

# Chemical Composition and *in vitro* Digestibility of Tree Leaves and Green Forages in Kangra District of Himachal Pradesh

A. Kannan<sup>1\*</sup>, R. Bhar<sup>2</sup>, S. Radotra<sup>3</sup>, G. Mal<sup>4</sup>, Manjeet Kumar<sup>5</sup> and Ravindra Jadhav<sup>6</sup>

<sup>1,2,4,5,6</sup>ICAR-Indian Veterinary Research Institute, Regional Station, Palampur, Himachal Pradesh-176061

<sup>3</sup>ICAR-Indian Grassland and Fodder Research Institute, IVRI Campus, Palampur, Himachal Pradesh-176061

E-mail: <sup>1</sup>akanna72@gmail.com

---

**Abstract**—Himachal Pradesh being a hill state, livestock farming has become one of the predominant livelihood options. However, the state faces shortage of 25.0 % dry fodder, 62.8% green fodder and 70.0% concentrates for feeding ruminants. Kangra district is the largest milk producing district in the state. Only limited information is available regarding the nutrient composition of the feed resources of the district and therefore, this research work was undertaken to investigate the chemical composition and *in vitro* digestibility of green fodders and tree leaves of the district. Based on survey and discussion with local farmers 18 tree fodders and 11 green fodders/grasses were collected and identified. The proximate composition, fibre fractions polyphenol profiles of the fodders and leaves were estimated. Effect on rumen fermentation and *in vitro* digestibilities were investigated by Hohenheim *in vitro* gas system. The dry matter content varied from 41.43 % to 63.17% in the 18 tree leaves analysed. The crude protein content was highest in *R. pseudoacacia* (24.69%) and lowest in *P. sylvestris* (10.06%). Neutral detergent fibre and acid detergent fibre contents varied from 33.4 to 81.40% and 29.3 to 52.72 %, respectively, and were higher in *P. sylvestris*. Lignin content was higher in most of the tree leaves studied. Hemicellulose content was lower than cellulose content. Calcium content ranged from 0.41 to 5.82 and phosphorus content 0.04 to 0.49 percent. All the tree leaves contained tannins and the values ranged from 0.32 to 8.34 percent. Total phenol, total tannins and condensed tannin contents of tree leaves varied from 1.2 to 9.40, 0.32 to 8.34 and 0.04 to 3.75 percent, respectively. Out of the 11 green fodders/ grasses, the crude protein content was highest in *Avena sativa* (12.27%) and lowest in *Bothriochloa pertusa* (5.80%). Neutral detergent fibre and acid detergent fibre contents varied from 52.47% to 84.1% and 31.8% to 42.0%. Lignin content was lowest in *Z. mays* (3.5%) and highest in *B. pertusa* (5.4%). Calcium content varied from 0.53 to 2.4% and phosphorus content 0.2 to 0.7%. *In vitro* true dry matter and organic matter digestibility varied from 47.94 to 65.49% and 51.05 to 66.73% and it was highest for *A. sativa* and lowest for *Setaria ancep*. The tree leaves with low tannin contents and with more *in vitro* digestibility and green fodder with more crude protein and higher digestibility identified during the study can be utilized for routine feeding of animals in the district.