

Palatability and Animal Preferences of Plants in Tehsil Nikyal, District Kotli, Azad Jammu and Kashmir Pakistan

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Authors' contributions

This work was carried out in collaboration between all authors. Author MSA designed the study, performed the field work, wrote the protocol, and wrote the first draft of the manuscript. Author MA managed the analyses of the study and revised manuscript. Authors SF and NM managed the literature searches. All authors read and approved the final manuscript.

Original Research Article

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ABSTRACT

Aim: The aim of this study was to assess the palatability and animal preference of 110 plant species of Nikyal rangeland during summer and spring season.

Place and Duration of Study: This study was conducted in Nikyal valley located at altitudinal range of 1500-1900 m within the longitude 74°04' to 10' east and latitude 33°26' to 29' north during July 2012 to June 2013.

Methodology: The palatability was assessed by collecting data through random sampling. The respondents (300) were randomly selected from different inhabitants of the area and were interviewed for this purpose. The respondents were those rearing the animal species considered for this study and they include: large scale farmers, domestic farmers, shepherds and house wives.

Results: There were 8 tree species (7.27%), 21 shrub species (19.09%) and 81 herbaceous species (73.63%) which were grazed among four species of animals in different season. over all 60 species (55%) were palatable and 50 species (45%) were non-

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palatable. Among the palatable 10 species (16.66%) were highly palatable, 22 species (36.66%) mostly palatable, 19 species (31.66%) less palatable and 9 (15%) were rarely palatable species. Most acceptable plant parts by animals are leaves (42, 53%) while the least acceptable parts are flowers/fruits (14, 18 %). The goat browsed 52 species (33%), sheep 36 species (23%), cow 31 species (20 %) and buffalo 37 species (24%).

Conclusion: Along with the plant type, the palatability is dependent on different factor including animal type, seasonal type, area, habitat and weather.

Keywords: Nikyal; palatability; animal preference; seasonal effect.

1. INTRODUCTION

Palatability refers to the delight with which plants or its parts or feed is consumed as determine by the stimulation of the sensory impulses of grazing animal [1]. While preference is the selection of a plant species by the animal as a feed [2]. Palatability is affected through different animal factors such as differential preference for forage species, period, phase of pregnancy, general health and hunger of animal. Palatability is also affected through different plant factors such as seasonal availability of plant, degree of maturity, growth stage, phenology, morphological and chemical nature [2,3,4,5,6,7]. It has been frequently observed that sheep generally prefer grasses and forbs more than shrubs; while goats prefer shrubs [2,8,9,6,10]. Many other factors including the animal accessibility to plants or sites, diversity or richness of related plant species and environment [3,6,7].

Some studies have been done on the availability, palatability and animal preferences of plants of Pakistan i.e [2,3,11,12,13,14]. However there is dearth of information on the acceptability and food preference of some animal species in tehsil Nikyal. Considering the need of information and significance of the area present study was conducted to assess i) differential palatability by parts and ii) plant preferences by grazing animals. The outcome will help the ecologist to suggest way or means to improve this rangeland and other similar areas in Pakistan and especially in Azad Jammu and Kashmir.

2. MATERIALS AND METHODS

2.1 Location

Tehsil Nikyal is situated in District Kotli, Azad Jammu and Kashmir at an altitude of 1500-1900m. They are located 30 km away from Kotli towards North. The investigated area lies within longitude 74°04' to 10' east and latitude 33°26' to 29' north. It is surrounded by Kotli on south, on western side by Tatapani, on Northern side by Mender and on east by Pir-Panjajl .

2.2 Climate

The climate of Nikyal valley is of sub tropical humid type with average monthly rainfall of 95.60 mm. The maximum rainfall occurs during July amounting to 251.52 mm, while least rainfall occurs during November amounting to 14.44 mm. The hottest months of the year are June and July, with mean daily maximum temperature of 37.69°C and 34.82°C respectively and minimum temperature of 23.61°C and 23.62°C respectively, while the coldest months of year were December and January mean maximum temperature of 19.99°C and 18.09°C

respectively and minimum temperature of 5.49°C and 4.41°C respectively. The average maximum and minimum relative humidity received by the area is 79.64 and 30.82% respectively (Source: Pakistan metrological department Lahore)

2.3 Survey

The palatability of plants was recorded by daily monitoring the individual animals grazing preferences by different plant species, plant parts for one year (June 2012- July 2013) during different seasons on different area in tehsil Nikyal, District Kotli , Azad Jammu and Kashmir.

2.4 Data Collection

The palatability was assessed by collecting data through random sampling. The respondents (300) were randomly selected from different inhabitants of the area and were interviewed for this purpose. The respondents were those rearing the animal species considered for this study and they include: large scale farmers, domestic farmers, shepherds and house wives.

2.5 Palatability Classes

On the basis of relative preference of grazing animals plants are classified in to following palatability classes:

Non palatable: Plants which are not grazed by animals.

Palatable: Plants which are partially or completely grazed by animals

Highly palatable: species which are preferred by most animals

Mostly Palatable: species which are usually preferred by animals

Less palatable: species which are less used as first choice by animals

Rarely palatable: species which are grazed when no other choice is available

They palatable species furthered classified on the basis of parts grazed by animals in to Complete plants grazed; Leaves and branches grazed; Inflorescence and fruits grazed.

Palatable plants were further classified on the basis of preference by animals Buffalo, cow, goat and sheep.

3. RESULTS

The data shows that in the Nikyal Hill total species were 110 out of which 55 percent species were palatable and 45 percent were non-palatable. Among the palatable 16.66% were highly palatable, 36.66% mostly palatable, 31.66% less palatable and 15% were rarely palatable species.

The trees include 28.57% highly palatable, 14.28% mostly palatable 28.57% less palatable and 28.57% rarely palatable species. Among shrubs, 42.85% species were palatable, 42.85% were no palatable while only 14.28% were rarely palatable. The herbs include 17.39% highly palatable, 39.13% mostly palatable, 30.43% less palatable and 13.04% rarely palatable species (Fig. 1, Fig. 2)

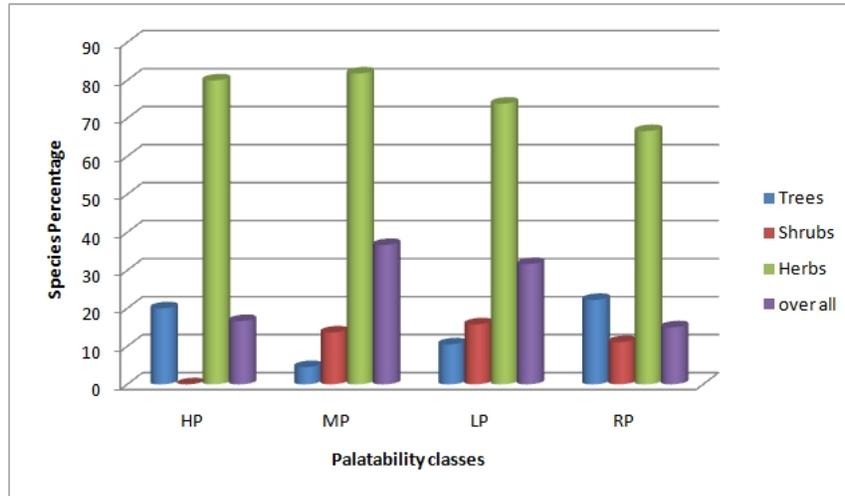


Fig. 1. Differential palatability of plant species in tehsil Nikyal, Kotli

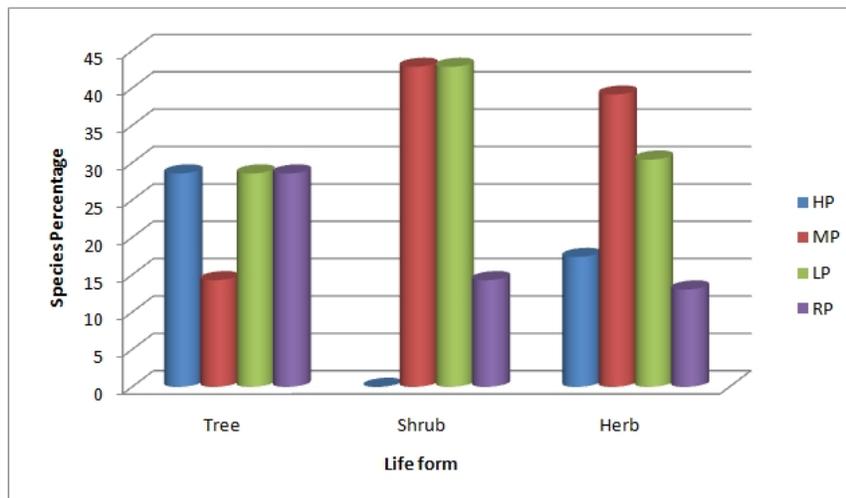


Fig. 2. Differential palatability percentage in each stratum of plant Species in tehsil Nikyal, Kotli

3.1 Preference by Animals

Among the palatable species, 33% species were used by goat which includes 7(13.46%) trees, 8 (15.38%) shrubs and 37(71.15%) herbs. The sheep preferred 23% species which

include 2 (5.15%) trees, 5 (13.88%) shrubs and 29 (80.55%) herbs. The cow used 20% species which include 1 (3.22%) tree, 4 (12.90%) shrub and 26 (83.67%) herb. The buffalo preferred 1 (2.70%) tree, 4 (10.81%) shrubs and 32 (86.48%) herbs (Fig. 3)

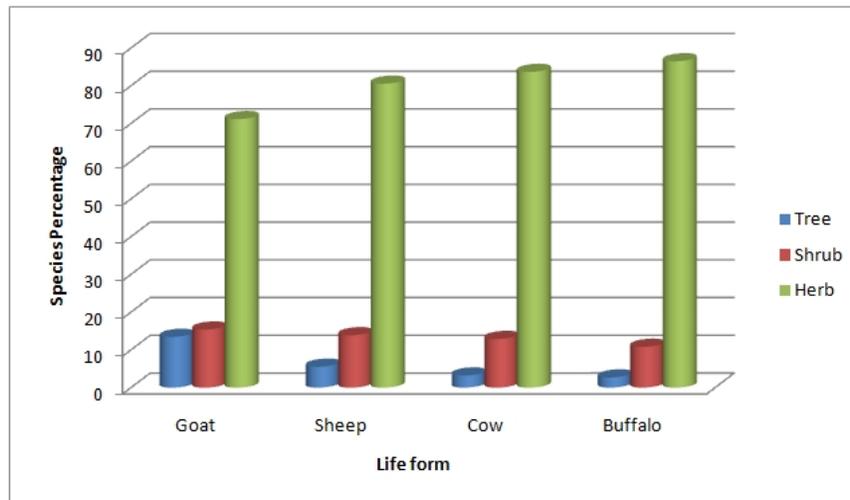


Fig. 3. Plant parts preferred by animals in tehsil Nikyal, Kotli

3.2 Plant Condition Preferred by Animals

The animals preferred 75.80% plants in fresh form, 4.83% in dry form and 19.35% in both form.

In trees 71.42% were used in fresh form while 28.57% were used in both forms. The shrubs were used only in fresh form while among herbs 72.92% species were used in fresh form, 6.25% in dry form and 20.83% species in both form.

3.3 Plant Parts Preferred by Animals

Maximum Palatable plant parts are leaves (53percent) and minimum palatable parts are flowers/fruits (18 percent). It is seen that 70% trees were used as a whole while 30% leaves were used. Among shrubs, 80% were used as a whole, while 20%, leaves were used. Among herbs 39% were used as a whole, 46% leaves were used and 15% flower/ fruit used (Fig. 4)

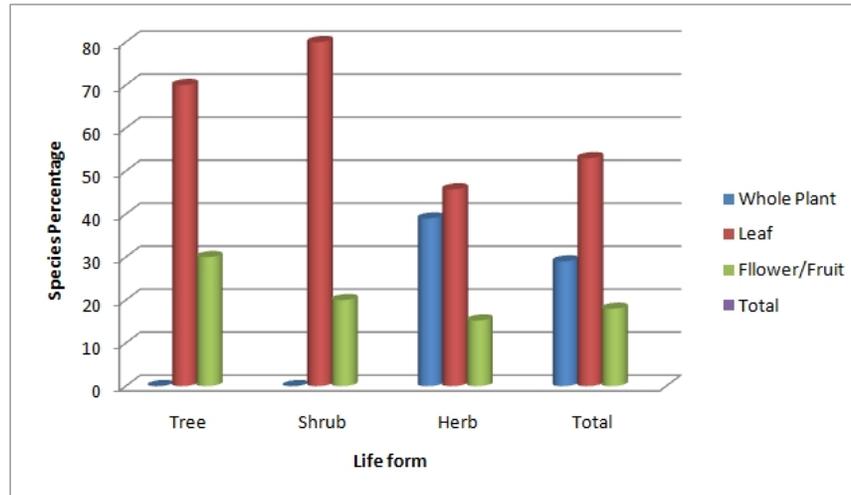


Fig. 4. Plant parts preferred by animals in Tehsil Nikyal, Kotli

4. DISCUSSION

Palatability is the relative preference/ acceptability of plants by grazing animals. Characteristics of plant species such as chemical composition growth stage and types of plant species affect their acceptability. They may induce selective responses by livestock or even may prevent from grazing [15].

In the study area total plant species were 110, out of which 55 percent were palatable and 45 percent were non-palatable. Nikyal Hills are freely grazed by cattle, sheep and goats in mixed herd. Grazing season starts from March till October. Grasses like *Andropogon*, *Cynodon dactylon*, *Themeda anathera*, *Sorghum halepense*, *Heteropogon contortus*, *Dichanthium annulatum* and are preferably grazed by livestock. Livestock prefer 50 percent of shrubs which make their appearance during April and May. The availability of palatable species decreases during the months of November to February. The animals are then forced to graze fairly palatable species.

The authors [16,17] recorded that *Zizyphus* was distinctly browsed and deformed, while on the converse Phoenix was seldom affected. Similarly in this study *Pinus roxburghii*, *Quercus dlatata*, *Berberis lyceum*, *Otostegia limbata* and *Plectranthus rugosus* were not or least browsed due to their non palatable nature while *Viburnum grandiflorum* and *Indigofera heterantha* were preferred by cattle and sheeps. Seedling of trees and shrubs became abundant but browsing markedly prevented the regeneration [18] which is accordance with findings of this study.

The existence of fresh plant materials increases ungulate grazing animal efficiency. The authors [2] stated that seasonal availability of fodder species depend on phenological stages and climate. This is similar to our observation that if the climate is suitable, extra fresh fodder plants will be obtainable to livestock. In drought and winter seasons, dried species and trees become the only supply of fodder to the livestock. The authors [19] stated that in Nsairabad valley, the livestock used mostly fresh forage species. The authors [20] stated that in

absence of annuals, the shrubs provide fresh fodder. It is obvious that most of the forage species are present in March to April and fodder availability is high in this time.

Leaves of 42 species and flowers/fruits of 14 species were preferred by the livestock, However 23 species are grazed completely.

The authors [2] studied palatability of different plant parts and reported that whole plants were preferred mostly which was followed by leaves and floral part. In our case leaves were preferred mostly by livestock, then whole plants and floral parts. So our findings in this regard do not agree with 2 because plant morphological characters such as spines, hairs, bitter taste and unfavorable odor reduced palatability. Many grasses accumulate silica that reduced digestibility [21] Similarly, stem of woody plants is less preferred by cattle due to high level of lignin. While green herbaceous forage is easily digestible than dried one [21].

The authors [22] reported that grazing had replaced palatable grasses by non-palatable species and decreases forage due to intense grazing. In our case similar situation was seen as palatable grasses viz, *Themeda anathera*, *Heteropogon contortus* and *Dichanthium annulatum* have been replaced by non-palatable grasses such as *Aristida adscensionis* at some sites.

Some species including *Euphorbia helioscopia* were non palatable probably due to occurrence of phenolics, alkaloids, saponins and further toxic materials [23]. *Euphorbia prostrata* and *Cynodon dactylon* were highly palatable in the area. According to authors [24] and [25], *Cynodon dactylon* is the most common grass along field boundaries and margins of the heaps. The authors [26] stated that the incensement of plant attractiveness for herbivores is due to the presence of nitrogen content in plant species. It becomes difficult to critically differentiate between lethal and nonpoisonous plants as animals obtain detestation to food as a consequence of offensive approach of physical awkwardness happening by existence of poison, or glut of nutrients, or by insufficient nutrient foodstuff.

Herbivory is strongly avoided by the livestock due to unpleasant nature and fragrance of the plant species [27]. This is in line with the present findings which report some 56 non palatable species due to spiny nature and un acceptable taste. In the investigated area heavy grazing has changed the overall structure and physiognomy of the vegetation. This is in agreement with [28] are in view that grazing may obstruct the structure and function of the ecosystem.

5. CONCLUSION

From this study, it was observed that palatability does not only depend on plant species, but also depend on different factors such as animal type, seasonal type, area habitat and weather. It is suggested that plant palatability should conform to the basis of elemental and nutritional value of plant species and also the animal food requirement in support of improving physical condition and output of domestic animals in the region.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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