Threat Status of *Rheum emodi* - A Study in Selected Cis-Himalayan Regions of Kashmir Valley Jammu & Kashmir India

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**Abstract**

*Rheum emodi* being one of the most sought after species in the pharmaceutical industry, providing good dividends to the States from where it is procured, is rapidly declining in nature. The present study entitled as “Threat status of *Rheum emodi* Wall - A study in selected Cis-Himalayan regions of Jammu & Kashmir” was conducted at Sonamarg (Upper Sindh Forest Range) and Chatengul (Manasbal Forest Range) with the aim to assess the status of *Rheum emodi* and factors affecting its sustainability. A comprehensive protocol was framed. From this study it was concluded that this highly beneficial herb, is under immense pressure to survive in natural habitat. Illegal/Unsustainable extraction from the Forests is a major cause for dwindling species of *Rheum emodi*. Lack of understanding of sustainable harvesting/extraction has lead to disturbance of habitat, loss of diversity, reduced abundance and local declining of *Rheum emodi*.

**Keywords:** Threatened herbs; Rhubarb; Medicinal herbs of J&K; Traditional medicine

**Introduction**

Jammu & Kashmir state is rich storehouse of medicinal, aromatic and other economic plants due to the wide variation of medicinal and aromatic plants. More than 50% of plant species described in British Pharmacopoeia are reported to grow in Kashmir Valley. Near 570 plant species are reported to be of medicinal importance. The Sonamarg Area and the Sindh Forest Division (Area of Study) in Kashmir is home to different high altitude medicinal plants like *Picrorhiza kurroa*, *Rheum emodi*, *Inula racemosa*, *Sausseria costus*, *Sausseria sacra*, *Artemesia (spp)*, *Pyrethrum Spp*, *Aconitum heterophyllum* etc. The medicinal extracts and essential oils derived from these plants form the backbone of pharmaceutical, perfumery and cosmetic industry [1-5].

*Rheum emodi* [6-10]

**BotanicalName(s):** Rheumemodi

**Kingdom:** Plantae

**Division:** Magnoliophyta

**Class:** Magnoliopsida

**Order:** Caryophyllales

**Family:** Polygonaceae

**PartsUsed:** Rhizome.

**Vernacular name(s):** Rhubarb, amla-vetasa, amli parni, revanchini, archu, Chinese Rhubarb, Turkey, rhabar, Da huang, Bangla Revanchini, Himalayan rhabar, Indian rhubarb, Ladakirevanda-chini, Natu ireval-chinni, Reval-chini, Rhabarber, Rheuchini, Rhubarb de Perse, Tursak, Varyiattu.

**Habitat:** Grown throughout the valleys in Himalayan region at altitude of 3200-5200 m. *Rheum emodi* Wall, Ex Meissn. is a perennial stout herb, distributed in the temperate and subtropical regions of Himalaya from Kashmir to Sikkim, between an elevation of 2800 and 3800 m. In Himalayas it is generally found between 2800 and 3600 m in an alpine zone on rocky soil, between boulders and near streams.

**Medicinal uses:** Rhubarb is stomachic, bitter, tonic, cathartic. Useful for simple diarrhea, but not in constipation or any affection in which a continuous aperient action is necessary; Best used for the ailments of children and aged persons. Purgative, antibacterial, antitumor, antifungal, diuretic, haemostatic, chologogue, antihypertensive, lowers serum cholesterol, anti-inflammatory. It moves the blood and is good for blood stagnation associated with acute stabbing pain and bruises, for which it can be taken both internally as well as externally in a liniment [8-10].Reduces the impact of Type II Diabetes Mellitus. Studies have shown it exhibits Anti-cancer properties in Human pancreatic cancer

**Chemical constituents** [11-14]: Hydroxanthracene derivatives such as chrysophanic acid (=chrysophanol), emodin, alo-emodin, rhein and physcion, with their O-glycosides such as glucorhein, chrysophanein, glucemodin; sennosides A-E, reidin C and others. The astringent principle consists of gallic acid together with small amounts of tannin. The drug also contains cinnamic and rheinolic acids, volatile oil and starch. Two major glycosidic active principles, sennoside A

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and B, are present along with free anthraquinones. At low doses, the tannin exerts astringent effect and relieves diarrhea; at higher doses anthraquinones stimulate laxative effect and relieve constipation.

Objectives

To study the status of *Rheum emodi* availability in the designated areas of upper reaches of Sonamarg (Upper Sindh Forest Range) and Chatergul (Manasbal Forest Range), to compare the current availability of the species with the availability before a decade or more, to evaluate the causes of current threat status of *Rheum emodi* species in Natural habitat of J&K.

Methodology

The present study entitled as “Threat status of *Rheum emodi* Wall - A study in selected Cis-Himalayan regions of Jammu & Kashmir” was conducted at Sonamarg (Upper Sindh Forest Range) and Chatergul (Manasbal Forest Range). A comprehensive protocol was framed. The study extended from May 2013 to June 2014. Blue print of the study was conceptualized as materials and methods which can be described as under Study design: Pharmacognosial Study.

Area of Study: Two areas from the natural habitat of *Rheum emodi* were selected viz a viz upper reaches of Sonamarg (10 Sq Kms) falling under upper Sindh Forest Range and upper reaches of Chatergul (10 sq Kms) falling under Manasbal Forest range.

Data Collection

Data was procured through:

1. Visits of PI: PI visited the area of study to determine the availability status of the herb. A target of 200 plants of *Rheum emodi* in 10 Sq km area in each area of study was fixed based on previous studies. (Annexure "A").

2. Interview and interactions with Locals/Nomads: PI took interview of people living in and around the area of the study (in the age group of 40-75 Years) through questionnaire in order to get their inputs regarding the presence of the herb in the area of study, its present status, uses and factors affecting its survival and availability. (Annexure "B")

3. Feedback from officials of Forest Department & Research Institutes: Information like present status of *Rheum emodi*, its market demand and factors affecting its survival was sought from experts in the field like forest department (Annexure "C"), Scientists/Research scholars of SKUAST-K, J&K, J&K SFRI, J&K SMPB working in Medicinal Plants sector through questionnaire (Annexure "D").

Observations

Visits of PI to the area of study (Table 1)

| % age of area under Forest Department | 70 | 14/20 |
| % age of area under wildlife Department | 30 | 6/20 |
| % age of area having natural habitat for *Rheum emodi* | 100 | 20/20 |
| % age of plants found by PI in Sonamarg Area | 6 | 13/200 |
| % age of plants found by PI in Chatergul Area | 7 | 15/200 |
| % age of target achieved | 7 | 28/400 |

Table 1: Visits of PI to the area of study. Target 200 Plants of *Rheum emodi* in 10Sq km area (Natural habitat) each of two areas of study.

| % age of people who know *Rheum emodi* is found in the area of study | 100 | 64/84 |
| % age of people using *Rheum emodi* as Traditional Medicine | 79 | 51/64 |
| % age of who think availability of *Rheum emodi* species have dwindled since last decade | 100 | 64/84 |
| % age of who think illegal extraction from forests is the cause of dwindling availability of the species | 75 | 49/64 |
| % age of who think lack of conservation and cultivation of *Rheum emodi* is the cause for declining availability of the species | 17 | 11/64 |
| % age of who think Environmental factors are responsible for declining availability of the species | 6 | 4/64 |

Table 2: Interview and interactions with Locals/Nomads. Sample size: 64 people (32 at each place).
to the States from where it is procured, is rapidly declining in nature. The threat perception of the species changes every single day. This highly beneficial herb, is under immense pressure to survive in natural habitat. The species is categorized as threatened. Three major causes found by the PI during the study for its decline were:

Illegal extraction, the major cause found by the PI during the study, for which almost 75% people, 100% Research Scholars, and even 22% Forest department officials (owing to their official constraints) voted to be one of the major causes for its dwindling species. The illegal extraction of high commercial and high demand species goes unabated in J&K. The Forest Department and the Law enforcement agencies have done a lot to stop the illegal extractions, but owing to the difficult terrains and lack of manpower, it is not possible to keep a check on all the areas. J&K State Medicinal Plants Board and Forest department invoked a blanket ban for extraction of some species, but find it difficult to stop the illegal extraction of these species. This has lead to an alarming statistics of the availability of the species in nature.

Lack of Conservation of the species was the 2nd important cause found for its decline. There is need of in situ conservation methods to be developed so that the species is safe within its natural habitat. J&K State Medicinal Plants Board had started a project of Vanaspati Van which was executed by the forest Department, in which 1465 Hectares of Forest land was taken under in situ conservation methods to be developed so that the species is safe within its natural habitat. If the conditions remain the same the species may be vanished after a decade.

The awareness programmes need to focus on the threats the local population in and around the natural habitats of the species.

The species of *Rheum emodi* is suffering from one or combination of more than one of the above factors. The threat status has rapidly increased from the last decade. The species which was put under ‘Threatened’ category is emerging to be an ‘Endangered’ one. Before 15 years people used to find more than 250 plants in the area of study, and now the status is that 15-18 Plants are found in the study area. If the conditions remain the same the species may be vanished after a decade.

- From the study conducted by PI, and data analysed, following observations have been inferred:
- The threat status of *Rheum emodi* has increased manifold from last 15 years.
- Illegal/Unsustainable extraction from the Forests is a major cause for dwindling species of *Rheum emodi*. Lack of understanding of sustainable harvesting/extraction has lead to disturbance of habitat, loss of diversity, reduced abundance and local declining of *Rheum emodi*.

### Table 3: Feedback from Scientists/Research scholars of SKUAST-K, IIIM J&K, J&K SFRI, J&K SMPB working in Medicinal Plants sector through questionnaire.

| Sample size: 7 scholars |  |
|------------------------|--|
| % age of Scholars giving *Rheum emodi* as status of High demand species | 100 | 7/7 |
| % age of scholars who think that the species of *Rheum emodi* is dwindling in J&K. | 100 | 7/7 |
| % age of scholars who think illegal extraction from forests is the cause of dwindling availability of the species. | 100 | 7/7 |
| % age of Scholars who think lack of conservation and cultivation of *Rheum emodi* is the cause for declining availability of the species. | 71 | 5/7 |
| % age of Scholars who think Environmental factors are responsible for declining availability of the species. | 28 | 2/7 |
| % age of Scholars who think Current status of threatened species be changed to Endangered species for *Rheum emodi*. | 100 | 7/7 |

### Table 4: Feedback from officers/officials of forest department through questionnaire.

| Sample size 9 officers |  |
|------------------------|--|
| % age of officers/officials who think *Rheum emodi* is a High demand species | 88 | 8/9 |
| % age of officers/officials who think that the species of *Rheum emodi* is dwindling in J&K. | 100 | 9/9 |
| % age of officers/officials who think illegal extraction from forests is the cause of dwindling availability of the species. | 22 | 2/9 |
| % age of officers/officials who think lack of conservation and cultivation of *Rheum emodi* is the cause for declining availability of the species. | 55 | 5/9 |
| % age of officers/officials who think Environmental factors are responsible for declining availability of the species. | 11 | 1/9 |
| % age of officers/officials who think Current status of Threatened species be changed to Endangered species for *Rheum emodi*. | 100 | 9/9 |

Data procured from Forest Department.
after power generation.

the potential to lead the employment/revenue generation for the State

the trade, cultivation, and value addition in the sector. The sector has

in Medicinal Plants Sector, and ensuring policy framework regulating

initiate steps at administrative level for encouraging entrepreneurship

so that the farmers/growers may find it feasible to cultivate these species

Rheum emodi

techniques and QPM for

and other endangered species,

of important components like Marketing, & processing should be a

appetite of the herbal industry commercialization and privatization

Forest Department, Medicinal Plants Board etc, all have obligations

of Medicinal Plants of Jammu & Kashmir. Research Institutes,

the study may hold true for other important Cis-Himalayan species

in unfamiliar habitats. Rheum emodi is not the only species suffering,

the model may hold true for other important Cis-Himalayan species

Medicinal Plants are natural resources, formulating a backbone

for AYUSH industry and treatment, which is achieving enormous

popularity among the masses, more in developed countries for its
curative and preventive efficacies more so for life style disorders. The

need of the hour is to promote, and propagate this natural wealth,

with innovations for their sustainability in their natural diversities,

as well as development of Agro techniques to swell their populations

in unfamiliar habitats. Rheum emodi is not the only species suffering,

this huge fatigue of the herbal industry commercialization and privatization

of important components like Marketing, & processing should be a

priority. Likewise, Research Institutes like Agricultural Universities,

IIIM (CSIR) J&K, Universities, should prioritize to develop good agro-
techniques and QPM for Rheum emodi and other endangered species,

so that the farmers/growers may find it feasible to cultivate these species

and add these species to their cash crops. Moreover, State Govt should

initiate steps at administrative level for encouraging entrepreneurship

in Medicinal Plants Sector, and ensuring policy framework regulating

the trade, cultivation, and value addition in the sector. The sector has

the potential to lead the employment/revenue generation for the State

after power generation.

Recommendations

Short term

1. Threat Status of Rheum emodi be changed from current

"THREATENED" to "ENDANGERED" Species.

2. The species should be included in the list of prioritized species of National Medicinal Plants Board under the category of

"75%" subsidy from the current "50%" for mass cultivation.

Long term

1. New areas for conservation of Rheum emodi be identified and projects to be implemented on public, private partnerships.

2. Measures to be taken for sustainable extraction/harvesting of the species from the Forests.

3. Strict laws are needed to curb the illegal extraction of the species.

Mass awareness programmes should be taken by J&K State

Medicinal Plants Board in collaboration with all line departments etc.

ecosystems.

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