

Chemical Investigation of *Danthania cachemyriana* (Jaub and Spach) of Kumaun Hills at Different Stages of Growth

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Danthania cachemyriana (Jaub and Spach), a perennial fodder grass of high altitude was investigated for its chemical constituents at different stages of growth from July to October 2000–2001. This fodder grass was found to contain sufficiently high level of all the chemical constituents and hence assessed as a good quality fodder.

Key Words: Chemical investigation, *Danthania cachemyriana*, Kumaun hills.

INTRODUCTION

Kumaun hill region consists of mountaineous terrains with poor farming conditions due to limited irrigation facilities and slopy terraces of agricultural land. The output from the crops is low as compared to the cost involved in growing them. Hence not only the livestock owners and dairy workers but also the farmers of this region are mostly dependent for their economy on the animals and animal based production. To increase the strength of ruminants and extent of lactation, a balanced and nutritious diet must be provided to them for which a proper and systematic selection of fodder is essential. Green grasses are used as principal fodder for the cattle by the local people during monsoon season. *Danthania cachemyriana* is found in natural grasslands of northwest Himalayas between 2200 m and 4400 m altitude and commonly browsed by goats and sheep, the chief means of transportation of essential commodities and trade at high altitudes where other means of transportation are not available.

Therefore, it was considered of interest to analyze this grass for its chemical constituents at different stages of growth.

EXPERIMENTAL

The samples of *Danthania cachemyriana* grass were collected from different parts of Kumaun hills (2200 m–4400 m altitude) at monthly intervals during the growing season in the year 2000–2001. Fresh forage samples were dried at 60–70°C in an electric oven and ground to powder for chemical investigation. The powdered samples were stored in refrigerators in polythene bags¹. These samples were analyzed in the chemical laboratories, D.S.B. Campus, Kumaun University, Nainital for crude protein, free amino acids, ether extract (crude fat), total available carbohydrates, total soluble carbohydrates, starch, cellulose, total

ash, soluble ash, minerals like Ca, P, Na, K and Fe and crude fibre. The *in-vivo* digestibility of the grass samples was determined at IVRI, Bareilly.

Crude protein, ether extract (crude fat) and crude fibre of the samples were determined as per the methods of AOAC². For protein, Kjeldahl's method was employed in which total nitrogen was determined and percentage of crude protein was calculated. The detection, characterisation and determination of free amino acids were carried out according to the method of Heathoote *et al.*³ Total available carbohydrates and total soluble carbohydrates were estimated by using the methods of Murphy⁴ and Johnson *et al.*⁵ respectively. Free sugars were detected by paper chromatography⁶. Starch was evaluated by Stoddart's anthrone reagent method⁷. For cellulose, Colin's method⁸ was employed. Ash and minerals were estimated by using the methods of Misra⁹ and Paech and Tracey¹⁰. *In-vivo* digestibility was evaluated by nylon bag technique of Neathrey¹¹.

RESULTS AND DISCUSSION

The findings of chemical investigation of *D. cachemyriana* recorded at monthly intervals during the growing season are reported in Table-1.

TABLE-1
CHEMICAL CONSTITUENTS OF *DANTHANIA CACHEMYRIANA* AT DIFFERENT STAGES OF GROWTH (g/100 g DRY MATTER)

Chemical constituents/Months	July	August	September	October
Total nitrogen	1.35	1.46	1.36	0.95
Crude-protein	6.87	7.31	6.75	5.43
Ether extract (crude fat)	2.10	1.40	1.11	0.90
Total available carbohydrates	4.21	3.01	6.25	7.95
Total soluble carbohydrates	2.12	2.06	3.11	3.96
Starch	2.01	2.46	3.52	3.98
Cellulose	27.22	28.01	30.40	34.25
Total ash	8.32	6.90	9.12	8.02
Soluble ash	5.71	4.07	6.30	4.02
Ca	0.41	0.39	0.30	0.30
P	0.091	0.100	0.120	0.125
Na	0.06	0.08	0.04	0.02
K	0.62	0.75	1.10	0.58
Fe	0.052	0.037	0.053	0.028
Crude fibre	34.86	35.54	38.10	39.85
<i>In-vivo</i> digestibility	46.25	42.21	34.80	29.50

Total nitrogen and crude protein contents of the fodder grass were found to increase from July to August (TN: 1.35–1.46%; CP: 6.87–7.31%) and then decreased continuously up to October (TN: 0.95%; CP: 5.43%). The chromatographic analysis of the ethanolic water extract of the samples revealed twelve

ninhydrin positive spots out of which ten were identified and characterized as cystine, lysine, serine, aspartic acid, glycine, glutamic acid, threomine, α -alanine, valine and isoleucine. Among these amino acids lysine, aspartic acid and glutamic acid were found in appreciable quantities, serine, glycine, threomine and α -alanine were present in low amounts whereas cystine, valine and isoleucine were recorded only in trace quantities. The concentrations of all the amino acids were found to decline with advancing maturity from July to October.

The amount of ether extract (crude fat) was observed to decrease continuously from the first cut in July (2.10%) to the last cut in October (0.90%). Total available carbohydrates showed an irregular trend having the lowest value in August (3.01%) and the highest amount in October (7.95%). Similar trend was observed in the case of total soluble carbohydrates with 2.06% in August and 3.96% in October. The amount of starch and cellulose were recorded in the increasing order with the advancing maturity (Starch: 2.01–3.98%; Cellulose: 27.22–34.25%). Five free sugars, viz., sucrose, glucose, arabinose, fructose and xylose were detected chromatographically in the fodder samples throughout the sampling season.

Total ash content and soluble ash content had an irregular trend. The amounts of the above parameters first decreased from July to August, then increased in September and again decreased in October as revealed by the Table. The amount of calcium was found to decrease continuously from the first cut in July (0.41%) to the third cut in September (0.30%) and remained constant till October while a regular increasing trend was noticed in the concentration of phosphorus (0.091–0.125%). The amount of sodium increased from July to August (0.06–0.08%) and then decreased up to the last sampling month (0.02%) but the potassium content increased up to September starting from July (0.62–1.10%) and then decreased in October (0.58%). Iron showed an irregular trend throughout the sampling season and total variation in the concentration of iron was found from 0.028% to 0.053%.

Crude fibre of the fodder was recorded to have an increasing trend from July to October (34.86–39.85%). *In-vivo* digestibility in rumen suspension (72 h) was found to decrease regularly from the first sampling month (46.25%) to the last sampling month (29.50%).

Adequate amount of minerals is essential for the growth of animals, production of milk and to restrain them from various diseases. NRC (USA, 1971)¹² has given the minimum requirement level of minerals as follows:

Ca: 0.20–0.25% ; P: 0.20%; Fe: 100 ppm.

The amounts of these minerals except phosphorus in the fodder grass analysed have been found much higher than the required level. The level of phosphorus was present slightly below the required amount.

It is concluded that *D. cachemyriana* contained sufficient amounts of all chemical constituents necessary for the cattle except phosphorus. From the digestibility data, it is revealed that the fodder is less digestible throughout the growing season but still may serve as a good quality fodder.

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