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Proximate Composition Analysis and Mineral Estimation of Locally Available Wheat (*Triticum aestivum* L.) and Paddy (*Oryza sativa* L.) Straw from Jammu Region

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ABSTRACT

Paddy and wheat generate multi-million tons of straw as residue. These two straws although similar in their nutrient content are quite different in microstructure and non-nutritive chemical composition. Present study was conducted to estimate the proximate composition and mineral estimation from locally available wheat and paddy straw from Jammu region. The OM, CP, EE, CF, NFE, TA, AIA, NDF, ADF, Ca and P of wheat straw was 92.87^{c}±0.01, 4.35^{a}±0.01, 1.34^{a}±0.00, 37.82^{c}±0.057, 49.40^{c}±0.080, 7.13^{a}±0.01, 5.35^{a}±1.01, 78.04^{c}±0.03, 53.51^{c}±0.02, 0.53^{c}±0.002 and 0.21^{c}±0.002 respectively. The OM, CP, EE, CF, NFE, TA, AIA, NDF, ADF, Ca and P of of paddy straw was 85.31^{a}± 0.02, 4.76^{b}±0.03, 1.43^{c}±0.01, 31.42^{a}±0.060, 47.70^{a}±0.063, 14.69^{c}±0.02, 10.29^{b}±0.01, 72.09^{a}±0.05, 50.12^{a}±0.02, 0.31^{a}±0.002, 0.11^{a}±0.003. The highest OM, CF, NFE, NDF, ADF, calcium and phosphorus levels were present in wheat straw and the per cent of CP, EE, total ash and AIA were highest in paddy straw. The wheat straw is relatively rich in OM, CF, NFE, NDF, ADF, calcium and phosphorus content, whereas paddy straw contains relatively higher concentration of crude protein, ether extract, total ash and acid insoluble ash content.

Key words: *Proximate composition, Minerals, Wheat, Paddy straw.*

INTRODUCTION

A major portion of ration of ruminant livestock in South-east Asia including India is based on cereal crop residues. The scarcity of green fodder, pasture and quality hay has increased the onus over cereal crop residues, as their feeding to livestock offers no direct competition with human resources and requirements. Alternative mode of disposal of cereal straw by burning is a major source of land and air pollution[3,28]. However, using itas a feedstuff for ruminant animals makes it an extremely important renewable resource[22].

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Rice (*Oryza sativa* L.) - wheat (*Triticum aestivum* L.) (RW) cropping system has been developed through the introduction of rice in the traditional wheat-growing areas and *vice versa* in India[15]. In the mid-1960s, green revolution technologies led to the emergence of RW as the major production system covering an area of 10 million hectares spread over the Indo-Gangetic Plains of India[31]. With increased production of rice and wheat, residue production has also increased substantially. There is a large variability in production of crop residues, and their use depends on the crops grown, cropping intensity, and productivity in different regions of India. There is mean residue production of about 6.7 and 5.0 Metric Tonne/Ha for paddy and wheat, respectively[13]. Cereal crops (rice, wheat, maize, millets) contribute 70% of the total crop residues (352 Mt) comprising 34% by rice and 22% by wheat crops, out of which, the RW system accounts for nearly one-fourth of the total crop residues produced in India[20].

Paddy and wheat are both important cereal crops of Jammu and Kashmir. Paddy is the main crop of Kashmir, followed by maize, oilseeds, pulses, vegetables, fodder and wheat. In Jammu region, wheat is the predominant crop followed by maize, paddy, pulses, oilseeds, fodder, vegetables and other crops[12]. About 290.99 thousand hectare of land in Jammu and Kashmir is under wheat cultivation, producing about 5819.5 thousandquintals of grain yield[12], concurrently producing roughly 1.5 times this weight as straw[13]. Simultaneously, about 265.88 thousand hectare of land in Jammu and Kashmir is under rice cultivation, producing about 4548 thousand quintals of grain yield[12], concurrently producing roughly more than twice this weight as straw[13].

MATERIALS AND METHODS

Locally cultivated wheat straw and paddy straw was procured from local farmers of Jammu. Straw was transported to the Division of Animal Nutrition experimental animal farm at FVSc & AH, SKUAST Jammu, R S Pura and was stored in a godown. Paddy straw was chaffed using power operated chaffer. A representative sample of the procured wheat and paddy straw were oven dried to a constant weight, and then ground in laboratory grinder (Wiley mill) using 1-2mm sieve for further analysis.

Proximate analysis of straw was done as per AOAC[4] and fiber fractions [Neutral detergent fiber (NDF) and Acid detergent fiber (ADF)] were analyzed as per the method of Van Soest *et al*[26]., Calcium was estimated as per Talapatra *et al*[24]., while phosphorus was determined calorimetrically using molybdovanadate reagent as per AOAC[4].

The data obtained from chemical analysis of feedstuffs was subjected to one-way ANOVA, the means bearing significant difference were ranked by Duncan's multiple range test as per Duncan[9].

RESULT AND DISCUSSION

The OM, CP, EE, CF, NFE, TA, AIA, NDF, ADF, Ca and P of wheat straw was $92.87^{c}\pm0.01$, $4.35^{a}\pm0.01$, $1.34^{a}\pm0.00$, $37.82^{c}\pm0.057$, $49.40^{c}\pm0.080$, $7.13^{a}\pm0.01$, $5.35^{a}\pm1.01$, $78.04^{c}\pm0.03$, $53.51^{c}\pm0.02$, $0.53^{c}\pm0.002$ and $0.21^{c}\pm0.002$ respectively. The OM, CP, EE, CF, NFE, TA, AIA, NDF, ADF, Ca and P of paddy straw was $85.31^{a}\pm 0.02$, $4.76^{b}\pm0.03$, $1.43^{c}\pm0.01$, $31.42^{a}\pm0.060$, $47.70^{a}\pm0.063$, $14.69^{c}\pm0.02$, $10.29^{b}\pm0.01$, $72.09^{a}\pm0.05$, $50.12^{a}\pm0.02$, $0.31^{a}\pm0.002$, $0.11^{a}\pm0.003$ as shown in table 1.

The highest OM, CF, NFE, NDF, ADF, calcium and phosphorus levels were present in wheat straw and the per cent of CP, EE, total ash and AIA were highest in paddy straw.

The wheat straw is relatively rich in OM, CF, NFE, NDF, ADF, calcium and phosphorus content, whereas paddy straw contains relatively higher concentration of crude protein, ether extract, total ash and acid insoluble ash content.

The chemical composition of wheat straw in this study was comparable with the values reported earlier by many workers[5,6,7,8,11,18,19,21,29,32].

Chemical composition of the paddy straw analyzed in the present study is similar to that reported in previous reports pertaining to paddy straw from different locations and varieties[1,2,10,14,16,17,23,25,27,30].

Table1: Proximate composition, fibre fractions, calcium and phosphorus content (%DM) of the wheat and paddy straw*

Attributes	Wheat straw	Paddy straw
OM	92.87^{c}±0.01	85.31^{a}± 0.02
CP	4.35^{a}±0.01	4.76^{b}±0.03
EE	1.34^{a}±0.00	1.43^{c}±0.01
CF	37.82^{c}±0.057	31.42^{a}±0.060
NFE	49.40^{c}±0.080	47.70^{a}±0.063
Total Ash	7.13^{a}±0.01	14.69^{c}±0.02
AIA	5.35^{a}±1.01	10.29^{b}±0.01
NDF	78.04^{c}±0.03	72.09^{a}±0.05
ADF	53.51^{c}±0.02	50.12^{a}±0.02
Calcium	0.53^{c}±0.002	0.31^{a}±0.002
Phosphorus	0.21^{c}±0.002	0.11^{a}±0.003

^{abc}Mean values with respect to straw bearing different superscripts within a row differ significantly (P<0.01)

**Each value is a mean of three observations (analysis in triplicate)*

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