

## Quercus semecarpifolia

khارشु

Sm.

Fagaceae

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### LOCAL NAMES

English (kharsu oak,brown oak); French (chêne de l'Himalaya); Hindi (moru,kreo,khor,kharshu); Nepali (kasru,ghesi); Trade name (kharshu)

### BOTANIC DESCRIPTION

*Quercus semecarpifolia* is a middle to a large gregarious, evergreen to nearly evergreen tree, forming a long clean bole, attaining a height of 24-30 m and a girth of 210 cm or more under favourable conditions. The larger trees are generally hollow, with young parts clothed with soft hairs. Bark dark grey, rough, cracked into more or less rectangular scales.

Leaves 5-12 x 2.5-7.5 cm, elliptic or oblong, spinous-toothed in young trees, often entire on older trees, stiffy, coriaceous, glabrous and dark-green above, generally rusty-tomentose beneath, lateral nerves 6-12 pairs, bifurcating, impressed above, base cordate or rounded. The new leaves, subtended by brown deciduous stipules, are bright green above, with a felty light brown, nearly white beneath. The branches are often festooned with mosses and lichens.

Male catkins crowded, 5-10 cm long and congested in seed years, 10-20 cm long in other years. The male catkins and female spikes appear in dense pendulous clusters on the new shoots. Perianth ciliate, stamens indefinite.

Acorn solitary, in pairs or in clusters of 3-6 on previous year's shoots, 2.5 cm diameter, globose, black when ripe, cup soft and leathery, enclosing about a third of the nut, scales green with reddish brown tips.

### BIOLOGY

In Nepal, the old leaves begin to fall in May-June, but do not fall entirely until the new leaves are formed. At the lower elevations, the new shoots appear in May, whereas on the higher elevations the new shoots do not commence to appear until June. There is little or no growth of the young acorns in the first season, however, rapid growth ensues in the second season, the acorns of all sizes, many green and others dark brown. It takes about 15 months between the flowering time and time of ripening of acorns. In Nepal, *Q. semecarpifolia* is an exceptional oak in that it ripen its seeds in the middle of the rains (July/August) as opposed to others, ripening their seeds after the end of the rainy season (October-January). The monoecious flowers are wind pollinated, followed by seed ripening in its second year. It hybridises freely with other members of the genus. Bears, monkeys, squirrels and birds, devour the acorns, dispersing them.

**ECOLOGY**

The tree is found throughout the Himalayas from Bhutan westwards, mainly between 2400 and 3000 m elevation, occasionally descending to about 2000 m and ascending up to about 3600 m elevation on northern and southern aspects respectively. It also occurs in east Manipur bordering Burma between about 2400 and 3000 m elevation. Within its well marked zone, it occurs gregariously, forming stands along the tops and upper slopes of ridges. It is frequently mixed with spruce (*Picea smithiana*), Silver fir (*Abies pindrow*) or yew (*Taxus baccata*) and in some localities with blue pine (*Pinus wallichiana*). Among the broad-leaved species, common associates are *Pyrus* spp, *Prunus padus*, *Acer caesium*, *Juglans regia*, *Betula alnoides* etc. It is a characteristic tree of West Himalayan upper oak/fir forest and Kharsu oak forest types, generally predominating on the exposed ridges.

**BIOPHYSICAL LIMITS**

Mean annual Temperature: 0-30°C.

Mean annual Rainfall: 500-2500 mm.

Altitude range: 2500-4000 m

Soil: It is found both on deep rich moist soil in more or less sheltered localities and also on poor rocky ground on the crests of ridges, where the growth remains stunted. Deep rich clayey loam soil in depressions supports good growth.

**DOCUMENTED SPECIES DISTRIBUTION**

Native: Afghanistan, China, India, Nepal, Pakistan

Exotic: France



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

**PRODUCTS**

**Fodder:** The tree is lopped extensively in the hills of Himachal Pradesh and Uttar Pradesh. Bears are particularly fond of acorns. The rotation lopping cycle is 3-4 year for maintenance of good health to lopped trees as they are capable of living to good old age and remain productive for very long periods.

**Food:** Seeds can be dried, ground into a powder and used as a thickening in stews etc or mixed with cereals for making bread. The seed contains bitter tannins, these can be leached out by thoroughly washing the seed in running water though many minerals will also be lost. Either the whole seed can be used or the seed can be dried and ground it into a powder. It can take several days or even weeks to properly leach whole seeds, one method was to wrap them in a cloth bag and place them in a stream. Leaching the powder is quicker. A simple taste test can tell when the tannin has been leached. The traditional method of preparing the seed was to bury it in boggy ground over winter. The germinating seed was dug up in the spring when it would have lost most of its astringency.

**Fuel:** It makes good firewood and excellent charcoal; the calorific value of sapwood is 4879 k cal and of heartwood 4815 k call/kg of dry wood.

**Timber:** Heartwood reddish-grey, very hard, annual rings not very distinct. Weight 850 kg/cum. The wood splits on seasoning. It is used only locally for building, door-frames, beds steads, ploughs and mule-saddles. Wood is also used as a substitute for imported oak for kegs in distilleries.

**Tannin/Dyestuffs:** Oak galls are excrescences that are sometimes produced in great numbers on the tree and are caused by the activity of the larvae of different insects. The insects live inside these galls, obtaining their nutrient therein. When the insect pupates and leaves, the gall can be used as a rich source of tannin that can also be used as a dyestuff.

**SERVICES**

**Other services:** A mulch of the leaves repels slugs, grubs etc, though fresh leaves should not be used as these can inhibit plant growth. Silkworms of *Antheraea proylei* is widely cultivated on the leaves of oaks, of which the leaves of *Q. semecarpifolia* are more palatable with little change of condensed tannins. The leaves contain 4.5% ash and 1.37% nitrogen.

**TREE MANAGEMENT**

This oak can be raised either by direct sowing or by planting out nursery raised seedlings. Slow growth, heavy grazing and dense growth of weeds hamper its establishment. For the establishment of natural reproduction, abundant overhead light is essential and often, dense thickets of young oak come up near the isolated mother trees or on the edge of stands, where the canopy is opened out.

For raising nursery seedlings, sowing is done in July, in lines 20cm apart and about 2cm deep. Seed from fresh collection should only be used. The nursery is irrigated and weeded regularly. During the following summer, the seedlings are spaced about 10 cm in lines. 2 year-old seedlings are planted out with balls of earth in July-August in 30 cm<sup>3</sup> pits. Spacing for the plantation may be 2.5m x 2.5m. Winter planting is not successful. Bagged plants can also be used. This oak is a light-demander and fails to establish under shade. It coppices and pollards fairly well, the latter in particular are liable to snow-break. Out of the large number of coppice shoots, a few eventually survive and the remainder are suppressed. The growth of coppice-shoots is slow. Young pole and tree may also suffer from load of snow and get uprooted. Young growth is susceptible to fire also.

**GERMPLASM MANAGEMENT**

The seeds of this genus are recalcitrant. The germination under favourable conditions is prolific. It seeds profusely every second or third year, twelve years of record of seeding showed abundant seeding in four years, and poor to moderate seeding in eight years. Ripe acorns should be collected from the trees as the seed lots collected from the forest floor contain fairly large number of insect damaged acorns. The seed should be carefully selected as the spikes contain various degrees of green to ripen seeds. The acorns should be dried in shade and kept in a cool place. About 140 acorns weigh 1 kg. The fresh seed has a high fertility of about 95-100 percent, but retains vitality for a short time. *Q.semecarpifolia* quickly loses viability if it is allowed to dry out. It can be stored moist and cool over winter but is best sown as soon as it is ripe in an outdoor seed bed, though it must be protected from mice, squirrels etc.

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### **FURTHER READING**

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Plants for a future Database ([http://www.scs.leeds.ac.uk/cgi-bin/pfaf/arr\\_html?Quercus+semecarpifolia](http://www.scs.leeds.ac.uk/cgi-bin/pfaf/arr_html?Quercus+semecarpifolia))

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### **SUGGESTED CITATION**

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