete records than I would now. Corrections and additions most welcome.

ACORN BIBLIOGRAPHY by David A. Bainbridge
Key Word -- Letter Code

F = Human Food    A = Animal food
E = Ecology     W = Wildlife food
P = Processing    D = Diseases and pests
O = Oak byproducts cork, etc.    I = Insects
H = Oak hardwood    T = Taxonomy
G = Growing oaks    M = Medicine

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