

# Acorn Production and Utilization in the Republic of Korea<sup>1</sup>

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## Abstract

Oak acorns have historically provided food for humans and animals in cultures across Asia, North Africa, Europe, and North America. The advent of the twentieth-century saw acorns become marginalized as a food crop in the United States and most of the world, but they have remained a constant part of the cuisine of the Korean Peninsula. Consequently, Korea is often cited when discussing the potential of a commercial acorn industry in California, yet little is actually known about acorn production in Korea.

This is a report of preliminary results from a project conducting interviews across the Republic of Korea and mining government statistical archives. Statistics from 2003 to 2012 show net acorn consumption in South Korea of approximately 14 000 000 kg/year with domestic production declining to approximately 400 000 kg/year as imports from China grew to make up 94 percent of consumption. Domestic production is entirely foraged by hand from the wild, primarily by older women. Processing of acorns consists of soaking, drying, shelling, leaching, and milling, and can take place at the family, community, or factory scale. Ultimate consumption takes the form of a variety of human foodstuffs, chiefly acorn tofu, but also dried acorn pasta, fresh acorn pasta, and acorn pancakes.

*Key words:* acorn, exports, food, imports, Korea, oaks, production, *Quercus*

## Introduction

Oak acorns have historically provided food for humans and fodder for animals in cultures across Asia, North Africa, Europe, and North America (Bainbridge 2006). Today, this starchy nut of long-lived trees also offers potential benefits for mitigating long-term climate change through oak tree carbon sequestration. Because acorns can be used to replace a portion of the grain in animal feed (Bouderoua and others 2009, Keddam and others 2010, Rodriguez-Estevéz and others 2011) in addition to serving as a human food, the potential exists to complement the millions of hectares planted to annual cereal grains with perennial hardwood oak groves that produce food and simultaneously sequester atmospheric carbon, provide wildlife habitat, create windbreaks, protect watersheds, and conserve soil.

Because of this great potential, it is important to understand existing acorn production and use in cultures that still utilize them. Although once widely used throughout the northern hemisphere, the Korean peninsula is one of the few remaining regions where acorns are still harvested in large quantities on a regular basis for human consumption (Bainbridge 1986). Traditionally, oak groves served as

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a backup source of carbohydrates for rural villages in years when the rice harvest was poor (Lee and others 2007). Acorns continue to this day to play a role in Korean cuisine, with certain towns being known for their production of acorn specialties (Lee 2013), but little else is known in the West about the Korean acorn industry. This research project aims to document traditional production and utilization practices as well as the current state of affairs of acorn production and use in the Republic of Korea.

## Methods

Traditional production and processing practices were documented through fifteen structured interviews conducted across the Republic of Korea. In order to capture any differences in practices due to environmental or regional factors, interviews were split equally across the five ecological provinces of the country (Shin and Kim 1996), so that three interviews were conducted in each ecological province. Care was also taken so that all political provinces of the country were represented. Suitable locations were identified by looking for regions noted for production of acorns or acorn foods. Sources of information used to identify these regions included the online INVIL database (Information Network Village 2002), which is a rural economic development program serving 400 villages. Additionally, local experts were consulted and the scientific literature was combed for geographic references to acorn production or consumption in the Republic of Korea.

Once a list of suitable locations was established, appropriate intermediaries were contacted to arrange the interviews. These intermediaries were usually a county official, the local village INVIL coordinator, or the village mayor. If a county official, they were asked to provide information as to which village in their county was best known for acorn production, and to provide a local village contact. Once a local village contact was established, they were asked to identify an elder in their village that was very knowledgeable in acorn production and processing. An interview was then scheduled with that village elder. The structured interview covered oak tree establishment and management, acorn harvesting, and postharvest processing and use. Interviews were conducted in English with simultaneous Korean language translation and responses were recorded in writing in addition to audio recording. When possible, photographic documentation was also taken of acorn harvesting/processing tools, equipment, and procedures.

In addition to the structured interviews, an in depth search of the Republic of Korea government archives was performed to determine if statistics could be found documenting domestic production of acorns as well as import and export figures.

## Results

Interview data has not yet been analyzed, so these are preliminary results documenting the current state of affairs of acorn production and use based on data from the government archives and general observations made during the interview process.

Extensive mining of the government archives uncovered excellent documentation of current acorn production (Korea Forest Service 2014a), and imports and exports (Korea Forest Service 2014b). The original data was broken out separately for whole acorns and acorn powder. Domestic production was exclusively whole acorns, which also dominated the import category, while the export category was dominated by acorn powder. For the purposes of this report, quantities of whole acorns and acorn

powder have been combined into a single number. Whenever a statistic about acorns is encountered in this report, it is referring to the combined amounts of whole and powdered acorns.

The most recent 10 years of complete data, 2003 to 2012, were analyzed, and domestic acorn production, acorn imports, and acorn exports were plotted (fig. 1). Net acorn consumption was computed as: net consumption = [(domestic production + imports) – exports], and plotted as well. Net consumption varied over the ten year period, averaging 13 701 412 kg/year. In the last year of complete data, 2012, net consumption was comprised of 3 percent domestic production, 3 percent South African imports, and 94 percent Chinese imports. Domestic production declined steadily over the ten years from a peak of 1 378 221 kg/year and 9 percent of net consumption in 2003, to a low of 392 567 kg/year and 3 percent of net consumption in 2012. Imports as a percentage of net consumption rose as domestic consumption fell, rising from 91 percent in 2003 to 97 percent in 2012. Exports were very limited, averaging 0.07 percent of net consumption over the ten year period.

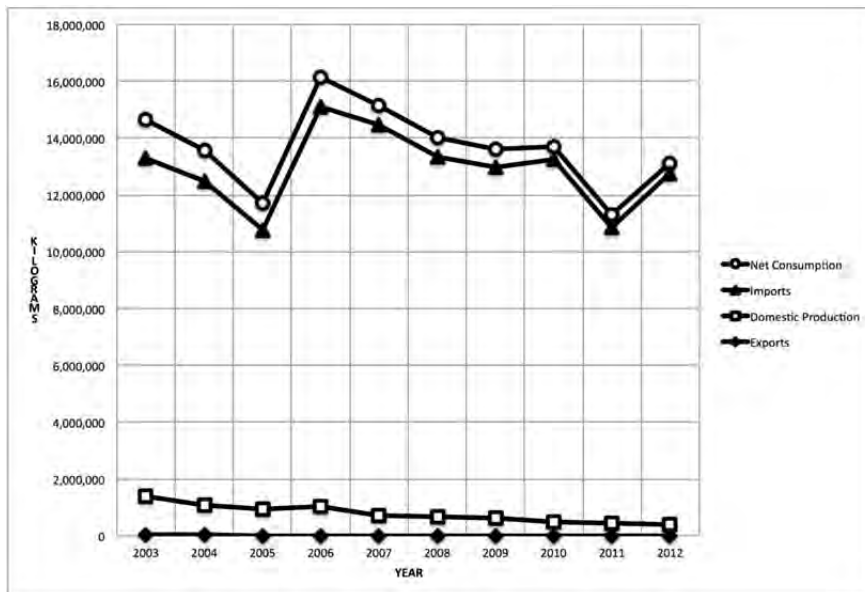


Figure 1—Korean acorn industry for the years 2003 to 2012, includes whole acorns and acorn powder.

China dominated the imports (fig. 2), comprising 96 percent of all imports over the 10-year period, followed by South Africa with 3 percent of imports, and Kyrgyzstan with 0.3 percent of imports over the same period. In decreasing order, Iran, Vietnam, Saudi Arabia, Uzbekistan, Myanmar, Turkey, and Argentina also provided small amounts of imports.

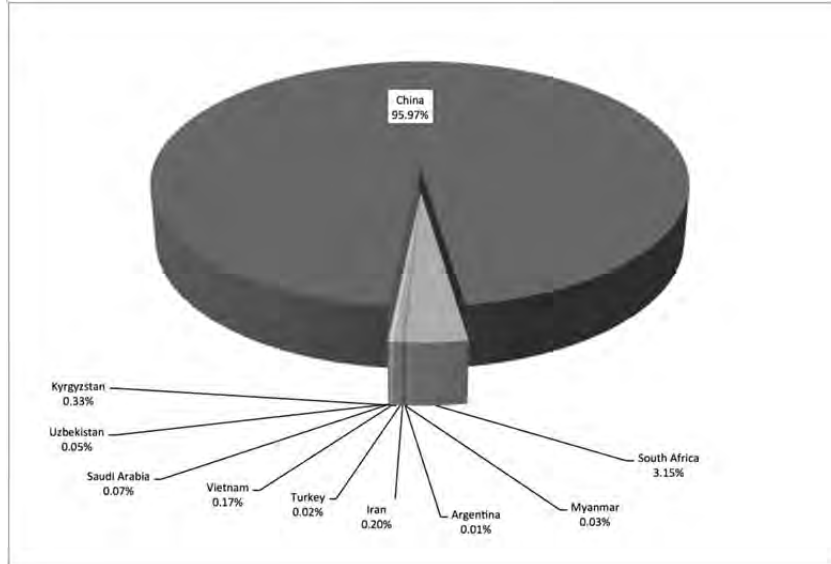


Figure 2—Korean acorn imports for the years 2003 to 2012, includes whole acorns and acorn powder.

Tiny in comparison to imports, exports from the Republic of Korea over the 10-year period (fig. 3) were primarily to North America, with 44.6 percent going to Canada and 32.2 percent going to the United States. Malaysia received 12.9 percent of exports, followed by (in decreasing order) China, Japan, Sri Lanka, Algeria, Libya, Saudi Arabia, Australia, the United Arab Emirates, Singapore, Germany, Great Britain, and Qatar.

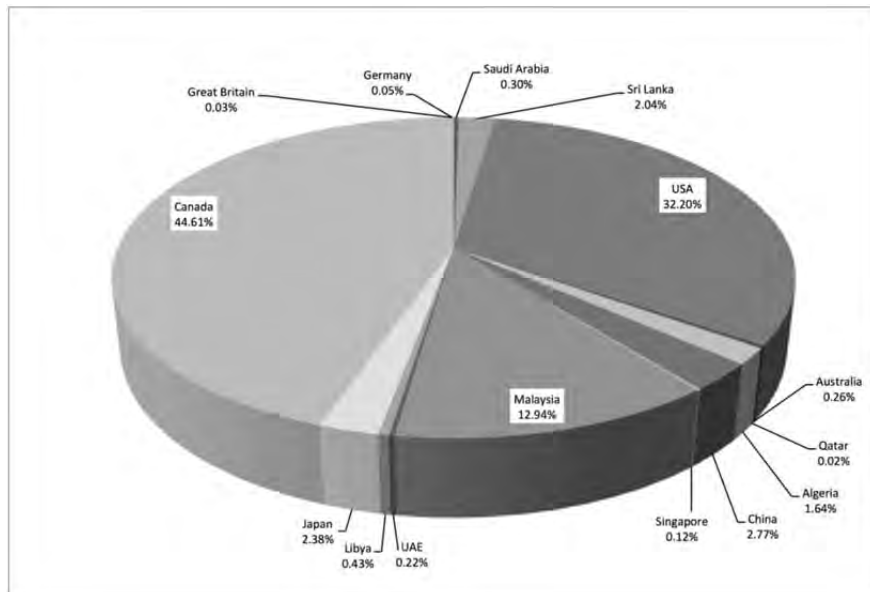


Figure 3—Korean acorn exports for the years 2003 to 2012, includes whole acorns and acorn powder.

It was generally observed from the interviews that all of the domestic acorn production is collected from the wild by hand and is mostly harvested by older women. Steps in acorn processing can occur in different order, but usually include soaking the whole acorns to kill pests and cause the shells to swell, drying the nuts causing the shells to shrink and crack, shelling the nuts, soaking the nuts in multiple changes of water to leach out the tannins and grinding the nuts while still wet into a slurry that is either used to make acorn foods directly, or drying the slurry into powder for future use.

Processing of acorns can take place at the family scale, a larger community scale, or at the factory scale. At the family scale, individuals collect acorns and process them at home, using them to make food primarily for their family. At the community scale, individuals collect acorns in larger quantities and process them mostly at home, but may also send them to a community mill for grinding, finally making acorn food not just for their family, but also to sell to friends and neighbors, or, as is sometimes the case, to sell in their restaurant. At the factory scale, acorns are still collected by individuals, but they are sold to a local wholesale merchant. These merchants consolidate acorns from many collectors into larger quantities that they then supply to factories. The factories then process the acorns using industrial-scale equipment for eventual sale to grocery stores and restaurants as acorn-based foods.

Overwhelmingly, the primary acorn food consumed in South Korea is dotorimuk, usually translated as ‘acorn jelly’ but more descriptively translated as ‘acorn tofu’. It is made from acorn starch and has the consistency and appearance of soybean tofu except that it is medium brown in color. It is very mild in taste, and is usually takes on the flavor of the sauce with which it is served. Some cooks, however, prefer a mild residual astringency in the dotorimuk and will purposely leave some of the tannins in the acorn for this purpose. Dotorimuk can also be cut into slices and dried in a dehydrator. This is called dotorimuk malengi or ‘dried acorn tofu’. When reconstituted in water, these strips very closely resemble chewy pasta cooked al dente. Dotori guksu or ‘acorn noodles’ are a form of pasta resembling Japanese soba that are made from acorn powder mixed with wheat or buckwheat flour. A form of fresh pasta is made from acorn powder mixed with potato and/or glutinous rice flour and is called dotori sujebi or ‘hand-torn acorn noodle’. These pasta dumplings are most common in soup but are sometimes used in salads as well. One sometimes sees dotori jeon, which are savory acorn pancakes made using a mix of acorn powder and wheat or other flour. Acorns are also distilled to make a drink known as dotori sul or ‘acorn liquor’ that has an alcohol content around 40 percent and is primarily manufactured in the Democratic People’s Republic of Korea.

## **Discussion**

The steady increase in the proportion of net consumption comprised by imports mirrors the steady decline in domestic production. It is unclear why domestic production has been declining steadily over the last 10 years, but it may be related to the steadily increasing household income over that same period (Korean Statistical Information Service 2014) which might mean a declining need to collect acorns for income in the presence of available imports from other countries.

Most notable about the import statistics, is the geographic breadth of countries supplying acorns, from China to South Africa to Argentina. With the overwhelming majority coming from China, questions arise as to the nature of acorn production in that country. Are they also all wild-collected, or have managed acorn orchards been established? It is worth pointing out, too, that oaks are not native to South Africa, and

the approximately 400 000 kg exported to the Republic of Korea in 2012 must either be the result of wild collection from large stands of naturalized oaks or of production from managed acorn orchards. Much remains to be understood about current world commercial acorn production.

As with the import statistics, the export statistics are notable for their geographic breadth, spanning the continents from Canada to Malaysia to Algeria to Australia to Germany. Most notable, however, is that over 75 percent of all exports go to North America. It is expected that these export patterns are driven by demand from temporary or permanent ex-patriot Korean communities in these countries.

Acorn foods are not at all uncommon in the Republic of Korea. With a 2003 to 2012 average net consumption of 13 701 412 kg/year and a population of 48,580,293 in 2010 (Korean Statistical Information Service 2014), the average in-shell equivalent acorn consumption in the Republic of Korea is 0.28 kg/person, which compares favorably to the 2003 to 2012 average United States consumption rate of 0.18 kg/person of in-shell equivalent pistachios (USDA Economic Research Service 2014). The 13.7 million kg/year net consumption of acorns also compares favorably with the 11.4 million kg/year of black walnuts processed annually in the United States (Wax 2013).

Recognizing that North America is the major importer of acorn products from Korea, and that acorns are a globally traded crop exceeding black walnuts in volume, it is curious that California, with its bounty of oak trees, and long history as a global leader in nut production, does not have even a small commercial acorn industry. Sue Chin, however, may be pointing the way to the future. She is a Korean-American businesswoman who collects and processes acorns into flour and baked goods that she sells not only in her small cafe in Martinez, California, but also nationwide through sales over the internet (Sue's Acorn Mill and Cafe 2013).

If Sue Chin is a harbinger for the future, perhaps the United States black walnut industry can provide an idea as to what a commercial acorn industry might look like in California. There is one major black walnut processor in the United States, Hammons Products, which is supplied almost entirely by individuals wild-collecting nuts across 16 states in the Midwest. These nuts are purchased from collectors at one of 250 temporary hulling stations that are set up across the heartland each season, after which they are transported to a central plant in Missouri where they are processed and packed (Wax 2013). If a commercial industry like this could be built around utilization of the acorn in California, it could add value to existing oak rangeland and woodland, thereby helping to protect these landscapes from development and preserving them for future generations.

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