International Oaks

The Journal of the International Oak Society

…the hybrid oak
that time forgot, oak-rod baskets,
pros and cons of grafting…

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Creating Sustainable Income From the Ancient Oak Forest on Kea Island, Greece

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ABSTRACT

Quercus ithaburensis subsp. *macrolepis* (Kotschy) Hedge & Yalt. is a semi-deciduous native of the Mediterranean region that produces acorns 4-6 cm/1.5-2.3 long, weighing 10-40 g/.35-1.4 oz each and with very large caps that have long, protruding scales. *Q. ithaburensis* subsp. *macrolepis* has been known by many aliases, the most common being *Q. aegilops* L. or *Q. aegilops* subsp. *macrolepis* (Kotschy) A. Camus as well as Valonia oak. The island of Kea is located in the drought prone Southern Cyclades where annual rainfall rarely exceeds 300 mm/12 in. Today, rugged Valonia oak cover 2,000 hectares/5,000 acres of central and eastern Kea, representing nearly 8% of the entire oak population in Greece. Although the forest is protected under the Natura 2000 protocol, trees continue to be sacrificed for firewood. Historically, the exportation of acorn caps for the leather tanning industry was a major sector of the local agricultural economy for at least four hundred years. The Hamada Acorn Initiative for Kea works to develop and promote responsibly sourced, oak-based income for farm families by facilitating the exportation of acorn caps to traditional leather tanneries and by developing and promoting acorn-based products.

Keywords: *Quercus ithaburensis* subsp. *macrolepis, Q. aegilops*, Valonia oak, hamada, tanning industry

History of hamada harvest on Kea

The annual exportation of tannin rich, giant, spiky acorn caps to leather tanneries in Europe and within Greece contributed significantly to the island's agriculturally based economy for as many as six centuries from the mid 1200s to 1965.[1] In 1687, Bernard Randolph in his survey of Greek islands writes, "The chief product of the Island, is Corn, Wine, and Velonia."[2] Acorn-cap collecting on Kea is mentioned in 1718 by the traveler Tournefort who admired Valonia oak as Greece's most attractive oak.[3] Entire families gathered the acorn caps from late August until the first rains in November. Extensive stone storage houses remain at the ports of Kambi and Korissia where more than 1,000 tons were gathered and exported annually (specific data for Kea is not archived; the amount quoted here is based on 6% of national exports in 1934).[4] Acorn caps were graded into three categories, the earliest harvest fetching the highest price per kilo. "Hamada" refers to grade AAA caps that were beaten out of the trees still ripe and left to dry thoroughly resulting in a cleaner and lighter leather and fabric dye. Acorn caps became less valuable as the harvest days grew damper and the acorn caps darkened with precipitation.

1/ Kea Island (Greece).

During the second half of the 18th century and the beginning of the 19th century the best quality acorn caps were nearly the same price as wheat (acorn caps are of course not edible but the comparison is to give an idea of their value).[5] 14,000 tons of acorns caps were exported from Greece in 1934 according to Thodoros Veltitsas.[6] Only raw (or dry) caps were used by the leather tanning industry until the 1920s. Later, liquid extracts made in Mytylini and known under the trade name Tanoval replaced the use of raw caps. Until 1935 Mytylini alone processed 8,000 tons of liquid extract and dry acorn caps per year. Records show that from 1938 on, one Athens factory processed 4,000 tons of tanning extract per year and in Turkey three times more extracts were produced during the same period.[7] Chemical alternatives for leather tanning that appeared in the late 1960s brought a sudden end to this vital source of income for Kean farm families. In 2011, local senior residents report regarding the local oak trees with anger and resentment immediately following the abrupt halt in income from the forest fifty years earlier (personal communication from Natasha Blatsiou who is currently editing a Greek documentary about the revitalization of the acorn-cap harvest on Kea). Oak trees were subsequently disregarded and cut down in large numbers for fuel. Only a fraction of the largest and oldest oak stands survived. No evidence of the oak as a motif in ceramics or other decorative arts can be found despite the ancient origins of the forest on Kea.

In 2005, Stephanos Lepouros, then mayor of Kea, organized a two-day conference on the Kean oak forest to encourage interest and understanding of this rare Greek island phenomenon. Participants learned the names in the Kean dialect for the different sizes and shapes of acorn caps: *dimiti (Διμιτυ)* for the heavier and harder ones and *malliari*

2/ Acorns ready to be harvested.

(Μαλλιαρη) for the fluffier, lighter caps. *Dimiti*, generally regarded as superior, are sold by weight. Amongst other presentations Dr. Yiannakopoulou contributed an interesting paper on the export history of the products of the Kean oak forest.[8]

Eating acorns—past and present

In 1862, German botanist Theodor Von Heldreich mentions acorns being eaten, often raw, throughout Greece.[9] In 1920, *National Geographic* featured an article entitled "Acorn, A Possibly Overlooked Source of Food" which builds a strong case for eating the fruit of oaks.[10] Acorn as an abundant food source for humans has been of particular interest to me ever since I learned that many Native American tribes in Northern California processed and ate acorns until the middle of the 20th century.[11] "There seems to be no reason why acorn meal should not be a food of unsurpassed excellence for cows, stock hogs, all work animals, and probably for beef cattle." writes Russel in his 1929 survey of possible uses for tree crops.[12] He also made this rather interesting observation:

"Some factory may be giving us artistic boxes of acorn cakes under an attractive name. We need be surprised by nothing, now that the food factory has come. One man is now selling each week, one and one half million sandwiches made of peanut butter and crackers. A few generations ago the peanut was unknown. Then for a few decades it served as the pocket food of the socially unsophisticated while enjoying the circus or the horse race. Finally, some enterprising enthusiast took the peanut to the factory. Millions now eat the one-time lowly nut in its various dignified forms. Peanut butter and the salted

3/ The ground has been netted to receive the acorns.

peanut, have an established place at the American table. Will the acorn be next?"[13]

Conducting my own experiments with acorns—this widely misunderstood nut—has led to the charting of optimum steps for medium-scale acorn processing; implementing what I've learned and using as little fossil fuel as possible. I have been fortunate enough to live among *Quercus* for much of my life and the giant acorns from Valonia oak on Kea are by far the most satisfying acorns I've had the opportunity to work with. Greek botanist Kavadas in his *Plant Dictionary* states that Valonia oak is the sweetest of the Greek acorns.[14]

In May 2011 I launched an awareness campaign to promote understanding acorns as an additional, and often superior, food source for much of the planet. In May 2012 I spoke at the TEDxThessaloniki—The Courage to Create gathering about utilizing previously disregarded resources available, especially during an economic crisis.[15]

2013 is the first year local farmers had the opportunity to profit from acorn nuts in addition to the acorn caps. The largest nuts tend to be sweeter and some Valonia oak acorns on Kea need very little leaching before being processed into gluten-free flour. Acorn flour can be used in any bread recipe, replacing up to 30% of wheat or corn flour and in gluten-free recipes up to 100%. Acorn flour is used to make tortillas, pancakes, pasta, *dotorimuk* (Korean acorn jelly), vegetarian burgers, cakes and cookies. The Gluten-Free Food Department at the Technical University of Thessaloniki has conducted extensive analyses on acorn nutrients (based on samples I provided) the results of which will be published in 2014. Initial findings, reviewed in June 2013, point to an extremely rich source for anti-oxidants, potassium, magnesium, protein and high levels of phenols, all of which make acorn a very promising source of protein and starch for any diet. Acorn

nuts from Valonia oak have 7-13% fat content, so high-quality oil extraction is a viable possibility. Acorn-oil based bath and body products are currently being researched and developed. Possibilities for interesting and marketable products produced from acorn flour and acorn oil are seemingly infinite.

Hamada Acorn Initiative

In 2011 the first exportation of acorn caps, 12.5 tons, left Kea for a German leather tannery. The Kean Farmers Association assisted farmers in determining opportunities to sell acorn caps and oversaw their payment. George Voutsina, President of the Kea Farmers Association, is an active supporter of the oak initiative with a particular interest in supplementing animal feed with shelled acorn. In 2013 orders tripled and Kean acorn caps were shipped to Germany, Amfissia and India. Aside from the traditional leather tanning industry, acorn caps are now available for decorative purposes in mass quantities.

Creating income for farmers on Kea through reigniting the acorn-cap economy in a manner that respects and conserves the ancient oak forest also creates the opportunity to spread practical information about acorns as a daily food ingredient. The Hamada Acorn Center will open on Kea in Spring 2014 providing our current grant proposal in the framework of the Leader+EU initiative for sustainable rural development is approved. In addition to organizing the annual hamada acorn and acorn-cap harvest and developing new oak-based products, the Acorn Center will serve baked goods made with acorn flour, host regular seminars and school trips and continue sharing acorn knowledge. An Acorn Cookbook will be published by the Hamada Acorn Center as our acorn recipe archives grow.

Several innovative measures have helped encourage and promote the Hamada Acorn Initiative. Crowd funding provides seed money and has helped to purchase an industrial acorn huller, an acorn-cap mill and a solar-powered dehydrator. Through meetings, seminars, school activities and speeches in Greece and abroad we have distributed over ten thousand acorn cookies! The 2013 Acorn Festival in late October was the second annual celebration of the oak harvest organized by the Hamada Acorn Initiative. Festival highlights included an exhibition on the steps of processing acorn flour*, examples of leather tanned with Kean hamada provided by Kostantinos Merinopoulos & Son O.A. (Amfissa)—a traditional leather tannery, and now the only representative of this industry that used to be central to the Amfissa economy—decorative oak craft workshop for adults and children, a demo of the acorn huller for creating animal feed and “the golden acorn” treasure hunt as well as other activities for children. The Acorn Festival is unique in bringing local farmers, students and Kea Island holiday homeowners together in a multifaceted and informative day of oak and acorn celebration.

Harvest 2013

Kea’s oldest generation, who have clear recollections of the hamada harvests of their youth, have shared traditional oak harvesting practices with us. After the ground under the trees is netted, green acorns that are firmly attached to the acorn caps are hit, beaten, shaken and swatted off the branches. Harvesting begins in late September

* The Festival was on October 27 and just two weeks later on November 11, a local resident began selling his own homemade acorn flour on Facebook!

4/ Sorting caps and acorns.

and lasts through to the first weeks of November when the acorns and acorn caps fall, ripe and dry to the ground. Upon reaching the ground, the largest and sweetest acorns are almost immediately eaten and/or stored away by both wild and domesticated creatures (rodents, birds, beetles, donkeys, goats, sheep and pigs). Trees that have been identified as yielding optimum acorns should be carefully monitored to determine optimum harvest time. Heavy spring rains usually result in higher acorn set.[16] Valonia oak has a unique mechanism for adapting to extreme drought by shedding larger leaves and replacing them with smaller, lighter, hairier leaves for optimum photosynthesis abilities and water retention.[17]

Trees are ready to harvest when the acorn can be gently released from the acorn cap without tearing the acorn shell. Acorns display a range of colors, from pure green to green with increasing patches and bands of brown as they ripen. Green and light tan-colored acorns must be left to ripen in a warm, dry place. Wooden decks are ideal to absorb moisture but acorns will permanently dye any surface they come in contact with if they get wet. Acorns should be covered at night when there is high humidity and they should not be exposed to more than a few days of direct sunlight to prevent the oils from becoming rancid. Acorns are ready to store when the moisture level in the nuts reaches 10%. Acorns must be stored in a sealed, dry area, preferably in wooden boxes. When plastic crates are the only storage available, an unfinished piece of timber is buried in the center of each crate to absorb moisture. Crates can be filled with acorns to a depth of 20-25 cm/8-10 in and should be stacked in a manner that allows air to flow through the crates. Acorns can also be stored in clean water for months, preferably in stainless steel containers with enough cold water to

keep the nuts covered. All acorn nuts must be leached and dehydrated, including those stored in water, before they can go to the flourmill.

Medium-size trees 4-6 meters/13-20 feet in height with canopies of 5 meters/16 feet in diameter can yield 15-35 k/33-77 lb of ripe acorns and an equal amount of acorn caps. It is not unusual to gather 200-300 kilos/441-661 pounds of acorns and caps from 10-meter-/33-foot-tall trees. Allowing for loss of hull weight and acorns discarded due to infestation, flour production represents 60% of total weight at collection. Acorns on Kea are frequently infested by moths, beetles, mites, and most notably by *Balaninus glandium* (*Curculionidae*) and *Tortrix viridana* (*Tortricidae*). The pronymph of these insects eats the leaves while creating a web around the damaged leaves.[18]

5/ Hamada Acorn Initiative volunteers.

Highly motivated farm workers can collect 90-120 kilos/198-265 pounds of acorns and/or acorn caps in six hours. Volunteers collect an average of 40 kilos/88 pounds each in five working hours. Nine volunteers hosted over a six-week gathering period from September to November 2013 collected two tons of acorns and one ton of acorn caps. Comparing four-, five-, seven- and nine-person volunteer teams for acorn and acorn-cap harvesting, I have found that maximum efficiency is achieved with teams of no more than five people per medium-size tree: two or three to climb into the branches of the tree and the remaining workers to help sort acorns and caps into bags after they have fallen. Trees should be beaten lightly from inside towards the outside to avoid damaging the next cycle of acorn production. It is important to turn the acorn caps as they dry to avoid over heating and subsequent mold. Caps dried on rocky ground rather than on tilled soil are always considered superior. Kean caps, dried on flat rooftops, have always been considered by the leather tanneries in Greece as being the finest available hamada.

Obstacles and challenges

One in six oak trees never produces mature acorns but it is not understood why. Some Valonia oak trees consistently drop the young flowers and acorns and are almost always barren. X. Diapoulis, who studied this phenomenon, concluded that one or more of the following could be responsible: a species of *Loranthus* (semi-parasitic plants), incomplete development of the flower, or insufficient nutrients.[19] Kavadas hypothesizes that an autosterilization mechanism resulting from incompatible autofertilization in the tree may play a role.[20] The first small acorns are rejected early in the summer as the result of warm southern winds in June of each year.[21]

Another problem is that sometimes the scales of the caps become dark with surface

6/ Acorn chips being leached in fresh water.
7-9/ Marcie Meyer straining leached acorn chips that will be sent to the dehydrator.

dust, due to the presence of a resinous, gum-like fluid, called oak manna, a sugary substance produced by aphids, also known as *manna quersina* or *eichen Manna*.[22] It does not affect the tannins in the caps but can cause black spots during the tanning process.

Conclusion

Acorns and acorn caps can once again play an important role in the agricultural sector on Kea. The Hamada Acorn Initiative shares practical knowledge about cultivating, harvesting, processing, and cooking with oak nuts. Across the planet, our ability to transport food over long distances will drastically diminish during the 21st century. Nearly all *Quercus* produce edible acorns and they are widely distributed throughout the Northern Hemisphere. Spreading acorn knowledge, which was once so commonly held, is the first and foremost goal of the Hamada Acorn Initiative. In this way, we hope to

give new value to all *Quercus* and encourage people in their admiration and preservation of oaks everywhere. On Kea we have seen an entirely new attitude arise in only two years, one that takes into consideration the welfare of the trees. The oak forest and new farming possibilities are now regularly discussed on Kea and there is a general awareness that residents can once again look to the trees for sustenance and support. It is our hope that the Hamada Acorn Initiative serves as an example for others to create small- and medium-size facilities for processing acorns everywhere oaks are found.

Hamada Acorn Initiative Timeline

August 2011: 1st Kickstarter Project raises $10,777. *http://www.kickstarter.com/projects/acorns/eating-acorns*
October 2011: 1st Acorn Cap hamada harvest since 1965.
October 2011: 1.5 tons of acorns collected and stored for processing into gluten-free baking flour.
November 2011: Industrial acorn huller imported from Southern Turkey.
March 2012: 12.5 tons hamada exported to Germany by Kean Farmers Association* at 0.47 €/k.
May 2012: Hamada Acorn Initiative featured at TEDxThessaloniki.
July 2012: 2nd Kickstarter Project raises $18,004.
http://www.kickstarter.com/projects/acorns/mighty-acorn-mighty-oak
October 2012: NO acorn harvest—all trees barren.
October 2013: 4 tons of acorns collected, bought and stored for processing into gluten-free baking flour and cold-pressed acorn oil.
November 2013: 1st time acorns purchased on Kea at 0.25 €/k.
November 2013: A 43,000 € ESPA grant awarded for acorn cookie processing tools and machinery.
November 2013: Hamada mill purchased by Marcie Mayer for the Kean Farmers Association to obtain the Merinopoulos contract.
December 2013: 3rd Kickstarter Project launched to raise funds to open the Hamada Acorn Center on Kea.
http://www.kickstarter.com/projects/acorns/the-acorn-center
December 2013: 40 ft container of hamada (approximately 11 tons) exported to India at the price of 0.50 €/k.
February 2014: Merinopoulos contract, 2 tons of hamada in powder form at 0.78 €/k.
March 2014: 25 tons of hamada exported to Germany at 0.50 €/k.

*All hamada exports from the island of Kea are overseen by the Kean Farmers Association.

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Photographers. Title page: Marcie Mayer (the magnificent acorn of the Valonia oak). Photos 2, 5: Marcie Mayer. Photos 3, 4, 6-9: Kostis Maroulis.

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For more information about processing acorns and acorn recipes please visit: www.iloveacorns.com