Monthly variation in nutrient contents in four fodder trees commonly grown in Nepal

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Foliage samples from five fodder tree species *Bauhinia purpurea, Ficus nemoralis, Ficus roxburghii* and *Ficus subincisa* commonly grown at Bhauluwachaur (900m), Palpa District, were analysed to determine the monthly variation in proximate amount of nutrient contents in a given foliage sample. Results indicated that the nutrients such as crude protein, crude fibre, total ash, either extract and phosphorus varied monthly. The nutrients also varied between different fodder species. Information on appropriate period of feeding foliage of different species have also been presented.

Keywords : Fodder trees, *Bauhinia purpurea, Ficus nemoralis, Ficus roxburghii* and *Ficus subincisa* Palpa District Phosporus, crude protin, crude fiber, total ash.

Use of tree fodder as livestock feed in the hills and in the mountains is a common practice in Nepal and the amount of fodder for a typical livestock depends on its nutrient contents (Amatya, 1990). Nutrient contents of green foliage vary from one species to another (Nag and Matai, 1993). The nutrient content of green foliage which varies from one part to another part of the same plant (East and Felker, 1993) is also influenced by environmental factors viz. site, rainfall and elevation, etc. (Pradhan,1983; Kumar and Toky,1994; Bhatta, *et.al.* 1992; Nag *et. al.,* 1994).

Younger shoot and leaves have higher concentration of nutrient than that in the older ones. Likewise, foliage contains more nutrient than in the woody shoot. Nutrient concentration in green fodder also varies from one month to another (Akbar and Gupta, 1986; Pandey and Osti, 1993). In the dry seasons, the relative moisture content of the green leaves is low but high in dry matter concentration. Naidu and Swamy (1995) have provoked that the nutrient concentration in the dry season would be higher than that in the wet seasons. Mahato and Subba (1988) suggested that tree fodder should be assessed for their chemical constituents to aid farmer and nursery research to choose quality fodder species for plantation.

Literature regarding the feed quality and livestock breed suggested that there is a direct relationship between the fodder quality and livestock health. but further works are needed to improve them (Bandana, 1988 and Bhatta *et.al.* 1992)

Green fodder is essential for livestock especially during the dry season (February to May). Studies to determine the nutrient concentration of green fodder have been done (see Gupta, *et. al.*1995; Pradhan, 1983; Mahato and Subba, 1988; Kumar and Toky, 1994). But there is an acute shortage of information on the monthly variation in nutrient contents of different fodder species from the same site. In order to bridge such information gap, the present paper attempts to determine the monthly variation in the nutrient content of a few fodder trees growing in the hills of Nepal. The results of this study would help

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Nepali farmers to know the time at which the nutrient contents in fodder are the highest. This would enable them to choose the correct time of harvesting each tree fodder.

Materials and methods

Seedlings of four tree fodder species viz. *Bauhinia purpurea, Ficus nemoralis, Ficus roxburghii* and *Ficus subincisa* were raised at the Bhutandevi Nursery at Hetauda. Eight hundred seedlings were transplanted at Bhaluwachaur (850-900m) at Palpa District in July 1990. The selection of these trees were based on the farmers' preference of that location.

Foliage samples were collected after the trees attained more than two meters in height. It took five years for trees to reach that height. This is the time at which farmers would normally start collecting green stuff from any tree after being planted. The collections were made during the first week of each month starting from the month of March 1995 to February 1996.

The foliage were collected following the standard practice (Richard 1993, and Anony 1994) being adopted for foliage analysis. Five dominant trees of each of the fodder tree were marked with enamel. Two branches of a tree facing towards the sunlight, were chosen. From each species of the marked tree, ten fully expanded leaves free from bird's soil, were taken . Leaves of each species were put in a clean, perforated plastic bag, labelled properly and were weighed immediately in a spring balance to record the gross weight at the place of collection.

Before analysis, the samples were kept in a well ventilated room to prevent from decay. The methodologies adopted by Sanker *et. al.* (1988) and Wheler *et.al.* (1994) were adopted while processing and storage of foliage samples before analysis. Big leaf stalk were removed from foliage before drying in the oven at 65± 5°c for 24 hours. The samples were grinded to pass through one mm sieve and the powder were stored into a screw capped polythene bottles.

Analysis

The foliage samples were analyzed for crude protein, crude fibre, total ash, ether extract and phosphorus in the laboratory of Forest Research Division, of the Forest Research and Survey Centre, Kathmandu.These elements denote the proximate amount of nutrient contents in the foliage. Crude protein was analyzed by using micro Kjeldahl method. Crude fibre was determined by using the official methods of the AOAC (1984). Phosphorus was determined by using calorimeter after developing Phosphomolybdic blue colour. Total ash was determined by igniting the samples in a Muffle furnace at 500± 10°c .

Results and Discussions

The results showed that the nutrient contents in tree fodder varies with months. It also varies with the species. In the case of *Bauhinia purpurea,* the percentage of crude fibre is highest during July and lowest during September, October and November. The percentage of crude protein follows more or less the same pattern. The percentage of ash content is high during November. It is more or less the same during other months except December, January and February (Figure 1).

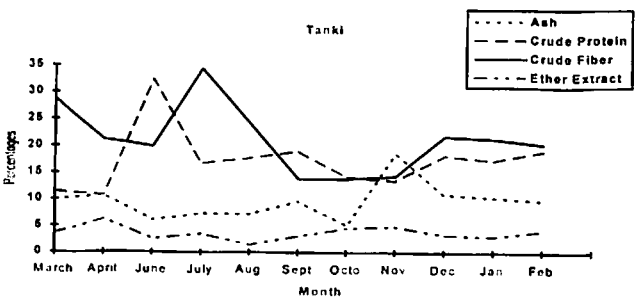

Figure 1: Nutrient contents in *Bauhinia purpurea*

In the case of *Ficus roxburghii* the percentage of crude protein and crude fibre is lowest during September. Crude protein was highest during April and crude fibre at October and January. The percentage of crude protein started declining from summer (April) upto winter (January/ February), whereas the percentage of ether

soluble fats increased from summer to winter (Figure 2).

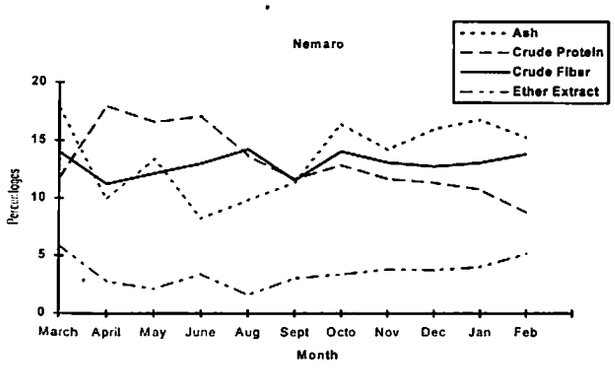

Figure 2: Nutrient contents in *Ficus roxburghii*

In *Ficus nemoralis* the percentage of crude fibre and crude protein are high during September and October. The percentage of ether extract remained nearly the same for the entire period whereas percent ash content fluctuated. The highest (10.9 %) was recorded in February (Figure 3).

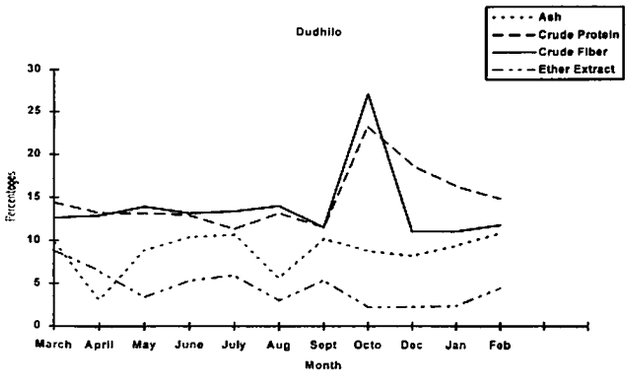

Figure 3: Nutrient contents in *Ficus nemoralis*

Ficus subinsica (Berulo) had higher percent of crude fibre in October and November and lowest during February and March.The percentage of crude protein was highest in July (15.19) and lowest (10.25) in March. The ash content fluctuated from 21.02 % in January to 8.96 % in August (Figure 4).

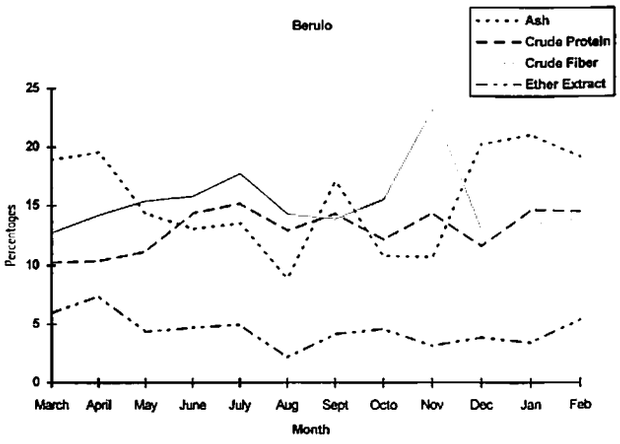

Figure 4: Nutrient contents in *Ficus subinsica*

The phosphorus content is not very high in the species studied. It ranged between 0.12% to 0.44%. There is not much change in phosphorus content both in *Ficus subincisa* and *Ficus nemoralis* (Figure 5) in contrast to *Bauhinia purpurea* and *Ficus roxburghii*. The percentage of phosphorus content in *Ficus roxburghii* is high twice during April and June and then started declining, whereas in the case of *Bauhinia purpurea* it is highest only once in the year. It is lowest (0.14) during March but increased sharply and reached to 0.43 in June.

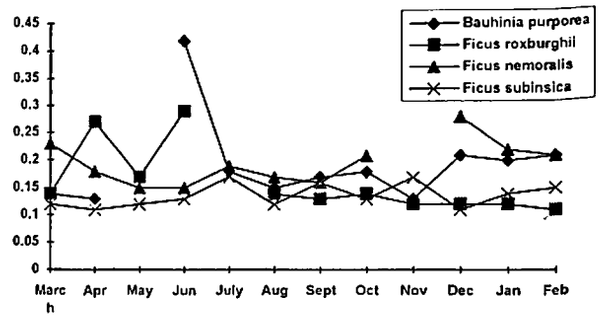

Figure 5: Percentage of phosphorus available in different fodder trees at different months

Note: Gaps in figure indicate unavailibility of fodder leaves

Implication of the study

The present study might have some implications on management of fodder trees. It indicates the months in which these fodders should or should not be given to livestocks in so far as the nutritive values are concerned.

Appropriate period of feeding foliage

The present study indicated that the following tree fodders have more nutritive values and therefore recommended be given to livestock at the following months:

Species	Feeding months	Non-feeding months
B. purpurea	June	July
F. roxburghii	June, August	March, July, October
F. subincisa	June to July, September, November and January to February	Early to mid October
F. nemoralis	October	August

Months when tree fodder are tender

Leaves contain micronutrient like calcium, sodium and potassium. There is a general belief amongst farmers that tender leaves are `good' for livestock. Researches have proved that tender leaves contain less ash than that in fully grown ones. Therefore, there in no point in feeding tender leaves to livestock. Following are the months when leaves are tender in the species studied:

Species	Months
B. purpurea	October
F. roxburghii	June
F. subincisa	August
F. nemoralis	April

Growth and development of livestock

Tree fodders are essential for the development of livestock. The phosphorus content on leaves which varies with the months, is responsible for the growth and development of livestock . Following are the months when element phosphorus are high in the species studied

Species	months
B. purpurea	June
F. roxburghii	June, August
F. subincisa	Throughout the year
F. nemoralis	Throughout the year (tree is leafless in November)

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