Oaks in Indonesia?

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ABSTRACT

Members of the beech family (Fagaceae), including chinquapins and oaks, are broadly characterized by long, usually drooping flower clusters called catkins, and by nuts which are completely or partially surrounded by a husk called a cupule. This guide is an introduction to the four Fagaceae genera that are indigenous to Indonesia and how they may be distinguished by the non-specialist.

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VERSION HISTORY

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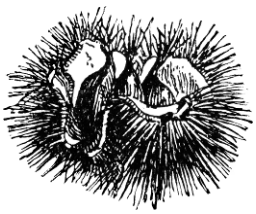
I was strolling the beach on Buton Island one day, near the mouth of the Kioko River. There were lots of shells, but then I noticed a nut. "This sure looks like an acorn that's missing its cap," I thought to myself. Later I showed it to some Kulisusu friends. They were familiar with it, and showed me how children would spin it between their fingers like a minature toy top. They also gave me the Kulisusu word for it: *pololi*. Could it be that the nut I had found came from an oak?

Later, however, a cursory search revealed that while oak trees (genus QUERCUS) occur in western Indonesia, they are *not* indigenous to Sulawesi, where I had discovered my nut. I was forced to dig deeper.

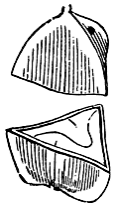
The broad picture: The beech family

Oaks are closely related to two other well-known types of trees, chestnuts and beeches. All three of these belong to the family Fagaceae, otherwise known as the beech family. Members of this family are characterized by a kind of long, usually drooping flower cluster called a 'catkin,' and nuts which have a kind of surrounding husk—technically called a 'cupule,' from the Latin meaning 'small cup.'[1] Even within this broad characterization, however, there is a good deal of variability. Is the husk spiny or scaly? How many nuts grow inside the husk? If you look at a cross-section of a nut, is it round, triangular, or somewhere in between? Does the husk partially or entirely surround the nut(s) inside? At maturity, does the husk split open along predefined structural lines, and if so, into how many sections or 'valves'? Do nuts separate easily from the husk, or are they more or less fused together?

acorn
(with scaly cupule)



chestnut
(with spiny cupule)



beechnut
(cupule removed)

[1] Not to be confused with 'cupola,' a kind of domed roof, but also having the same etymology.

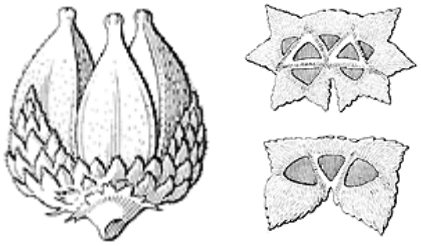
The narrow picture: Four genera in Indonesia

The variability in fruit shape was certainly a good clue. I was also helped in narrowing my search because, of the seven (some say nine)[2] genera within the beech family, only four occur in Indonesia. Here is what I learned about each.

genus	common name	no. of species worldwide	in Indonesia?
CHRYSOLEPIS	golden chinquapins	2	*no*
TRIGONOBALANUS	whorled oaks	3	Sumatra, Borneo, Sulawesi
CASTANEA	chestnuts	8	*no*
FAGUS	beeches	10	*no*
CASTANOPSIS	chinquapins	125–130	throughout Indonesia
LITHOCARPUS	spike oaks	330–340	throughout Indonesia
QUERCUS	true oaks	500+	western Indonesia only

Trigonobalanus

One species of genus TRIGONOBALANUS is known in Indonesia. Furthermore it is extremely rare, with only seven 'populations' of T. VERTICILLATA Forman known worldwide, ranging from northern Sumatra to peninsular Malaysia and northern Borneo and finally one at the 'neck' of Central Sulawesi.[3] As for its fruit, TRIGONOBALANUS is considered a primitive type within the beech family, with the scaly cupule containing from three to seven triangular nuts. This couldn't be the tree I was looking for. But now I'll start keeping my eyes open, and maybe someday I'll discover a new 'population' on my own!



fruiting cupule of T. VERTICILLATA (left) and cupules showing scars of nuts (right); from Soepadmo (1972:400), used by permission of the Flora Malesiana Foundation, Naturalis Biodiversity Center, Leiden, The Netherlands.

Castanopsis

In English, trees of genus CASTANOPSIS are correctly called 'chinquapins,'[4] although sometimes they are also referred to in a general way as 'chestnuts.' Depending on the

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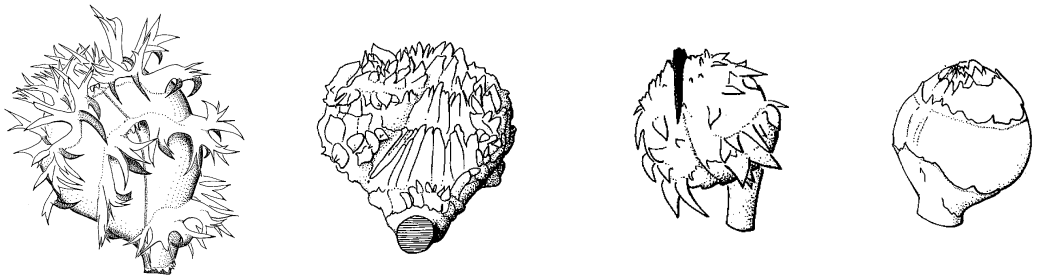
[2] Some botanists treat the three TRIGONOBALANUS species as belonging to separate genera.

[3] Information from Nixon and Crepet (1989:837). An eighth population has recently been discovered on Hainan Island in southern China (Lin et al. 2007).

[4] The spelling 'chinkapin' is less correct but acceptable. The name 'chinquapin' is derived from an Algonquian word, and its original reference was to certain species of true chestnuts (CASTANEA) of the eastern U.S. that bore a single nut inside a spiny bur. Later the name was extended to certain Pacific coast trees of genus CHRYSOLEPSIS and CASTANOPSIS, which had similar fruiting structures, and lastly was applied as a cover term for all Asian CASTANOPSIS species (members of CHRYSOLEPSIS being limited to

species of CASTANOPSIS, the cupule may contain only one nut, or it may contain up to four nuts. The nut itself resembles that of an acorn, but instead of being perfectly round it has three thickened ridges running its length. The cupules, however, can be quite variable from one CASTANOPSIS species to the next. In some species the cupule is "massively invested with strong, sharp spines" (Kaul 1988:1480), but in others it is less spiny, more irregularly knobby, while in still other species it is nearly smooth with only slight ridges. At maturity, usually the cupule splits open ('dehisces'), either irregularly or else along two or four predefined lines ('sutures'). However, there are a few species in which a smooth cupule is fused ('adnated') with the nut, in which case the cupule does not split open. Many CASTANOPSIS species have nuts which can be eaten—boiled, roasted, or in some cases even raw.



C. FOXWORTHYI Schottky | C. INERMIS (Lindl.) Benth. & Hook.f. | C. ACUMINATISSIMA (Blume) Rehder | C. PIRIFORMIS Hickel & A. Camus

fruiting structures of four selected CASTANOPSIS species, illustrating variability in cupular structure and appearance; from Kaul (1988:1485–1491), used by permission of Missouri Botanical Garden Press.

In Indonesian, CASTANOPSIS trees are called *pohon berangan*.[5] Of the roughly sixty CASTANOPSIS species which occur in tropical or subtropical Asia, following Soepadmo (1968, 1972), twenty-one occur in Borneo, eleven in Sumatra and four in Java, while only two species—C. BURUANA Miq. and C. ACUMINATISSIMA (Bl.) Rehd.—occur east of the Wallace line. Anyway, even though the nut I wanted to identify was missing its cupule, it was completely round in cross-section without thickened ridges. I needed to move on.

North America). The term 'chinkapin oak'on the other hand refers to two oak species, namely QUERCUS MUEHLENBERGII Engelm. (also known as 'yellow oak' or 'yellow chestnut oak'), and Q. PRINOIDES Willd. (also called the 'dwarf chinkapin oak' or 'dwarf chestnut oak'). The yellow oak is said to have a sweet, edible nut (acorn), but whether this was the basis for extending the term 'chinquapin' to these true oaks, or whether there was some other basis, is unknown to me.

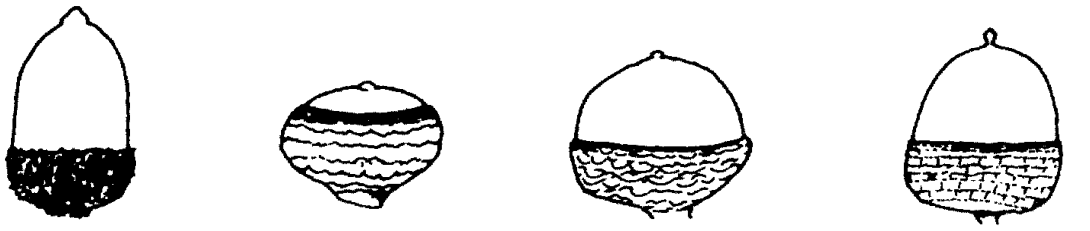
[5] This name is also applied to some QUERCUS and LITHOCARPUS species; see footnote 7. In addition, the term *riung anak* is apparently the name of a specific CASTANOPSIS species, but authorities are divided whether it applies to C. JAVANICA (Blume) A. DC. or C. ACUMINATISSIMA (Blume) Rehder.

Quercus & Lithocarpus

The fruits of QUERCUS and LITHOCARPUS species are nearly indistinguishable. In both cases a scaly cupule surrounds a single, round nut—just what comes to mind when you think of a prototypical 'acorn.' There is a major difference, however, in where the flowers (and acorns) are borne on the tree:

> QUERCUS: flower stalks always unisexual, male flowers in the axils of lower leaves; female flowers in the axils of higher leaves.
>
> LITHOCARPUS: similar, but in addition flowers can also occur in 'paniculate clusters' (that is, at the ends of branches) which include both male flowers (on the upper parts/ends) and female flowers (toward the base of the panicle).

In fact it is from this arrangement of the flowers and fruits that LITHOCARPUS species are called 'spike oaks'—because the flowers (and later the acorns) occur in terminal spikes or spikelets. Another name for trees of this genus is 'stone oaks.' This other name is doubtless based on the scientific name (< Greek *lithos* 'stone' + *karpos* 'fruit').[6] In the Indonesian context, oak trees (both QUERCUS and LITHOCARPUS) are called *pohon pasang* or *pohon ek* (from Dutch *eik*). In addition, I have encountered the term *mempening*, which appears to be the preferred term in Malaysia. Finally, the previously mentioned term *berangan* has also been applied to at least some LITHOCARPUS species.[7]



L. HAVILANDII (Stapf) Barnett | L. GLUTINOSUS (Blume) Soepadmo | L. ELEGANS (Blume) Hatus. ex Soepadmo | L. CELEBICUS (Miq.) Rehder

fruiting structures of the four LITHOCARPUS species occurring in Sulawesi; from Whitten, Mustafa and Henderson (2002:504), used by permission of Periplus Editions

Because I only had the nut and had not seen the tree from which it came, I didn't know where the nuts grew on it. But fortunately I had another clue—the aforementioned difference in geographical distribution. My nut must be from a LITHOCARPUS species!

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[6] The one LITHOCARPUS species growing in western North America—L. DENSIFLORUS (Hook. & Am.) Rehd.—is called the 'tanoak.' This name should not be applied to species in Indonesia.

[7] Wilkinson notes that Malay *berangan* is a "generic term for chestnuts and oaks" (1959:s.v.). Stevens and Schmidgall-Tellings (2004:s.v.) specifically identify *berangan babi* as the tree LITHOCARPUS RASSA (Miq.) Rehder, and both they and *Kamus Besar* identify *berangan landak* as the tree LITHOCARPUS ELEGANS (older synonym: QUERCUS SPICATA).

Summary and identification key for Fagaceae in Indonesia

Fortunately for the professional lexicographer, who is likely only an amateur botanist, trees of the beech family which are indigenous to Indonesia can be identified down to the genus level fairly readily—and usually by simple inspection of the nut along with its cupule. The following is a simple key which summarizes the preceding discussion.

1. a. cupule scaly, containing three to seven triangular nuts ..... TRIGONOBALANUS
   b. cupule spiny, knobby or smooth (not scaly), containing one to four nuts, nuts with three thickened ridges running their length..... CASTANOPSIS
   c. cupule scaly, containing a single nut that is round in cross-section → GO TO 2

2. a. fruits borne only axially along the branches..... QUERCUS
   b. fruits borne in clusters at the ends of branches ..... LITHOCARPUS

Maybe someday I'll actually come across a *pololi* tree, and with luck I'll see the flower spikelets, or at least the acorns hanging there in terminal clusters. However, most CASTANOPSIS, LITHOCARPUS and QUERCUS species in Southeast Asia have buttress roots, and they all have simple, entire (unlobed) leaves—not at all like the white, black and red oaks that I'm used to back in the states. Except for the acorn, I might not recognize an Asian oak tree if I saw one!

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