

Fodder and Burning Material - The Use of Oaks in Nepal and Adjacent Himalayan Regions

Eike Jablonski

Ettelbruck Arboretum

Hoesdorf, Luxemburg

Nowadays the higher regions of the Himalayas see a growing population with all its pressures. This includes a rising number of livestock, like cattle, sheep and goats. The forests of the Himalayan midlands, which lie between 800-3000 Meters (2400 - 9000 feet), become more and more fragile and over-utilized. Besides the cutting of trees for firewood, the practice of coppicing and pollarding trees for fodder is common.

The Nepali population has a long tradition of mixed farming, with animal husbandry being interdependent components. Livestock is also an integral part of the cultural life in Nepal. About 50% of the forested area in Nepal is used for fodder production from trees. The other half of the forested area is out of reach of settlements, or grows in steep gorges or other places where any fodder production is too difficult.

Animals in Nepal derive ca. 35% of their feed from trees. The annual production of fodder from trees in Nepal is estimated to 3.5 to 4 tons of dry leaves. The production of fodder from trees is possible through various methods. Trees, which are believed to have high quality fodder or special medicinal power, are lopped very carefully; only the leaves are stripped off by hand. The people own most of these trees, and they are growing in close proximity to the villages.

Trees in the forests, belonging to no one in general (called "everybody's trees" in Nepal), are more or less heavily lopped by the "Khukuri" - a knife, or by axe. In this case, twigs and branches are also cut, and this is often done down to the main trunk. Thus, firewood can also be harvested (Jablonski, 1993). According to Wormald et al. (1983) twigs and branches can make up to 30% of the weight of the whole harvest. This practice can cause heavy injury to the trees. If this practice is repeated frequently, and more annually, the trees hardly can produce flowers or fruits. Natural rejuvenation becomes more and more unlikely in such forests. Already in 1937, stated Gorrie, oaks in Northern India became increasingly weak because of annual lopping, instead of the formerly common lopping in a three-year-cycle. He also noted that not only did the trees produce less fodder, but that oaks became more and more displaced by *Pinus wallichiana*.

Livestock face maximum nutritional stress from January to May, which is the dry season in Nepal. Only in the rainy season is there sufficient fodder for animals. Consequently, only milk-producing animals like buffaloes get well fed, whilst others are grazed on the limited pasture areas, fallow land, and in the forests. In the dry season, animal fodder is in very short supply, and during this period trees provide a valuable source of nutrition.

Around a dozen oak species are growing in the forests of the Himalayas. The rural population utilizes more than one hundred species of trees (Amataya, 1991;

Gorrie, 1937; Shabnam, 1959). Although they know little about their chemical composition, they have considerable knowledge of their nutritional qualities (Amataya, 1990). The farmers do prefer special fodder tree species, including several species of oak. Some of the species coppice well, others have both coppicing and pollarding powers.

Authors from Nepal and India (Behari et al., 1968; Gupta, 1963) count *Quercus floribunda*, *Q. glauca*, *Q. lanata*, *Q. leucotrichophora* and *Q. semecarpifolia* as the most valuable fodder trees in the mountains. In Eastern Nepal, Sikkim and Darjeeling also name *Q. lamellosa* as heavily lopped.

Quercus glauca has a wide distribution throughout the Himalayas, growing from the mid-hills (1800 m) to about 3100 m elevation. This species coppices well, and it is extensively lopped for fodder. Lopping starts from April and continues until July. The new flush appears in March, varying from region to region. The leaves contain 9.6 % crude protein and the total of digestive nutrients amount to 39 % (Singh, 1982). Panday (1992) estimates a mean annual fodder yield of 80-100 kg per tree, fresh material.

Quercus lamellosa grows from about 1800 m to about 2700 m elevation, but only in regions with high annual rainfall. This moderate to large-sized tree demands light. It is quite sensitive to fire. It coppices well, but does not produce root suckers. It is extensively lopped for fodder. Lopping starts from March and continues until October. The dry leaves contain 10 % crude protein.

Quercus lanata grows from the Nepali mid-hills (1800 m) to about 2400 m elevation. This light-demanding species coppices well. It produces a massive root system and grows on a variety of soils. In some regions in Nepal *Quercus lanata* yields 78% of the whole fodder leaf harvest (Hawkins et al., 1983). Lopping starts from October and continues to April. The old leaves shed during summer, and the new flush appears before winter, between July and Oc-



© Guy Sternberg

A couple in northwestern Yunnan, Peoples' Republic of China, returns from an oak forest with bundles of fodder for their livestock



© Eike Jablonski

Heavily lopped *Quercus lamellosa*, growing in a forest near Yoksum, Sikkim, at nearly 3000 m.

tober. One tree is estimated to produce 50-80 kg of fresh fodder per annum (Panday, 1982)

Quercus leucotrichophora occurs mostly in the Western Himalayan belt up to an elevation of 2100 m, although it has a wide range of distribution throughout the country, except in the eastern Himalayas. It is a moderate to large-sized evergreen tree with a characteristic rounded crown. This light-demanding species can tolerate shade to a certain amount, coppices well, but is susceptible to drought. In some regions of Nepal it is the most heavily lopped fodder tree, and local farmers rate it as a high quality fodder tree. Lopping starts from October and continues until August. The new leaves appear in March or April. They contain a high percentage of crude fibre (30-32 %) and tannin. Because of the high tannin content it is not advisable to use leaves of *Quercus leucotrichophora* as a sole feed for livestock.

Quercus semecarpifolia grows in high elevations, ranging from 1500 - 3600 m. In many regions it forms large stands in the upper forest belt. The medium to large-sized tree develops a spreading crown. It is a strong, light-demanding species. It coppices and pollards quite well. According to Panday (1982), farmers in the higher regions of the Himalayas regard *Quercus semecarpifolia* as the fodder tree with highest qualities. Amataya (1990) also counts *Quercus semecarpifolia* in the five most important fodder trees in Nepal. The tree is lopped extensively in the northernmost districts of Nepal. The leaves of this species are preferred as a good fodder source. Lopping starts from November and continues until March-April, before the old leaves start shedding. The new flush appears immediately in April-May; therefore it has an evergreen appearance. The leaves contain 4.5 % ash and 1.4 % nitrogen. Annual harvest of fodder leaves per tree can be up to 120-200 kg of fresh material.



© Eike Jablonski

Quercus leucotrichophora, with *Rhododendron arboreum*, on a hill above Kathmandu (ca. 2500 m). The trees are growing in a Royal Hunting Preserve so they are not lopped.

Trees play an important role for the feeding of livestock in the Himalayan regions, and oaks are a remarkable part of it. Despite the tremendous demand for fodder and the fodder deficit for livestock, there is little active production or planting of fodder trees being done. To protect and conserve Himalayan forests, including the oaks, there is a need for several measures (Amataya, 1990; Jablonski, 1993):

- Establishing of nurseries, which produce fodder trees in cooperation with the local population.
- Planting of "Fodder Forests."
- Planting of fodder trees on erosion-prone hill slopes and marginal areas of small farms. Unlike other fodder crops (clover, leucerne) trees do not deprive farmers of land capable of growing crops for human consumption.
- Education of the rural population; programs to improve the farmers' knowledge of fodder tree management.
- Fodder quality improvement.
- Reduction of animal populations, especially in monsoon season.
- Necessity of stall feeding in monsoon season.

It is urgent to make efforts in stabilizing the forests of the Himalayas and the oaks involved. Unfortunately, the recent political situation makes it unlikely that the people are able to make these efforts by themselves. Let's hope that there will be a wide consensus between all concerned parties, regional and worldwide, to save these forests, and to try to realize the above-mentioned measures.

References:

- Amataya, S.M. (1990): Fodder Trees and their Lopping Cycle in Nepal. 2. ed., Kathmandu, Nepal
- Behari, M., R. Prasad, (1968): Fodder Potential of Trees. *The Allahabad Farmer* 42 (4): 245-248.
- Gorrie, R.M. (1937): Tree Lopping on a permanent Basis. *Indian Forester* 63: 29-31.
- Gupta, R.K. (1963): Social Economy of the Himalayan People in relation to the Forests of Garwhal Himalayas. *Proceedings of the National Academy of Science of India* 33 (1): 104-114.
- Hawkins, T., R.B. Malla, (1983): Farm Fodder Trees: Patterns of Ownership and Use. *Nepal Forestry Technical Bulletin* 9: 25-31.
- Jablonski, E. (1993): Aspekte rezenter Schneitelwirtschaft am Beispiel Nepals. Universität Hannover, Institut für Landschaftspflege und Naturschutz
- Panday, K. (1992): Fodder Trees and Tree Fodder in Nepal. *Swiss Development Cooperation*, Bern, Switzerland.
- Shabnam, S.R. (1959): Fodder Tree Species for Himanchal Pradesh. *Indian Forester* 85: 736-739.
- Singh, R.V. (1982): Fodder Trees of India. Oxford Publ., New Delhi, Bombay, Calcutta.
- Wormald, T.J., Y.B. Malla, P.R. Pradhan, (1983): Estimating Tree Fodder Yields. *Nepal Forestry Technical Bulletin* 9: 21-24.