



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; 9(11): 295-297
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www.thepharmajournal.com
Received: 12-09-2020
Accepted: 16-10-2020

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Studies on identification and uses of *Morus alba*: An important Multi-purpose tree species in Kashmir Valley

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Abstract

A study was conducted to identify different varieties of *Morus alba* in Kashmir and their uses among people in the year 2018-2019. A detailed survey at village level was conducted in three districts of North Kashmir (Bandipora, Baramulla and Kupwara). Identification was done on the basis of different phenological characteristics of the species e.g. shape and size of leaves and colour of fruits. Different varieties of *Morus alba* were identified with the help of local farmers and Taxonomist. Studies conducted revealed that 13 varieties of *Morus alba* are grown in North Kashmir i.e., Shahtul, Chatatul, Zagtul, Robesh sernal, Botatul, Brentul Kashmir, Chinese white, Gosherami, Ichinose, Kokuso, Kanva and Rokokuyaso. Of these 13 varieties, six are reportedly exotic and rest are indigenous. *Morus* species has multiple uses in North Kashmir. Species is used for fodder (41.46%), fruits (34.72%), fuel (12.52%) and silkworm rearing (11.30%). Trees were found on private lands and they were planted by farmers for commercial (16.31%) and household (83.69%) purposes.

Keywords: *Morus alba*, north Kashmir, uses

Introduction

Mulberry is rapidly growing deciduous woody perennial having deep root system. The plant has simple, alternate, stipulate, petiolate, entire or lobed leaves. The inflorescence is a catkin, containing a pendent or drooping peduncle bearing unisexual flowers. Leaves of *Morus alba* have an antioxidant property due to presence of β -carotene and α -tocopherol (Kelkar *et al.*, 1996) [6]. In most European Countries, mulberry fruits are used for human consumption either in raw form or in the form of various confectionary products such as jams, pulp, juice, wine (Soufleros *et al.*, 2004) [10]. It is also used as fodder for animals since it is highly palatable, nutritious and digestible (70-90 percent) (Benavides, 2000) [3]. Mulberry also finds application in landscaping in Europe, America and Asia (Tipton, 1994) [15]. *Morus alba* has been extensively used in conventional Chinese medicine (Li, 1998) [7]. *Morus alba* is reported to have neuro protective, Skin tonic, antioxidant, anti hyperglycemic, antibacterial, antihypertensive and anti-hyperlipidemic activities (Nomura *et al.*, 1980; Butt *et al.*, 2008; Sun *et al.*, 2011) [8, 4, 13]. India is the only country in the world where all the four commercial varieties of natural silks namely Mulberry, Tassar, Eri and Muga culture is being practiced especially in Assam, West Bengal, Manipur, Bihar, Orissa, Nagaland, Meghalaya, Karnataka, Andhra Pradesh and Tamil Nadu States (Priyadarshini, 2013) [9]. Sericulture in India is a commercially attractive and sustainable form favoring the rural poor in the unorganized sector. Sericulture has become one of the most important cottage industries in a number of developing countries. The cottage industries occupy a special importance in developing country's economy (Srivastava and Upadhyay, 2012) [11]. Sericulture industry in India is well organised industry which provides succour to large number of families who are associated with it. It is estimated that the industry provides direct employment to about six hundred thousand people (Subramanian *et al.*, 1995) [12]. The industry comprises of two main sectors which include mulberry cultivation and silkworm *Bombyx mori* L. rearing. Mulberry which besides, constituting the only food for silkworms is best suited for afforestation programme and is generally grown as trees. In Kashmir, 760 villages are engaged with this industry, constituting 1.46% of the total sericulture villages in India. There are about twenty five thousand families associated with sericulture industry in the state contributing to the production of 521 MT of cocoons (Anonymous, 2005) [1]. This demands production and exploitation of indigenous as well as exotic varieties of mulberry in a big way for overall improvement and sustenance of

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industry. *Morus alba* is used as a tree component in different agroforestry systems. It is used as a tree component in Western Himalayan region, Eastern Himalayan region and Lower Gangetic plains under silvipasture and agrihorticulture systems (Anonymous, 2007) [2].

Materials and Methods

Survey was conducted in North Kashmir. North Kashmir comprises of three districts i, e Bandipora, Baramulla and Kupwara. District Bandipora lies in extreme north of the valley, situated between 34° 25' 12" North latitude and 74° 39' 00" East longitude. Bandipora district comprises of 7 Tehsils and 12 Blocks. District Baramulla lies in extreme north of the valley, situated between 34.19° North latitude and 74.36° East longitude. Baramulla district comprises of 16 Tehsils and 26 Blocks. District Kupwara lies in extreme north of the valley, situated between 34° 31' 12" North latitude and 74° 15' 00" East longitude. District kupwara comprises of 14 Tehsils and 24

Blocks. The elevation is 6070 feet amsl and the climate of the region is moist temperate with mean annual precipitation of 730 mm in the form of snow in winter and rains in March to April. The mean temperature of 13.3° C with maximum reaching upto 35° C in summer and may dip to -10° C in winter. Soils are dominantly alluvial which suffer from impeded drainage. For collection of data, method of stratified random sampling was followed where in a detailed survey at village level of all districts of North Kashmir (Fig 1 Diagrammatic representation of areas Surveyed) was conducted and observation with regard to different varieties and uses of *Morus alba* was studied. For collection of data three blocks were selected in each district. In each block, four Panchayats and subsequently four households from each panchayat were selected randomly for taking observations. Altitude of all villages was recorded with the help of Global Positioning System (GPS). Data was collected Questionnaire method, Informal interview and transit walk of villages.

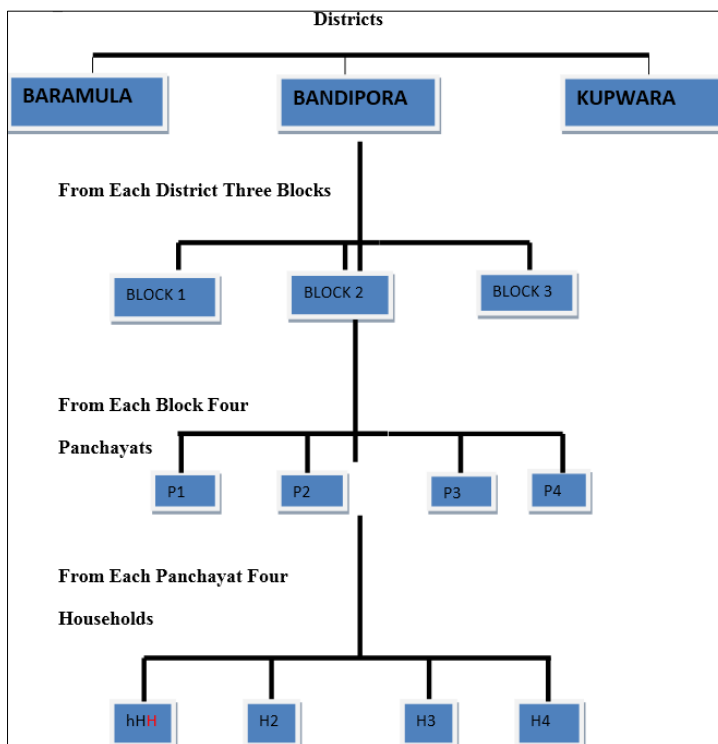


Fig 1: Diagrammatic representation of areas Surveyed

Table 1: Indigenous varieties of *Morus alba* in North Kashmir

S. No.	Species	Variety	Identification	Altitude (m) {a.m.s.l}
1	<i>Morus alba</i>	Shahtul	Fruits/Leaves	1550-1996
2	<i>Morus alba</i>	Chatatul	Leaves	1582-1614
3	<i>Morus alba</i>	Zagtul	Leaves	1650-1996
4	<i>Morus alba</i>	Robesh sernal	Leaves	1573-1996
5	<i>Morus alba</i>	Botatul	Fruits/Leaves	1550-1996
6	<i>Morus alba</i>	Brentul	Leaves	1582-1614
7	<i>Morus alba</i>	Local mulberry	Fruits/Leaves	1550-1996

Table 3: Uses of *Morus alba* in North Kashmir

Uses	Percentage (%)
Fodder	41.46%
Fruits	34.72%
Fuel	12.52%
Silkworm rearing	11.30%

Table 2: Exotic varieties of *Morus alba* in North Kashmir

S. No.	Species	Variety	Identification	Altitude (m) {a.m.s.l}
1	<i>Morus alba</i>	Chinese white	Leaves	1650-1696
2	<i>Morus alba</i>	Gosherami	Fruits/Leaves	1573-1996
3	<i>Morus alba</i>	Ichinose	Leaves	1614-1996
4	<i>Morus alba</i>	Kokuso	Leaves	1582-1614
5	<i>Morus alba</i>	Kanva	Leaves	1564-1650
6	<i>Morus alba</i>	Rokokuyaso	Leaves	1573-1996

Results and Discussion

A detailed study conducted in Bandipora, Baramulla and Kupwara districts of Kashmir Valley on the basis of different phenological characteristics of the species e.g shape and size of leaves and colour of fruits revealed that 13 varieties of *Morus alba* are grown in North Kashmir i.e., Shahtul, Chatatul, Zagtul, Robesh sernal, Botatul, Brentul Kashmir, Chinese white, Gosherami, Ichinose, Kokuso, Kanva and Rokokuyaso (Table 1 and 2). Of these 13 varieties, six are reportedly exotic and rest are indigenous. Tikander (2001) [14] reported occurrence of *Morus alba*, *Morus indica*, *Morus lavigata* and *Morus serrata* under natural conditions in

Punjab, Himachal Pradesh and Kashmir. Tikander (2001) [14] reported that 26 exotic, 31 indigenous and 18 others mulberry Germplasms are present at SKUAST Kashmir where as 33 exotic, 23 indigenous and 9 others Mulberry Germplasms are present at CSR&TI Pampore. Hooker (1885) [5] reported occurrence of *Morus nigra* (black mulberry) and *Morus rubra* in Jammu and Kashmir. *Morus nigra* commonly known as Shahtul is sparsely found throughout Kashmir. *Morus rubra* occurs in Bhaderwah and Ramsu areas of Jammu provenance.

Studies conducted also revealed that *Morus alba* has different uses in North Kashmir. People use this species for Silkworm rearing, Fruits, Fodder, Fuel etc. *Morus alba* has multiple uses in North Kashmir (Fig 2 Use of *Morus* species in North Kashmir). Species is used for fodder (41.46%), fruits (34.72%), fuel (12.52%) and silkworm rearing (11.30%). Least number of people were using this species for fuel wood because felling of *Morus* species is banned in Jammu and Kashmir. Trees were found on private lands and they were planted by farmers for commercial (16.31%) and household (83.69%) purposes (Fig 3 Purpose of growing *Morus* species in North Kashmir). In Sericulture it is widely used for its foliage to feed the silkworm *Bombyx mori*. Its fruits are used for human consumption either in the raw form or in the form of various confectionary products such as jams, pulp, juice etc (Soufleros *et al.*, 2004) [10]. It is also used as fodder for animals, since it is highly palatable, nutritious and digestible (Benavides, 2000) [3].

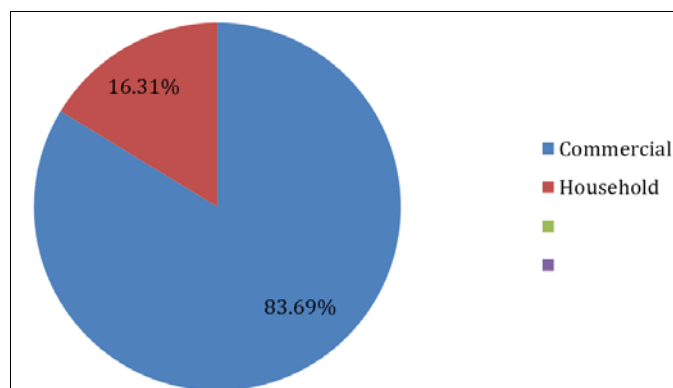


Fig 2: Use of *Morus* species in North Kashmir

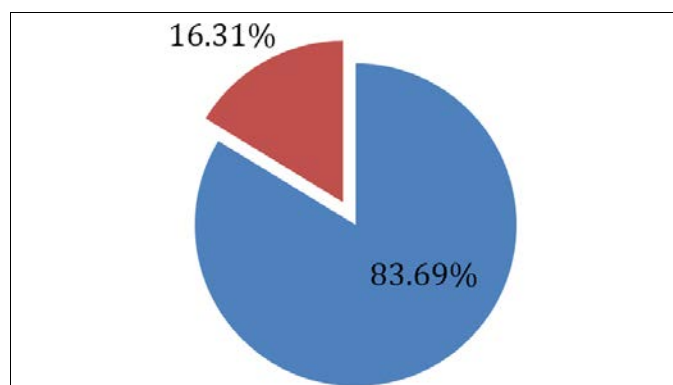


Fig 3: Purpose of growing *Morus* species in North Kashmir

Conclusion

Findings of present investigation concluded that *Morus alba* had different varieties as well as different uses among farmers in North Kashmir. Both indigenous as well as exotic varieties of *Morus alba* are found grown throughout North Kashmir. People use this species as fodder, fruits, fuel and for rearing

of silkworm.

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