A NOTE ON FUELWOOD SPECIES OF MARGALLA HILLS NATIONAL PARK, ISLAMABAD

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Abstract

Results of an ethnobotanical investigations conducted in Margalla Hills National Park during 1997 are presented. The survey was aimed to enlist the fuelwood species and to assess their rate of consumption, availability and threats facing by the park authorities. A total of 35 species, belonging to 29 genera and 24 families of wild tree and shrubs, were found to be commonly used as fuelwood in Margalla Hills National Park by the people. *Acacia modesta* Wall., *A.nilotica* (L.) Delile, *Buxus papillosa* C.K. Schneid. and *Dodonaea viscosa* (L.) Jacq. were found to be under high fuelwood pressure. Issues were discussed and conclusions made to improve the situation.

Introduction

The Margalla Hills National Park is located between 22 40°-33 44° N latitude and 72 55°-73 20°E longitude and forms the north-eastern edge of Islamabad. It spreads in a roughly east-west direction and its altitude varies from 465 to 1600 m. It has rugged topography comprising mainly steep slopes and gullies where rock structure is basically limestone. The total area of the park is 12605 ha with 40 km length. Deforestation and grazing have caused soil erosion leaving little but parent rock with shallow residual soil and silty loss. The average maximum and minimum temperature is 34.32°C and 3.4°C respectively with occasional snow. Rain fall occurs in monsoon and winter, the average being 1200 mm per year. The park is under pressure due to illegal settlements, quarries, fires, extensive tree cuttings, urban encroachment and pollution.

The area has been included in the sub-tropical scrub forest (Champion *et al.*, 1965), Said (1951) studied the salt range forest and discussed the biotic interference while Amin and Ashfaque (1982) reported the vegetation of Ayub National Park and established *Acacia modesta, Cannabis sativa, A. modesta, Cynodon dactylon, A. modesta, Lantana camara* communities. Hijazi (1984)

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observed that *Dodonaea viscosa* was the most common shrub of Margalla Hills National Park. Akbar (1988) analysing the vegetation of Quaid-i-Azam University campus established 7 communities. Khattak and Ahmed (1990) compared the vegetation on the north and south facing slopes of Margalla Hills and reported the presence of *Pinus roxburghii, Apluda mutica, Quercus incana* community on the north facing slopes and *Acacia modesta, Woodfordia fruticosa, Dodonaea viscosa* community on the south facing slopes. According to them, the north facing slopes showed a greater species diversity compared to the south facing slopes having the similarity index as 46%.

In Pakistan, information about the field survey of fuelwood species is quite meagre as few papers have been published. Khan (1994) described the past and present status of natural tropical thorn forest in Punjab which was the main source of fire wood supplies for urban and rural populations. The present status of natural tropical thorn forest was appraised by surveying areas formerly under these forests. It was concluded that the natural tropical thorn forests of Punjab had almost disappeared due to overgrazing, fuelling and wind erosion, desertification, salinity and water logging, *Salvadora oleoides* is given special attention because of its great ecological and ethnobotanical importance. Similarly, Shinwari (1993) presented a note on 74 species of trees and shrubs being used as fuelwood in North West Frontier Province of Pakistan. Out of which 7 were gymnosperms, 2 monocotyledonous and 65 dicotyledonous commonly used as fire wood specially in southern and south western parts of North West Frontier Province. In literature, there is no inventory list of the species used as fuelwood at Margalla Hills National Park. This effort has been done to get the information about the species which are under pressure due to their use as fuelwood in the area.

Methodology

Trips were arranged at the time of wood collection used by the inhabitants. Interviews were taken and observations were made during guided and transect walks. Head loads of animals and men were analysed by weight. Plant specimens were collected and preserved in the herbarium of Quaid-i-Azam University, Islamabad. Interviews of about 100 informants including local inhabitants, wood sellers, park authorities and societies were randomly conducted through questionnaires. Two girl students were involved for survey in women communities. Outcome of the results were rechecked and compared with literature. Analysis of the data was done and idigenous knowledge was documented.

Results

It was found that 35 species belonging to 29 genera and 24 families of wild trees and shrubs were commonly used as fuelwood in Margalla Hills National Park by the people. Some commonly cultivated fruit trees are also used as fuelwood. These include *Pyrus, Prunus, Eriobotrya* of family Rosaceae; *Mangifera indica* of Anacardiaceae and species of *Citrus* of family Rutaceae etc. Some herbs like *Centaurea iberica, Carthamus oxycantha* and *Cannabis sativa* etc. are also used for ignition when dried.

The fuelwood is collected by children and men and very rarely by women. About 80% of the people in the area use plant species as fuelwood. However, in some areas dung cakes, kerosine oil and gas cylinders are also used as an alternate source for fuel. About 20% families of the total population are estimated to get their earnings by selling wood. The wood is collected from the far flung areas located at 3-5 km distance either from standing trees or dead branches.

The instruments used for wood cutting are Saw (Aree), Axe (Khulhari) and Digger (Kuddal). For transportation, donkeys and camels are used. As head load, man also carries the fuelwood. They gather the wood and tie the load with the help of elastic stem of *Mallotus phillipensis* (Kamila); the method is as 'Sub'. The wood consumers are houses, shrines and small hotels of the area. About 1.5 kg per head per day fuel is consumed in summer while 3 kg per head per day in winter season. Storage is done during rainy season from July thrugh September.

Table 1. Fuelwood consumption in CDA Park Lands (MHNP)

Village	Houses	Residence	Average consumption (kg)/month
Mangial	25	128	5760
Subban	36	321	14445
Mandla	57	415	18675
Jabbi	60	455	20475
Jhang	51	297	13365
Bajran	12	78	3510
Padoh	31	122	5490
Narias	58	328	14760

Village	Houses	Residence	Average consumption (kg)/month
Jalwalian	4	23	1035
Rumli	40	217	9765
Kamlari	22	104	4680
Milka Dhoke	4	21	945
Lass	7	43	1935
Mandhiala	44	181	8145
Barah	23	117	5265
Ratta Hotter	19	90	4050
Malwari	63	332	14940
Chan Agah	25	61	2745
Chan Jabbi	1	6	270
Kalinger	21	176	7920
Saniari	18	135	6075
Ghandhian	14	129	5805
Chauntra	340	1970	88650
Total	975	5749	258705

Note: Calculations are based on CDA, Park Lands Census, 1991.

1. Trees

Family: Bombaceae

Bombax ceiba L. (Simbal)

A large deciduous tree, 36 m or more tall with a diameter of 0.75 to 1.25 m, having attractive flowers. The fruit or pods are 12 to 17 cm long and contain seed which is surrounded by a thick mass of silky hair. The pods mature in April and May. The tree is native to Pakistan. An intolerant tree that does not do well in shade. It grows best on deep alluvial soils that are well drained. The thorns of younger plants protect it from grazing. Older trees are somewhat fire resistant,

forest fire does retard growth. It is reproduced both from seed and by vegetative means by the people. It is very fast growing, drought resistant and is also in demand as commercial timber tree. It can be planted on arid and semi arid sites with irrigation. Wood colour is whitish. Density is very light and strength is weak. Rarely used as fuel in Margalla Hills.

Family: Buxaceae

Buxus papillosa C.K. Schneid. (Shamshad)

An evergreen shrub small tree upto 10 m tall. It is monoecious. The fruits are 7-10 cm long and mature between June and August. The tree is native to Pakistan. A tolerant tree that does well in shade. It grows on a variety of soil but prefers rich sandy loam end. It can be reproduced both from seed and by vegetative means. Natural regeneration occurs in moist, shady microsites. Colour of the wood is light yellow to yellowish brown. Density of wood is heavy; strength is hard, strong and very durable. Commonly used as fuel at Margalla Hills National Park.

Family: Caesalpinaceae

Cassia fistula L. (Kinjal)

A medium sized deciduous to semi-evergreen tree with an open crown. The height of the tree ranges from 5-9 m with a diameter of 0.5-1.5 m. The fruit is a long pod (2-3 cm in diameter and 30 or more cm long). Usually smooth, hard and dark brown when ripe. They mature between September and February and pods break open easily to expose the seed. The tree is native to Pakistan. It is a moderately shade tolerant that grows on many soil types i.e. poor in nutrients and shallow. It is easily repoduced from seed and by vegetative propagation. Colour of the wood is yellowish red to reddish brown. Strength is very strong, hard and durable. The wood is used for various purposes, makes excellent fuel but is smoky.

Family: Celastraceae

Maytenus royleanus (Wall. ex Lawson) Cuffdont (Pattaki)

Small tree or shrub, usually spiny capsule 3-angled, 1-4-seeded. Moderate growth. Seldom used as fire wood in the area.

Phyllanthus emblica L. (Amla)

A medium-sized, deciduous tree, 25 to 30 m tall with diameters of 0.3 to 0.6 m. The crown is large, oval and dense. The fruit is small, round, fleshy, 2.5 cm in diameter, containing 6 seeds. The tree is native to Pakistan. It grows on a variety of soils but prefers deep moist alluvium. It can succeesfully be grown on alkaline or poor soils. It is reproduced both from seed and by vegetative means. A moderately fast growing tree. Wood colour is red. Strength is hard and strong. Rarely used as fuel in the area.

Family: Fagaceae

Quercus leucotrichophora A. Camus (Rein)

A medium to large evergreen tree, 18 to 24 m tall and with a diameter of 0.8 to 1 m with round crown. It is monoecious.The fruit is an acorn or nut, 2.5 cm in diameter. The fruiting period is November to January. The tree is native to Pakistan. It grows on deep, rich moist, well drained soils and prefers moist shady sites. It is reproduced both from seed and by vegetative means. The fruit, nut, is solitary; viability is low and storage is difficult. It is slow growing tree. Heart wood is reddish brown. Strength is heavy and hard. Its wood is particularly desirable for quick, intense long lasting cooking fire at Margalla hills.

Family: Flacourtiaceae

Flacourtia indica (Burm.) Merr. (Kokoh)

A moderately growing, spiny, small tree, having edible fruit. Normally used as fire wood in the area.

Family: Meliaceae

Melia azedarach (Linn.) (Drek)

A medium to small sized, deciduous tree, 6-12 m tall and with diameter of 0.75 to 0.7 m. The crown is spreading and round. The fruit is a drupe containing 4 to 5 seeds. The fruiting period is January. The tree is native to Pakistan. It is an intolerant tree that grows on a variety of well drained soils in

valleys and ravines. It is reproduced both from seed and by vgetative means. About 70% of the seeds are viable. Growth rate is high. It is good tree for reforestation because of its fast growth. Sapwood is yellowish white, heart wood is reddish brown. Strength is light, moderately hard. Seldom used as fuel wood in the area.

Family: Mimosaceae

Albizzia lebbeck (L.) Benth. (Shareen)

A fast growing deciduous tree 12 to 30 m tall, diameter 1 m. The crown is open flat, and about 25 cm long. They are yellowish brown when ripe. The pods mature between June to September. It is native to the sub-Himalayan. It is a moderately intolerant tree that grows variety of moist sites. It favours well drained loamy soils but can tolerate saline and sodic conditions. It can be reproduced both from seed and by vegetative means. According to the people, pre-treatment of seeds by an overnight soaking in water increases germination. Relatively fast growing tree. Sapwood is yellowish-white, while heart wood is greyish-brown. Strength is very high. Usually used as fuelwood.

Acacia catechu (L.f.) Willd. (Khair)

A medium rized, deciduous tree, 9 to 15 m tall; diameter 29 to 31 cm. The small pods are 5 to 9 cm long which mature between December and January. The tree is native to subcontinent in the western regions of the Himalayas. It is hardy tree which grows best on rocky, stony, gravely, sandy alluvium, loamy, clayey, well drained soils. It is easily reproduced both from seed and vegetative means. Seed can be stored for at least 12 months when treated with insecticides. Relatively slow growing. It is valuable commercial tree because of the wood extract, much of which is smuggled into Pakistan from India (Sheikh, 1993). It fixes nitrogen and is good for reforestation. The sap wood is creamy white to reddish while heart wood is dull pink to reddish brown. Wood is hard, heavy and very strong. Commonly used for fuel purpose and has become endangered in the area.

A. nilotica (L.) Dilile (Kikar)

An evergreen, thorny, moderate-sized tree, 20 m tall with diameter up to 1 m. The pods are variable 4 to 22 cm long and mature year around depending

on sub-species and geographic location. It is native to Pakistan. The tree is intolerant, drought resistant that grows on a variety of sites. It can be grown on saline sodic sites if adequate soil moisture is available. It is easily reproduced from seed. People pre-treat seeds with boilding water or they keep it in cow dung for a week to enhance germination. Relatively fast growing tree. This tree is aggressive and is easily established. It has great potential in farm forestry and is useful for controlling erosion in gullies and can also be grown on saline, sodic sites for soil reclamation and biomass production. Sapwood is white; heartwood is pinkish white turning to reddish brown. Wood strength is durable, heavy, hard and very strong. Commonly used as fuelwood in the area.

A. modesta Wall. (Phulai)

A deciduous, thorny moderate-size tree, 3 to 9 m tall with diameter up 2 m. The tree is native to Pakistan. It is a moderately drought resistant tree that grows on a variety of soils including dry shallow soils. It is easily reproduced from seed and by vegetative means. Relatively slow growing tree. This tree is aggressive because it can tolerate some shade. Young plants need protection from grazing. It has great potential as a farm forestry tree. Sapwood is white, heartwood is dark brown with black streaks. Commonly used as a very good fuelwood in the area.

Family: Moraceae

Morus alba Linn. (Tut)

A medium sized deciduous tree, 9 to 15 m tall, and diameter of 0.6 to 0.8 m. The crown is spreading and round. It is monoecious. The fruit is a berry containing 5 to 15 small seeds, 0.7 to 1 cm long. The berries are white to pinkish. The fruiting period is between March and June. The tree is native to Pakistan. It grows on a variety of well drained, rich soils. It is fast growing and good for reforestration. Sapwood is yellowish white, heartwood is bright yellowish. Its wood is hard and elastic. Used as fuel wood.

Ficus benghalensis L. (Bohr)

It is cultivated as shade tree along roadsides or in the vacinity of villages particularly near ponds. The wood is sometimes used as fuel in the area although it is smoky.

F. religiosa L. (Pipal)

A large deciduous tree having fruit grows in the exel of the lower leaves. Seeds are very small. Fruit matures from October to November. The tree is common in the sub-Himalayas. It is cultivated on large variety of sites but does best on sandy clay soils. It is reproduced both from seed and by vegetative means. Seeds are very small and are sometimes spread in bird droppings. Growth rate of the tree is fast. It has value as a avenue tree and is planted along water courses. Wood is whitish grey in colour and soft in strength; seldom used as fuel wood in the area.

F. virgata Wall ex Roxb. (Phagwara)

Deciduous tree up to 8 m tall. Trunk smooth, greyish brown. Fruit axillary solitary or paired, top or pear shaped. Moderate growth; some times used as fire wood in the area.

Family: Oleacea

Olea ferruginea Royle. (Kao)

A small evergreen tree 9 to 12 m tall with diameter of 0.3 to 0.6 m. The fruit is a drupe 8 mm long that matures between May and December. The tree is native to the sub-continent including Pakistan. A tree that grows on a variety of calcareous loamy, to gravel sandy soils. It is reproduced both from seed and by vegetative means. Although grows slowly but is a good tree for reforestation in arid area. Attempts to graft better varieties could increase both oil and fruit production. Sapwood is white, heartwood varies from light brown to nearly black. Hard and heavy in strength; usually used as fuelwood in the park area.

Family: Palmae

Nannorrhops ritchieana (Griff.) Aitchison. (Mazari, Chatai Kajoor)

It is a gregarious, usually small tufted palm from a much branched underground rhizome. The tree grows best in sandy clay soil under favourable conditions. Its leaves are used as fuel.

Phoenix sylvestris (L.) Roxb. (Khajoor)

A tall evergreen tree attaining a height of 30 to 35 m. The stem is covered with the stumps of old leaves from the bottom to the top. Fruit is full of nourishment. The tree has been introduced to the subcontinent by Muslims from Middle East countries and has become naturalised. It is reproduced from seed and suckers. Its growth is slow specially when young. Wood is greyish white in colour and hard but non durable in strength. Wood and leaves are used as feul in the area.

Family: Papilionaceae

Butea monosperma (Lam.) O. Kuntze (Dhak)

A small or medium sized deciduous tree with a crooked trunk and large irregular branches. The pods mature in May and are long, thin and flat 10 to 20 cm long. Each pod contains only one seed. It is native to tropical area of the sub-continent. The tree grows best on black loamy soils. It is reproduced from seed or by vegetative means. Direct seeding has been reported to be more successful than planting. It is moderately fast growing tree. It fixes nitrogen. Wood is dirty white in colour while soft and non-durable in strength. Commonly used as fuel in the area.

Dalbergia sissoo Roxb. (Tali)

A medium size to large, deciduous tree, 30 m in height. The branches are spreading with diameter of 3 m. The pods are small, 5 to 8 cm long and papery. The pods ripen from June to February. There are usually 1 to 4 seeds per pod. The tree is native to the subcontinent. It is moderately fast growing tree that adapts well to semi arid conditions. It can be reproduced both from seed or by vegetative means. It is difficult to separate the seeds from the pods. Sapwood white to pale brown and heartwood is golden brown to dark brown in colour. Wood has high density and is strong. Wood is oftenly used as fuel.

Family: Pinaceae

Pinus roxburghii Sargent. (Chir)

A large tree 21 to 33 m tall with an average diameter of 0.6 m. The crown is round. It is monoecious. The fruit is the female cone. The seed is

available in April/May takes full year to mature. The tree is native to Pakistan. It is an intolerant tree that grows on a variety of soils, including shallow soils and soils originating from lime stones, granites and sand stone. It is reproduced from seed. Seed can be stored in sealed containers in a refrigerated environment for a number of years. It is considered as a fast growing tree. Sapwood is white and heartwood light red turning to reddish or yellowish brown with age. Strength moderately hard and heavy.

Family: Rhamnaceae

Zizyphus mauritiana Lam. (Beri)

A spiny deciduous or evergreen small tree 12 m tall with a diameter of 40 cm. The crown is spreading with drooping branch. The fruit is shiny orange red or reddish brown. The seed matures from December to March. The tree is native to south Asia including Pakistan. It is an intolerant tree that has no particular soil requirements and grows on a variety of sites. It is reproduced from seed and by vegetative means. Seeds can be stored up to 3 years without refrigeration and maintain viability. Cracking the hard seed coat before planting increases germination. People keep its seeds in cow dung for 10 days to hasten germination. It is a fast growing tree. In the past this tree has been planted for its valuable fruit. Wood is reddish brown, hard, heavy and strong. Commonly used as fuelwood.

Family: Rosaceae

Pyrus pashia Buch. Ham. Ex D. Don (Batangi)

A small to medium sized deciduous tree 6 to 10 m tall with oval shape crown. The fruit is 1 to 3 cm in diameter and matures from May to December. This tree is native to the Himalayas of Pakistan. It grows on sandy loam soil that is well drained. It has the potential to control erosion on steep hill sides in addition to providing a fruit crop. Wood is light, reddish brown, hard, heavy and strong. Dry wood is used as fuel in the area.

Family: Tiliaceae

Grewia optiva Drum. ex Burrett (Dhaman)

A moderately fast growing, small sized, deciduous tree. It is reproduced

from cuttings and root suckers and rarely from seed. Normally valued as fodder source in the area. The bark of the branches is peeled off to make ropes while the remaining inner wood is used a fire wood. The wood alongwith the bark produce bad smell on burning and is avoided to be uesed as such.

2. Shrubs

Family: Acanthaceae

Justicia adhatoda L. (Bhekar)

Evergreen, much branched shrub that usually grows to a height of 2.5 meter but can also attain 6 m height. It is a particularly desirable wood for quick intense, long lasting, clean cooking fire. It burns with little or no smoke, odour or sparks. The wood is moderately hard. It is propagated by seeds or cuttings. Most commonly used as fuel wood in the area.

Family: Apocynaceae

Carissa opaca Stapf ex Haines. (Granda)

Common shrub of the area up to 3 m or more tall. Spines usually straight, 20-30 cm long. Young shoots produce milky juice. Fruit black berry, 5-8 mm long, edible. Wood is commonly used as fuel in the area.

Family: Berberidaceae

Berberis lycium Royle (Sumbal)

Shrub with whitish grey stem spines 1-3 fid, straw coloured. Berries (fruit) 7-8 × 5 mm. Dried wood is used as fuel in the area.

Family: Lamiaceae

Otostegia limbata (Benth) Bioss. (Bui)

Branched cylindrical shrub with whitish stem. Used as fire wood when dry.

Family: Punicaceae

Punica granatum L. (Anar)

A shrub or small tree upto 4 m tall. Seeds juicy, red or pinkish. Branched and stem used as fire wood in the area. Wild in the area; valued due to fruit.

Family: Rhamnaceae

Zizyphus nummularia Burm (Jher Beri)

Shrub with small spines. Fruit is edible; wild in the area. Wood is used as fire wood. Regeneratd through seed and cuttings.

Family: Spindaceae

Dodonaea viscosa (L.) Jacq. (Sanatha)

A component of the scrub vegetation, the gregarious habit of this shrub makes it an excellent hedge plant. The branches very commonly are used as fire wood and as a support for flat mud roof in village house. It is the major constituent of the fuel wood species used in the Margalla hills.

Family: Verbenaceae

Lantana indica Roxb. (Ghaneri)

An erect, branched shrub roughly hairy. Branches used as fire wood in the area.

Lantana camara L. (Punch puli)

Erect, branched shrub roughly hairy. Branches used as fire wood when dried.

Vitex negundo Linn. (Nirgundi)

It is often planted along water channels to check erosion, readily grown from cuttings; wood is some times used for fuel purposes.

Discussion

A lot of pressure on collection of firewood has been found on *Dodonaea viscosa*, *Justicia adhatoda*, *Carissa apaca*, *Buxus papillosa*, *Acacia modesta*, and *A. nilotica*. This is pressure increasing due to expansion of population. Reforestation trend of these native species is lacking among the local communities. To enhance regeneration, of the species an alternate source should be provided to reduce dependency on fuel wood. For instance, natural gas, which is available in Islamabad, can be provided through pipeline or cylinders. Similarly, for low income people, energy efficient cookstoves and ovens (tandoors) can be provided which can save 24-50% wood fuel.

It has been observed from the Phytosociological study of Rumli village that tree density is 6 times higher at places which are declared sacred e.g. shrines, graveyards by the people than the reserved and unreserved areas. They pay great homage to the shrines. However, misuse of fuelwood at Bari Imam Shrine (burning 24 hours throughout the year) can be minimised by clarifying the misconceptions of the people through local religious leaders or by proper management of the wood used for fire (Ibrar, 1998).

Conclusions

The results of the survey can be applied to the management plan of the park for conservation. Reforestation of fuelwood and fodder species must be encouraged and alternate sources like natural gas, energy efficient cook stoves and ovens (tandoors) should be made available to the local people. The reserved forest area around the shrines may be dedicated to the name of the respective shrine or saint. Awareness and incentives for planting local useful trees may be launched through school teachers, religious leaders of local mosques and elders of the villages. Park rules must be overhauled by taking the local people (villagers) into confidence to avoid misuse of present rules.

References

Akbar, K.F. 1988. Phytosociological studies of the Quaid-i-Azam University Campus, Islamabad. M.Phil.Thesis. Deptt. of Biological Sciences, Quaid-i-Azam University, Islamabad.

Amin, A. and Ashfaque, R.M. 1982. Phytosociological Studies of Ayub National Park, Rawalpindi. Pak. J. For 32(4): 130-135.

Champion, H. G., Seth, S.K. and Khattak, G.M. 1965. Forest types of Pakistan. Pakistan Forest Institute, Peshawar.

Hijazi, S. 1984. A phytosociological study of Margalla Hills National Park, Islamabad. M.Phil. Thesis. Quaid-i-Azam University, Islamabad.

Ibrar, M. 1998. Ethnobotanical studies of Margalla Hills National Park, Islamabad, Pakistan. M. Phil. Thesis. Department of Biological Sciences, Quaid-i-Azam University, Islamabad.

Khan, A.U. 1994. History of decline and present status of natural tropical thorn forest in Punjab. Biological Conservation, 67(3): 205-210.

Khattak, Z.D., and Ahmed, S. 1990. Phytosociological studies of the vegetation on the North and South facing slopes of the Margalla Hills. J.Sc. & Tech. Univ. Peshawar. 1990, 14. pp. 129-132.

Nasir, Y. and Akhtar, R. 1987. Wild flowers of Rawalpindi-Islamabad districts. National Herbarium, Islamabad.

Nasir, E. and Ali, S.I. (ed.). 1970. Flora of West Pakistan/Pakistan, Islamabad & Karachi.

Shinwari, Z.K. 1993. Research note-fire wood crops: Shrubs and tree species in N.W.F.P. Pakistan. J. Agri. Res. 14(1): 92-100.

Stewart, R.R. 1957. Flora of Rawlapindi district. Pak. Jour. For. 7(4): 237-300.

Stewart, R.R. 1958. Flora of Rawlapindi district. Pak. Jour. For. 8(1): 13-111.