

USE AND SURVIVAL OF KUTH (*SAUSSUREA LAPPA*) A PLANT OF MEDICINAL AND ECONOMIC VALUE IN PAKISTAN

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Abstract

Temperate forests of Pakistan are rich in important plant drugs. Presently the supplies of these drugs, especially Kuth (*Saussurea lappa*) are dwindling mainly because of over and uncontrolled extraction. As a result, Kuth has been listed as "Threatened with Extinction" in Appendix II of CITES. Therefore, the production and utilization of this drug plant need to be regulated through management plans and in-situ and ex-situ cultivation. This on one hand will ensure sustained supply of Kuth, compatible with its survival, and on the other provide additional job opportunities for the local communities.

Introduction

Medicinal plants have played a historic role, as remedies for human ailments. Large quantities of medicinal plants are in use in traditional Ayurvedic and Greco-Arab system of medicine in Pakistan. In 1985, the annual collection and use of medicinal plants, all over the country, was about 8,000 tonnes from about 75 plant sources, with a market value of 119.5 million rupees (Khan, 1985). A few items of drugs are also exported to the other countries, earning about US\$ 4.5 million per annum as foreign exchange. Some of these are cultivated on farms, while most others grow naturally and are collected from different forest areas.

In addition to authorized extraction, under hand collection of medicinal plants is also going on, from the forest areas and the drugs so procured are handled without entering the formal marketing channels.

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Local people also collect medicinal plants for use as home remedies. The quantities going in this collection and use are also not known.

As a result, there is no complete information available on the actual quantity of medicinal plants including Kuth extracted from the forest areas of Pakistan. However, there is enough to believe of ruthless extraction; Kuth being the main victim, resulting in depletion of its supplies from the near and accessible forest areas (Khan & Zaidi, 1989). Consequently, the Kuth has been listed as "Threatened with Extinction" in the Appendix II of CITES.

Therefore, the production and utilization of Kuth in Pakistan needs to be regulated and made compatible with its sustained supply and survival. The implementation of CITES Listing in Pakistan lies with the Management Authority, the National Council for the Conservation of Wildlife (NCCW) through the Office of the Inspector General of Forests, Ministry of Environment, Local Government and Rural Development, Government of Pakistan, Islamabad.

Description and Status of Kuth in Pakistan

The information reported in this paper, on the various aspects of Kuth production and utilization are collected through interviews/questionnaires and from secondary data sources.

Description

Vernacular/ trade names	Kutk, Kut, Kot, Kuth-talakh, Qust-talkh, Costus root.
Botanical name	<i>Saussurea lappa</i> C.B. Clarke
Synonyms:	<i>Aplotaxis lappa</i> Dcne., <i>Aucklandia costus</i> Falc. (Zaman & Khan, 1970 and Stewart, 1972)
Family:	Compositae

Distribution

Kuth/Kuth-talkh (*Saussurea lappa*) is indigenous to parts of Pakistan and India. In Pakistan, this plant species is sparsely distributed, in small patches on moist shady slopes, in temperate mountains in NWFP (Kaghan and Kohistan), Azad State of Jammu & Kashmir (Sharda and Keran Forest Divisions and Jhelum Valley) and Northern Areas (Astore) between 2,500-3,600 m elevation (Chaudhry, 1991, Khan & Zaidi, 1989 and Zaman & Khan, 1970).

Habit and Life Cycle

Kuth is a large, robust and velvety herb having an annual stem. Leaves radical, heart shaped, large, rough above and smooth beneath and irregularly toothed. Roots thick and perennial. The plant sprouts immediately after snow melt in May. The flowers are dark purple, borne in sessile clusters and appearing during third year of growth from July to August and seeds mature in September. The roots when 4-5 years old attain commercial size. The plant regenerates both from root sprouts and seeds (Khan & Zaidi, 1989 and Zaman & Khan, 1970).

Constituents

The active constituents of roots are essential oil [1.1 to 2.0%] containing bicyclic lactone [kushtin], alkaloid saussurine [0.05%] and a bitter resin [6.0%] (Khan & Zaidi, 1989; and Zaman & Khan, 1970).

Uses

The roots of the plant under different names have many medicinal and other economic uses. The important ones are given us under:

Medicinal

Roots of Kuth have been used for the treatment of many ailments in Ayurvedic and Greeco-Arab system of medicine since ages. The common uses are as an *aromatic, carminative, stimulant*; remedy for *cough, bronchial asthma* and persistent *hiccup*; diseases of *blood, liver, kidney, skin* and as an *aphrodisiac* tonic. Roots also have *antiseptic* and *disinfectant* properties (Khan & Zaidi, 1989; and Zaman & Khan, 1970).

Kuth under the name of Qust-talakh is used in two herbal preparations in Hamdard Pharmacopeia (Hamdard, 1968). These are Maafoon-e-Murravehul-azwah and Roghane-Qust-talakh (essential oil) which, in addition to above indications, are also used for the treatment of *hypothermia, debility, tremor, tetanus* and *gout*.

Others

The roots are used in religious ceremonies of Buddhists and burnt as an *aromatic incense* in temples in China (Khan & Zaidi, 1989) and other far eastern countries. But in view of the diminished supplies and socio-political changes, over the last half a century, it is uncertain whether this use in China and far eastern region is still going on and, if so, with the same extent. Locally the Kuth is also used as insect repellent and protection of woollen clothes against mold damage in storage.

Supplies

Supplies of Kuth from Kaghan valley forests (Hazara, NWFP) have already exhausted. Sharda and Keran Forest Divisions and Jhelum Valley Forests of Azad State of Jammu and Kashmir (AJ&K), Kohistan

Forest Division (Hazara) and Astore (Northern Areas) are a source of Kuth supply in Pakistan.

AJ&K Sources

The AJ&K is the major source of Kuth supply in Pakistan. The production data on Kuth from forest areas of AJ&K from the year 1979-80 to 1997-98 are given in table 1. As shown by these data, the yearly production is very inconsistent as an indicator of unmanaged production. The average yearly production over 18 years from 1979-80 to 1996-97 is 13,253 kg (13.25 tonnes). But in the year 1997-98, a record quantity of about 259,000 kg (259 tonnes) of Kuth has been extracted. This quantity is nearly 9% higher than the total extraction over 18 years, from 1979-80 to 1996-97, and 19.5 time more than the average yearly extraction. From 1993-94 to 1996-97, there was no regular Kuth extraction from AJ&K. In total the average annual extraction from AJ&K sources between year 1979-80 to 1997-98 was 26,187 kg (26.19 tonnes).

Kohistan Sources

The extraction of Kuth from Kohistan Forest Division (NWFP), over the last five years from 1994-95 to 1997-98 is given in table 2.

As shown in table 2, a total of 17,427 kg (17.4 tonnes) of Kuth over the past five years from 1994-95 to December, 1998-99 were extracted from the Kohistan Forest Division. This gives an average annual yield of 3,485 kg (3.5 tonnes). A nearly consistent annual supplies show that the yield is fairly sustainable.

Table 1. Kuth Extraction from the forest areas of Azad State of Jammu & Kashmir (AJ&K)

Year	Quantity	
	Kilograms	Tonnes
1979-80	29,857	29.9
1980-81	10,404	10.4
1981-82	-	-
1982-83	-	-
1983-84	26,526	26.5
1984-85	38,375	38.4
1985-86	25,000	25.0
1986-87	15,051	15.1
1987-88	22,350	22.4
1988-89	2,302*	2.3*
1989-90	1,355*	1.4*
1990-91	3,157*	3.2*
	36,320	36.3
1991-92	-	-
1992-93	24,000	24.0
1993-94	-	-
1994-95	2,450*	2.5*
1995-96	-	-
1996-97	1,410*	1.4*
1997-98	259,000	259.0**
Total Extraction	497,557	497.6
Average Yearly Extraction	26,187	26.2

* Confiscated from nomadic graziers

** Figure collected personally

Source: Anonymous, 1997.

Table 2. Annual extraction of Kuth from Kohistan Forest Division, Hazara, NWFP.

Year	Annual Extraction	
	kg	Tonnes
1994-95	2,220	2.2
1995-96	3,182	3.2
1996-97	7,030	7.0
1997-98	4,884	4.9
1998-99 (upto December, 1998)	111	0.1
Total	17,427	17.4
Average	3,485	3.5

Source: Office record of the Kohistan Forest Division.

Others

A quantity of 4,867 kg of Kuth was extracted from the Lower Kaghan Forest Division, NWFP only in one year (1996-97), from 1994-95 onwards. This casual supply shows that the resource has already been exhausted.

No latest data on the production of Kuth from Astore (Northern Areas) is available. An annual yield of 17 tonnes of Kuth from Astore was estimated in 1953 (Kazmi & Siddiqui, 1953). Since then, it is presumed that this yield might have drastically gone down due to over collection. However, 1,500 to 2,500 kg of Kuth are annually collected from the Minimerg Range, adjacent to AJ&K, and is marketed for its medicinal value (Anonymous, 1993).

Kuth grows in the sub-alpine areas which also serve as rich grazing grounds for the livestock of nomadic graziers in summer months. These nomads leave the area in the months of September and October and on way back carry Kuth which they have collected illegally. A quantity of this collection is confiscated by the Forest Department at the exit points, but a good part of it escapes un-noticed and is sold in the towns and cities. This is an unrecorded supply source without known potential.

Consumption and Prices

The consumption of Kuth in the local Pansar market/ Dawakhanas is only 50 tonnes mostly from AJ&K (Khan, 1985). Another study reported that the indigenous Kuth trade falls under Category-C, where annual sale of crude drug is less than 100 tonnes (Khan & Zaidi, 1991). However, under the prevailing situation an annual sustained yield of 25 tonnes of Kuth from AJ&K, Astore (Northern Areas) and Kohistan (NWFP) is estimated. This sustained yield of Kuth is only enough to meet 50% of domestic needs. The deficit of additional 25 tonnes is met, probably, from trans-border trade with India and other unrecorded sources.

The sale prices of Kuth, from AJ&K sources as given in table 3, show that in early three years from 1985-86 to 1987-88, the price remained almost steady selling at Rs.87.17 (82.96-93.20) per kg (Chaudhry, 1991).

In 1988-89, sale price of Kuth jumped up to Rs.104/kg from the last year's price of Rs.82.96/kg. In the coming years the sale price steadily increased to a maximum of Rs.172.40/kg in 1990-91. The price of crude drug increased more than double from 1985-86 to 1990-91. The price went, even higher, when the purchasers offered Rs.195/kg of Kuth collected during the year 1997-98 in Muzaffarabad, AJ&K. The retail price of Kuth in Peshawar market in December, 1998 was Rs.180/kg. The whole sale source of Kuth selling in Peshawar market was told from Akbari Mandi, Lahore, getting it's supplies from India.

Table 3. Sale prices of Kuth from AJ&K (Sharda and Keran Forest Divisions)

Years	Sale Price	
	Rs. million	Rs./kg
1985-86	2.134	85.36
1986-87	1.403	93.20
1987-88	1.862	82.96
1988-89	0.352	104.00
1989-90	0.452	153.00
1990-91	-	172.40
Total	6.203	
Average	1.241	90.65

Source: Chaudhry, 1991.

The forest department of AJ&K earned an average annual revenue of Rs.1.241 million from 1985-86 to 1990-91 from the sale of Kuth. No separate figures of revenue earned from the sale of Kuth from Kohistan Forest Division were available.

Foreign Trade

The latest foreign trade statistic on Kuth did not fall at hand. But as shown by use it is well confirmed, that this drug remained an important article of trade with China (Khan & Zaidi, 1989). A study reported that in 1974, from Rawalpindi market, about 33,383 kg of Kuth collected from AJ&K were sent to Karachi (Khan, 1976), for export to China or other far eastern countries. Such a trade is further confirmed when a consignment of 3,000 kg of Kuth roots, originating from AJ&K sources was detained, in 1986, by the Government of Japan, under CITES obligations.

However, these days trans-border between Pakistan and India is flourishing and Kuth from Indian sources is being sold in Akbari Mandi, Lahore at a very competitive price. There is nothing to doubt about the

health of this information as the Kuth collected from Indian held Kashmir and other parts in India can not be traded over seas under CITES obligations and therefore, is traded across the border with Pakistan.

Conclusions

From the above discussion, on various aspects of Kuth supply and utilization in Pakistan, the following conclusions are drawn:

Pull of Demand

The demand of Kuth in traditional medicine, as home remedy and for export is high and may expand in future. In spite of a necessity for control on its trade and utilization under CITES obligation, a limited production of Kuth to meet the domestic demand is essential. Otherwise, under the pull of demand and associated price increase, an illegal extraction and trade may start. This may cause uncontrolled damage to the resource as well as deprive the forest departments of their legitimate income through departmental sale and extraction of this drug. Local supply of Kuth is already lower than demand and to fill this gap, trans-border trade with India has already started.

Lack of Sustained supply Management

The production record of Kuth, especially from AJ&K sources, show that the supply of this drug remained erratic. There are years without any extraction, while in one instance a record production of about 259 tonnes, over a year, is noticed. This shows that there is no management under the principles of sustained yield and the decisions to extract Kuth, in a season, are purely discretionary.

Outside Influences

Some times the decision to extract medicinal plants are made under external influences rather than as part of management. In this regards, the

example of Kuth extraction from the forest areas of AJ&K during 1997-98 is enough to explain the situation. The record extraction of about 259 tonnes, in one year, has already been discussed under AJ&K sources.

This quantity is about 5 times higher than the prescribed sustained yield of about 52 tonnes per annum, at a rotation of 6 years, in the Working Plan of Kuth Fields (Anonymous, 1927) for the Gorez Range, Sindh Forest Division (1927) covering Kuth producing area larger than under the control of AJ&K. The ruthless extraction is the only answer to this dilemma. The cruelty done to this dwindling natural resource was only motivated under external influences.

However, the quantity of 259 tonnes of Kuth extracted in one year, leaves much to believe that Sharda and Keran Forest Divisions in AJ&K have a big potential for Kuth production, if sustainably managed.

Biotic Injuries

Kuth production areas are under heavy pressure of grazing by the livestock of nomadic graziers in summer months. Goats browse on the leaves of Kuth, while other livestock cause damage through trampling and soil compaction (Anonymous, 1927). These direct and indirect damages to the plant reduce the Kuth production.

Recommendations

From the above discussion, it became clear that there is no managed and sustained extraction of Kuth from forest areas in Pakistan. As a result, it is threatened with extinction through ruthless exploitation both for local use and trade abroad. To overcome this situation the following recommendations are made:

Supplies from the Wild

Because of medicinal and other uses the demand for Kuth both at home and abroad will exist and may expand in future. Under this pull the extraction and marketing of Kuth from wild can not fully be controlled. Moreover, the record production of Kuth during 1997-98 suggest that the forest areas of AJ&K have a very high potential of Kuth production provided yield is regulated as already laid in "Management Plan of Kuth Fields, 1927" (Anonymous, 1927). This management plan may be modified and made applicable to the Kuth production areas in Pakistan (AJ&K, Astore and Kohistan). This will preserve the resource as well as maintain the market supplies in a legitimate and sustainable manner.

Management System

Extraction of Kuth through lease and royalty has not worked well in the past resulting in an uncontrolled and ruthless collection. Therefore, a mechanism needs to be evolved to make the forest department effective in the implementation of necessary regulation. The need is to change the system. One approach could be that the forest departments themselves perform all operations, right from collection, curing, transportation and final sale of drug thereby, leaving no room for the vested interests of a second party. Complete control of grazing in Kuth fields is recommended to check the damages to this plant through livestock of various kinds.

Sustained Yield

As already discussed the annual yield of Kuth, under the prevailing conditions is erratic. Realizing this fact the management (Chief Conservator of Forests), Forest Department of AJ&K has already suggested an annual sustained production of 10,000 kg of Kuth from the forest areas under its control to the Secretary Forests, Government of AJ&K, Muzaffarabad (Letter No. 8492 dated 27.5.1986). However, from the analysis of past production figures, a sustained yield of 25 tonnes/annum, from all Kuth sources in Pakistan, is more feasible. However, this yield is purely provisional therefore, a well thought over,

yield needs to be determined in the light of resource potential under the management plan to be prepared for Kuth fields in Pakistan.

Artificial Cultivation

To supplement the supplies and reduce pressure of collection on natural resources of Kuth, in-situ and ex-situ cultivation of this drug is very practicable. Artificial regeneration techniques for Kuth from seeds and vegetative means (roots) are already known and have been further studied by the Pakistan Forest Institute, Peshawar. On this basis the following assumptions on Kuth production through artificial means are made:

- i. It is estimated that under artificial conditions a yield of 648-780 kg/ha of dried Kuth roots can be obtained over a period of 5 years (Khan & Zaidi, 1989).
- ii. 100 ha of area set aside for the cultivation of Kuth, at 5 years rotation, can yield 12,960-15,600 kg/annum.
- iii. Taking the average production of 14,000 kg/100 ha/annum an area of about 360 ha would be enough to produce 50 tonnes of Kuth to feed the present local market demand without touching the natural sources.
- iv. If the export of this drug is also a policy the size of the additional area can be calculated based upon the above assumptions and foreign demand.
- v. The village farmers must also be motivated for the artificial cultivation of Kuth by providing incentives of training, fertilizers, small loans and surety of marketing of product.

Additional Benefits of Artificial Cultivation of Kuth

The artificial cultivation of Kuth in addition to supplementing the natural supplies and relieving the pressure of collection on this drug from wild has also other advantages.

- i. Kuth can be cultivated artificially at lower elevations than its natural range. This ensures the more land availability, more intensive cultivation, longer growing season and more production.
- ii. The artificial cultivation of this drug will also improve job opportunities, due to the involvement of people, in different cultural operation including harvest, transport and marketing. It is estimated that in processing (collection, drying and cleaning) of 100 kg of Kuth generates an employment of 10 man-days. Similarly in cultivation and tending operations, transport and marketing additional man-days of labour could be generated.

Role of Research

- i. Research is needed to increase the yield of Kuth under cultivated conditions and reduction of rotation age.
- ii. Artificially cultivated drug (especially ex-situ) may differ in quality manifested as changes in active constituents. Research would be needed to study the differences in the active constituents of drug collected from wild and cultivated sources and mitigation options.
- iii. Studies are recommended to explore the possibilities of growing Kuth in combination with the agricultural crops.
- iv. Economic analysis need to be undertaken to estimate the net return from the cultivation of Kuth as pure crop and in combination with agricultural crops.

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