

The year 2010 was ‘mast seed year’ for the Kharsu oak (*Quercus semecarpifolia* Sm.) in the Western Himalaya

There are more than 35 species of *Quercus* reported from the Indian Himalayan region, of which *Quercus semecarpifolia*, commonly known as ‘Kharsu’ or brown oak (Figure 1) is the main forest-forming evergreen tree species from upper temperate to sub-alpine regions (2500–3300 m)¹. This represents the climax community and forms the tree line in many parts of the Western Himalaya. At lower altitudes it succeeds the Moru oak (*Q. floribunda*) forests and on the upper part it grooves into sub-alpine forests, where it is associated with *Betula utilis* and *Abies spectabilis*. The species occurs in all aspects and slopes in the Western Himalaya, but prefers the scarp slopes, especially when it coincides with southern aspects, where it is gregarious.

Masting is the intermittent production of large seed crops by a population of plants, and this behaviour is reported for many tree species in boreal, temperate and tropical forests. Earlier, it was reported that *Q. semecarpifolia* produces mass seeds every 8–10 years (ref. 2), but in the recent past the exact year of mass seed production by this species has not been documented from the Western Himalaya. During the current survey of oak forests in the Western Himalaya from June to October 2010, mass seed production by

Q. semecarpifolia was recorded everywhere in the stipulated altitudinal zone of the species. During masting in *Q. semecarpifolia* the seed fall is up to ten times greater than normal years, which leads to profuse seedling emergence. The role of masting in this oak is immense as it leads to re-establishment of regeneration. Two broad hypotheses have been proposed with regard to the advantages of masting: (1) resource matching, in which plants vary their reproductive effort in response to fluctuations in available resources, and (2) economy of scale, in which larger reproductive effort is more efficient, favouring an occasional large effort rather than a regular, smaller one.

Oaks are highly preferred by the local inhabitants for their livelihood and also serve vital ecosystem services in the Himalayan region. Oaks in the Himalaya are intimately linked with subsistence hill agriculture as they protect soil fertility, watershed and local biodiversity. They also supply fodder, leaf litter, firewood and timber. They are considered to be one of the oldest plants of the region. *Q. semecarpifolia* is one of the most over-exploited species in the sub-alpine zones. The acorns are eagerly devoured by bears, langurs, monkeys, Himalayan tahr, barking deer, goral and birds, but in

a good seed year they are produced in great abundance, and there is no lack of seeds. Naturally occurring sub-alpine zones of the Western Himalaya are typically anthropogenic zones, where natural regeneration of species is almost negligible or species fail to regenerate adequately either in disturbed or undisturbed natural habitat. The reason for this condition is due to the long history of pastoral migratory communities and recent unmanaged tourism in the Himalayan regions. It is estimated that three months grazing by cattle can cause 75% of seedling mortality in oak forests. In many parts of the Western Himalaya, man has influenced mountain forests and tree lines in many ways such as agro-pastorals uses, timberlines and nearby alpine meadows for grazing of thousands of cattle and sheep/goats; most of the tourist routes and temples are come across the tree line and people excessively use forests for burning as fuelwood therefore, affecting regeneration. Most of the tree lines in the Western Himalaya are of such kind and very few stands are at their potential altitude for growth and survival.

Since plantation has not been successful for this hardy species, natural regeneration plays an important role in maintaining the forests at the sub-alpine zone. Collective efforts are needed from researchers, management authorities, local and migratory pastoral communities to capitalize the mass seed production by *Q. semecarpifolia* to ensure the successful establishment of the regenerating individuals.

1. Singh, J. S. and Singh, S. P., *Forests of Himalaya: Structure, Functioning and Impact of Man*, Gyanodaya Prakashan, Nainital, 1992.
2. Negi, S. S. and Naithani, H. B., *Oaks of India, Nepal and Bhutan*, International Book Distributors, Dehradun, 1995.

GAJENDRA SINGH*
ISHWARI DUTT RAI
G. S. RAWAT

Department of Habitat Ecology,
Post Box # 18, Chandrabani,
Wildlife Institute of India,
Dehradun 248 001, India

*e-mail: gajendrawat@yahoo.com

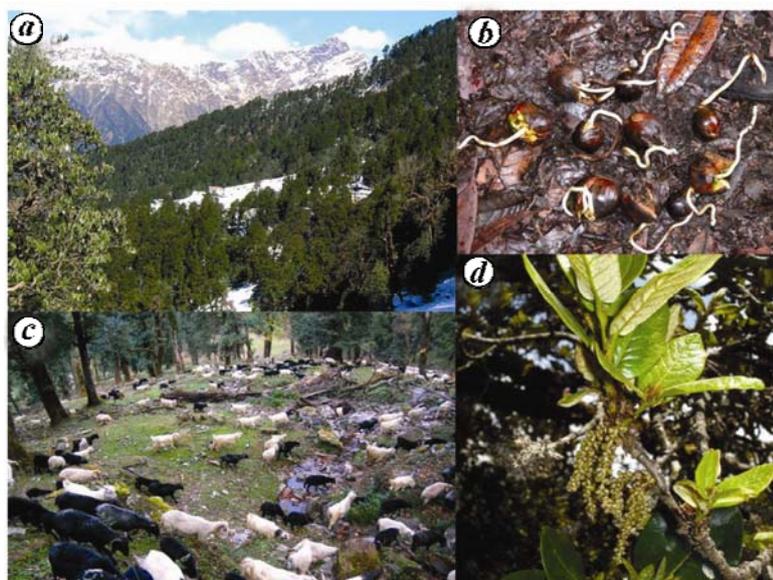


Figure 1. a, Dense *Quercus semecarpifolia* forest; b, Germinating seeds; c, Grazing by sheep/goats in the *Q. semecarpifolia* forests and d, Flowering twig of *Q. semecarpifolia*.