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Interspecies differences in tannin activity of leaves from 13 species of Nepalese browse trees

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Introduction

In Nepal tree leaves are an important foodstuff for ruminants, particularly in the dry season when foods are scarce. Many tree species are used as browses in Nepal, however little is known about the anti-nutritive factors which they may contain. Tannins occur in many plants including some trees. Tannins interact strongly with protein hence their original use in leather making. They have also been implicated as anti-nutritional factors although their effects on animals are not fully understood. This paper describes a preliminary screening aimed at quantifying the tannin levels in some species used.

Material and methods

The fodder trees sampled were located at various altitudes in the mid hills of western Nepal. The tree species and altitudes are given in Table 1.

Duplicate leaf samples from a single specimen of each tree were taken monthly from November to March, dried at 60°C and sent to the National Resources Institute for analysis. Tannin activity was assayed by a modified version of a radial diffusion technique developed by Hagerman (1987). This assay measures the ability of tannin extracts to precipitate protein. Tannins where extracted in 70% aqueous acetone and plated on agarose plates containing 0·1% haemoglobin. Precipitation activity was calculated as the ratio of the areas of rings of test extracts divided by the area of the ring developed by a resorcinol standard expressed on a per gram of dry leaf basis.

Results

The precipitation activity of leaf extracts is shown in Figure 1. Very clear species to species differences can be observed in activity levels. For example Qs extracts were consistently very active at precipitating protein while Ds extracts did not have any activity in any of the five monthly samples. Fluctuation from month to month could be very marked for some species, slight for others. The trends shown by Fg, Al, Lp, Fs, Fr and Fn were similar in that early falls in precipitation activity were subsequently reversed.

Discussion and conclusions

Tannin content and composition is known to change as tree leaves develop (Makkar, Dawra and Singh, 1991). Seasonal differences have also been observed

Table 1 *Fodder tree species analysed*

Species	Species code	Altitude
Ficus glaberrima	Fg	1100
Artocarpus lakoocha	Al	1100
Dendrocalamus strictus	Ds	1100
Litsea polyantha	Lp	1100
Ficus semicordata	Fs	1650
Brassaiopsis hainla	Bh	1650
Ficus roxburghii	Fr	1650
Ficus nerrifolia	Fn	1050
Quercus semicarpifolia	Qs	2200
Quercus lamelosa	Ql	2100
Prunus cerasoides	Pc	1650
Castanopsis indica	Ci	1650
Castanopsis tribuloides	Ct	1650

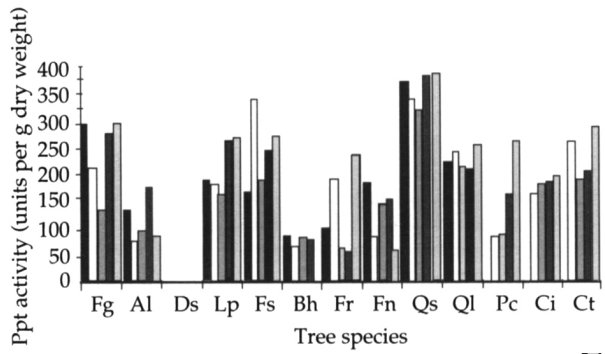

Figure 1 Tannin activity of Nepalese fodder leaf extracts. ■ Nov. ❑ Dec. ◘ Jan. ■ Feb. ❑ Mar. For abbreviations see Table 1.

which may or may not be linked with leaf development (Vaithiyanathan and Singh, 1989). As tannin activities have been observed to rise and fall in some species the changes are unlikely to be due only to leaf development. These fluctuations presumably occur in response to a varying environmental stimulus such as weather conditions. The importance of factors such as sunlight, water and temperature have yet to be established. A consequence of these fluctuations is that it is not possible to assume values for tannin levels: they should be measured for particular foods for feeding trials and for particular fodder species over the range of environmental conditions where they are to be used. The radial diffusion method is a relatively simple and potentially useful measure of tannin activity for screening work of this type. It does, however, need to be correlated with animal responses.

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