



## NATURAL RESOURCE ASSESSMENT OF DAL LAKE AND DOCUMENTATION OF WILD FODDERS WITH COMMERCIAL POTENTIAL FOR KASHMIR VALLEY, J & K

Afrozah Hassan and Irshad A. Nawchoo

Plant Reproductive Biology, Genetic Diversity and Phytochemistry Research Laboratory,  
Department of Botany, University of Kashmir, Srinagar, 190006, J & K. India

Conflicts of Interest: Nil

Corresponding author: Afrozah Hassan

### ABSTRACT

Exploration and collection of fodder plants from the lake is an important day to day activity of the local communities living within and in the vicinity of Dal Lake. Fodder collection is an important source of economy, for sustaining livelihoods of local communities. Further, for livestock rearing, the fodder plants are commercially sold to markets for generation of economy. Intensive field surveys were carried in the lake in order to document the knowledge of fodder plants collected from the lake. A total of 9 plants, belonging to 8 families, used as fodder for livestock were documented from the lake. The documentation of the data will in turn help in identifying the important nutritious fodder plants, for supporting the livestock and enhancing the livelihoods of local people.

**Keywords:** Fodder plants, Lake Ecosystem, Local people, Livestock

### 1.1 INTRODUCTION

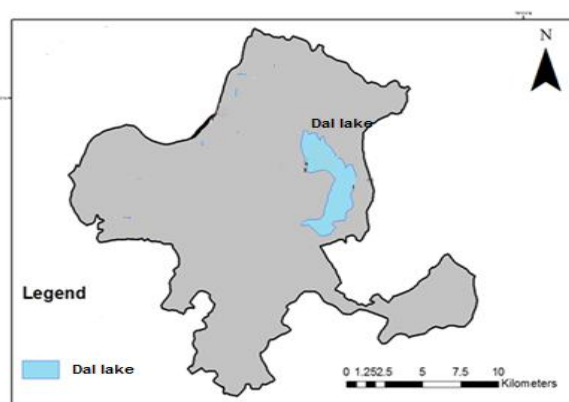
Freshwater ecosystems are considered as one of the richest repository of natural resources for the survival of all the living organisms of the biosphere (Shah and Pandit, 2012). Kashmir valley, nestled in northwestern folds of the Himalaya's is supplemented with diverse types of freshwater bodies (Khan, 2000), which are not only important for socio economic, ecological, and cultural heritage of the state; but also serve as primary source for the upliftment of local economy. These ecosystems are also important for the sustainable economy of the state as they provide food, fodder, fish, wildlife, green manure, vegetables, medicinal plants, timber and other useful products, besides being a potential source of recreation (Mir et al., 2005). Besides the benefits derived from lakes, the livestock rearing is an important source of livelihood for the local people residing in these lakes.

Livestock is an essential subsector of Indian economy and contributes 4% of total GDP and 26% of agricultural GDP in 2010-2011 (Iqbal, 2013). The livestock industry in Jammu and Kashmir has vast scope for the development, providing quick economic returns (Kumar et al., 2012). However, the limiting factors for this development are- shortage and inferior quality of fodder resources (DOS, 2004). Livestock population in Jammu and Kashmir is 7.8 million, hence, fodder resources are not sufficient to meet the increasing livestock population

(Anonymous, 2008). The potential of trees and shrubs for green fodder production has not been fully appreciated in India except in hilly states where these are major source of green fodder (Heybroek, 1963). Therefore, it is in this context present study envisages to assess the current status of different fodder plants in Dal lake, Kashmir valley, J & K.

### 1.2 Materials and methods

The study area selected for the present study is Dal Lake. It is a Himalayan lake which is located in Srinagar city (longitude 74°48' to 75°08' and latitude 34°3' to 34°13'), at an average elevation of 1583m. The peripheries and the middle of lake are occupied by the local communities. These communities are located in pockets, locally known as "Mohalla's" surveyed during the present study



**Fig 1:** The Location of the study site at Srinagar

### 1.3 Data collection

Ethno-botanical approach was followed to document traditional knowledge regarding plants used for livestock grazing and how they are used following (Paterson *et al.*, 1998; Etkin, 2002, Ikram *et al.*, 2014). The most commonly grazed species for improving fodder can be identified, following (Roothaert and Franzel, 2001). The research design used a mixed method approach, which includes: individual interviews, group interviews, participant observation, conversation/interaction, questionnaire method.

### 1.4 Results

During the present study a total of 9 plants belonging to 8 families used as different fodder resources for livestock were documented from the Dal Lake (**table 1**). The growth form of the plant species differ from one plant to another such as; *Nymphaea mexicana*, *Potamogeton natans* and *Marsilea quadrifolia* are rooted floating type. *Phragmites australis*, *Epilobium hirsutum*, *Cyperus rotandus*, *Sparganium erectum* and *Ranunculus lingua* are emergents. However, *Potamogeton lucens* is submerged type. The plant species belong to different families such as 2 plants belong to family Potamogetonaceae, 1 plant belongs to family Poaceae, 1 plant to Onagraceae, 1 plant to Cyperaceae, 1 plant belongs to family Typhaceae, 1 plant belongs to family Ranunculaceae and 1 plant belongs to family Marsileaceae.

The usage of plant parts differ from one plant to another such as in some plants only leaves were used, in some plants leaves and stems and some

plants were used as whole plants. In *Nymphaea mexicana*, *Epilobium hirsutum*, *Cyperus rotandus*, *Sparganium erectum* and *Ranunculus lingua* leaves and stems are used, however, in *Phragmites australis* only leaves are used. Although in *Potamogeton natans*, *Potamogeton lucens*, and *Marsilea quadrifolia* whole plants were used for fodder purposes. The harvesting time of the plant species is important for retaining texture of the plant species.

Harvesting period also differs from plant species to another, such as *Potamogeton lucens* is harvested from April-July. *Phragmites australis* is harvested from April-September. *Potamogeton natans* is harvested from the month of May-June. *Ranunculus lingua* is harvested in the month of June. Although *Epilobium hirsutum*, *Cyperus glomeratus*, *Sparganium erectum*, *Marsilea quadrifolia* are harvested in the month of July. Further *Nymphaea mexicana* is harvested from September- November.

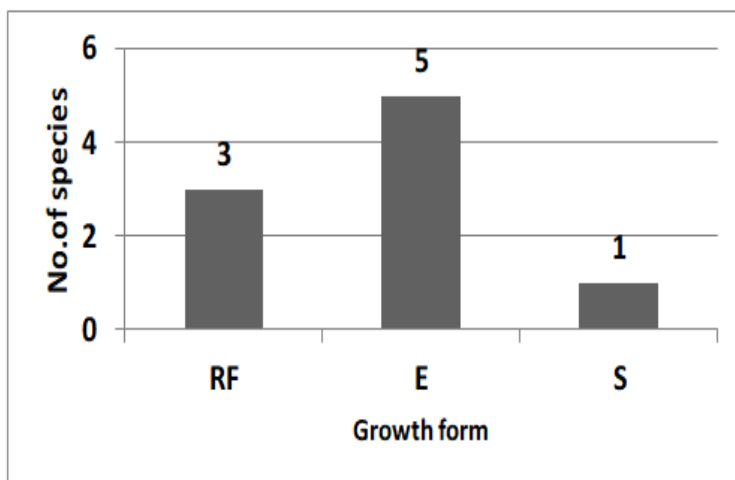


**Fig. 2:** Collection of fodder from Dal Lake

**Table 1:** Fodder plants of Dal lake Kashmir Himalaya.

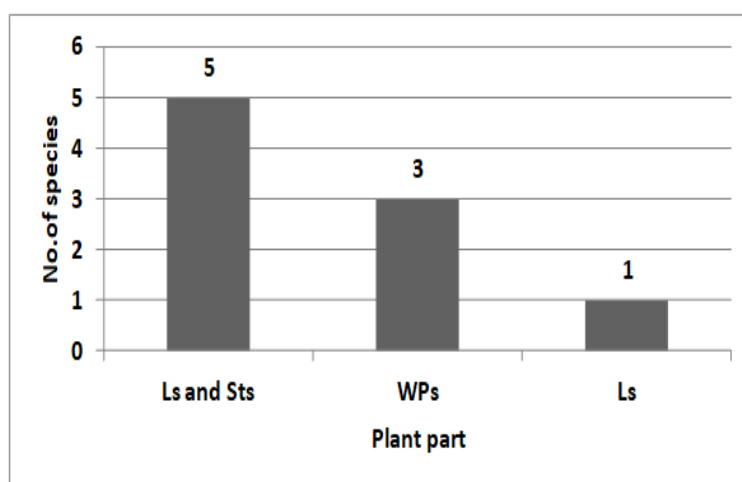
Name of the plant	English name	Vernacular name	Family	Growth form	Part utilized	Harvesting period	Used in form	Used as
<i>Nymphaea mexicana</i> Zucc.	Water lily	Punjabi bum	Nymphaeaceae	RF	LF,ST	September-November	Wet	Fodder
<i>Phragmites australis</i> (Cav.) Trin. ex Steud	Common reed	Pech	Poaceae	E	LF	April-September	Wet	Fodder
<i>Epilobium hirsutum</i> L.	Hairy willow herb	Gasseh	Onagraceae	E	LF,ST	July	Wet	Fodder
<i>Potamogeton natans</i> L.	Broad leaved Pondweed	Anez hill	Potamogetonaceae	RF	WP	May-June	Wet	Fodder
<i>Potamogeton lucens</i> L.	Shinning pond weed	Anez hill	Potamogetonaceae	S	WP	April-July	Wet	Fodder
<i>Cyperus glomeratus</i> L.	Nut grass	Gasseh	Cyperaceae	E	LF,ST	July	Wet and Dried	Fodder
<i>Sparganium erectum</i> L.	Bur reed	Gasseh	Typhaceae	E	LF,ST	July	Wet and dried	Fodder
<i>Ranunculus lingua</i> L.	Water spear wort	Tahre posh	Ranunculaceae	E	LF,ST	June	Wet and dried	Fodder
<i>Marsilea quadrifolia</i> L.	European water clover	Gasseh	Marsileaceae	RF	WP	July	Wet	Fodder

**Abbreviations:** LF=Leaf, ST=Stem, WP=Whole plant E=Emergent, R=Rooted floating type, S=Submerged



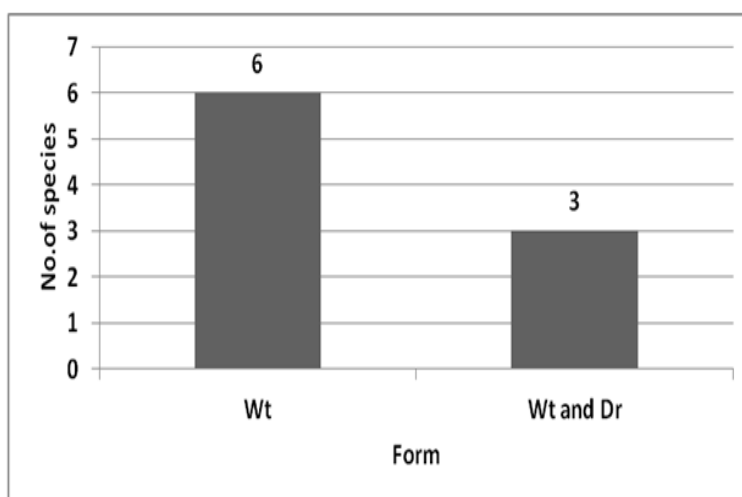
**Fig. 3:** Growth form of fodder plants

**Abbreviations:** RF=Rooted floating, E=Emergent, S=Submerged



**Fig 4:** Different plant parts used for fodder

**Abbreviations:** Ls and Sts=Leaves and stems, WPs=Whole plants, Ls=Leaves



**Fig 5:** Usage form of fodder plants

**Abbreviations:** Wt=Wet, WT, Dr=Wet and dried

### 1.5 Discussion

The study of aquatic plants provides useful information about the productivity of a habitat (Kwarfo and Ipinjolu, 1995). During the present study the knowledge 9 plants belonging to 8 families, used as fodder resources by local communities of Dal Lake were documented. Feeding of livestock in natural systems is, therefore, becoming a challenge and is partly limiting growth in the livestock sub-sector. It is necessary, therefore, to initiate interventions leading towards the active management on the farm of fodder or browse species that are exploited by cattle in traditional grazing systems (John and Iye, 2009). The livestock sub-sector of agriculture contributes 17% of the total agricultural production and 5% of the national Gross Domestic Product. This sub-sector adds significantly to the national food security and nutritional balance, provides raw materials such as milk and meat for the agro-processing industry (MAAIF, 2000).

### References

1. Anonymous (2008). Status paper on fodder production in the state of Jammu and Kashmir. Paper presentation 41st RCM (Rabi 2008), SKUAST-K, Shalimar, Srinagar, J&K, India
2. Etkin, N.L. (2002). Local knowledge of biotic diversity and its conservation in rural Hausaland, Northern Nigeria. *Economic Botany*, 56: 73-88.
3. Heybroek, H.K. (1963). Disease and lopping for fodder as possible causes of prehistoric decline of *Ulmus*. *Acta Botanica Netherlandica*. 12: 1-11.
4. Ikram, S. Bhatti, KH, Parvaiz, M. (2014). Ethnobotanical studies of aquatic plants of district Sialkot, Punjab (Pakistan). *Journal of Medicinal Plants*, 2:58-63
5. Iqbal, M. A. (2013). Livestock husbandry and environmental problem. *International Journal of Scientific and Research Publication*, 5:1-4.
6. John, R. S., and Lye, K. A. (2009). Fodder plants for cattle in Kaliro District, Uganda. *African Study Monographs*, 30:161-170.
7. Kahn, M. A. (2000). Anthropogenic eutrophication and red tide outbreak in lacustrine systems of the Kashmir Himalaya. *Acta hydrochimica et hydrobiologica*, 28: 95-101.
8. Kumar, P., Kher, S. K. and Dwivedi, S. (2012). An analytical study of livestock in Jammu and Kashmir. *International Journal of Plant Animal Environmental Science*, 2: 169-177.
9. MAAIF, M. (2000). Plan for modernization of agriculture (PMA): eradicating poverty in Uganda, "Government strategy and operational framework", Ministry of Agriculture, Animal Industry and Fisheries & Ministry of Finance Planning and Economic Development. Kampala, Uganda.
10. Mir, A. Q., Pandey, G. C. and Sarwar, S. G. (2005). Impact of SKIMS effluent on the water quality of Anchar lake, Kashmir. *Fundamentals of Limnology*. SB Nangia for APH Publishing Corporation, 5: 44-49.
11. Paterson, R.T.G.M, Karanja, R.L. Roothaert, OZ. Nyaata, IW. Kariuki. (1998). A review of tree fodder production and utilization within smallholder agroforestry systems in Kenya. *Agroforestry Systems*, 41: 181-199
12. Roothaert, R.L. and Franzel, S. (2001). Farmers' preferences and use of local fodder trees and shrubs in Kenya. *Agroforestry Systems*, 52: 239-252.
13. Shah, J. A. and Pandit, A. K. (2012). Physico-chemical characteristics of water in Wular lake-A Ramsar Site in Kashmir Himalaya. *International Journal of Geology, Earth and Environmental Sciences*, 2: 257-265.