

JUNIPERUS POLYCARPOS C. KOCH FORESTS AND ITS CONSERVATION STATUS IN
COLD DESERTS OF HIMACHAL PRADESH, NORTH WEST HIMALAYAS

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ABSTRACT

The article outlines the results of a study carried out for assessing the distribution and ecological status of *Juniperus polycarpus* C. Koch in cold deserts of Himachal Pradesh, comprising the districts of Lahaul and Spiti and Pooh Sub-division of Kinnaur district. A valley-wise inventory of the cold deserts under the species had been prepared and compared with the available records. Regeneration status and vegetative associates of the species in various valleys of the cold deserts have also been recorded. The results of study show that the species is under great threat due to the ever-increasing biotic pressure and poor natural regeneration. The article also suggested some measures to be initiated for its conservation.

Key words: *Juniperus polycarpus*, Distribution, Regeneration and cold desert

Introduction

Cold desert is a unique ecosystem, falling in the rain shadow zone, above the natural tree line and is generally described as a high altitude cold desert. In North-west Himalayas, cold deserts occur in Ladakh region of Jammu and Kashmir, Lahaul and Spiti, and Pooh sub-division of Kinnaur district of Himachal Pradesh. The cold deserts are one of the most ecologically fragile biogeographic zones in India (Rodgers and Panwar, 1988). The fragile and rugged nature of the cold desert ecosystem does not show much vegetal cover and hence the area appears to be very poor in terms of its plant diversity. The short growing season due to extreme climatic conditions which is around four and half months, further restrict the growth of vegetation in this region. Here, the juniper forests and its associated diversity of plants and animals constitute a unique ecosystem. These forests can be considered to be one of the world's oldest and extremely slow growing, often termed as the "Living Forest Fossils".

Five species of *Juniperus* were recorded from the Western Himalayas (Kaushal, 1994). However, the genus is represented by only one distinct tree species (*Juniperus polycarpus*) and three shrubby forms (*J. communis*, *J. squamata* and *J. indica*). In India the difference in opinion in identification of various *Juniperus* species of the Himalayas are primarily due to natural variation present within the species and also within the natural hybrids. They show much intra-

specific and inter-specific variation in plant form and size, ranging from shrubby forms to large trees. The taxonomy of *Juniperus* species, is therefore, often debated and the classification of *Juniperus* of Asia thus requires critical revision. The difficulties encountered and the difference in opinions, in identification of *Juniperus polycarpus* are perhaps partly due to the great variations within the species in its natural range of distribution (Dogra, 1986; Farjon, 1990). However, according to Takhtajan and Fedorov (1972), there are two subspecies, *excelsa* and *polycarpus*. Geographically and ecologically there is some overlap with the typical subspecies, but both *taxa* occupy for the greater part distinct ranges and habitats. Treatment as a subspecies, proposed by Takhtajan (Takhtajan and Fedorov, 1972; Takhtajan, 1980), seems therefore the best taxonomic judgment (Farjon, 1992). Additional major synonymy includes; *Juniperus polycarpus* C. Koch, 1849; *Sabina polycarpus* Ant. 1857; *Juniperus excelsa* Wall. 1880; *Juniperus macropoda* Boiss. 1884; *Sabina excelsa* (M.-Bieb) Ant. 1857; *Sabina religiosa* Ant. 1857; *Juniperus excelsa* var. *polycarpus* (K. Koch) Silba, 1984. Brandis (1907) refers to the juniper population in India as *J. macropoda* and *J. excelsa* as a synonym. These studies suggest that *J. polycarpus* is an early synonym of both *J. excelsa* and *J. macropoda* and that the two *taxa* are either two separate, closely related species or a single, variable species. For purposes of this manuscript, the designation *J. polycarpus* is used to refer to the population of *Juniperus* in the study area. Vidakovic (1991) reported *Juniperus polycarpus* from

Regeneration status and vegetative associates of *Juniperus polycarpus* in various valleys of cold deserts is under threat due to biotic pressure and need urgent conservation initiatives.

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Ladakh (Jammu & Kashmir) and in the tribal district of Kinnaur and Lahaul and Spiti in Himachal Pradesh.

Juniperus polycarpus K. Koch, (Family Cupressaceae) is one of the main indigenous tree species of the cold deserts of Himachal Pradesh which is locally known as shur, suru, shukpa or surukh in different valleys of the region. Natural forests of this species occur mainly as open woodlands of scattered trees. It offers multipurpose uses to the local inhabitants of the cold deserts regions of upper Kinnaur, Lahaul and Spiti and parts of Ladakh. Locals used its wood as fuel and timber; bark as roofing material and the leaves are often lopped to burn as incense. The species also holds the land against erosive forces including glacial avalanches and wind. Increasing biotic pressure and over exploitation of the species over the years has badly affected its population and range of its distribution, which otherwise is essentially required for eco-restoration of this fragile eco-system.

Material and Methods

Extensive surveys were conducted in cold deserts of North-West Himalayas comprising Pooh sub-division under Kinnaur Forest Division, Spiti Forest Division and Lahaul Forest Division in Himachal Pradesh for knowing the distribution, regeneration status and vegetative associates of *Juniperus polycarpus* plant specimens of vegetative associates were collected and identified by consulting the herbaria at Forest Research Institute, Dehradun (U.K.) and Himalayan Forest Research Institute, Shimla (H.P.), India and with the help of available floras (Aswal and Mehrotra, 1994; Polunin and Stainton, 1997). Detailed field observations regarding the drying of *Juniperus polycarpus* stands in cold deserts were recorded and composite soil samples at a depth of 0-30 cm. were collected from the affected and unaffected adjoining stands for ascertaining the ecological causes associated behind the drying. Soil samples thus collected were analyzed as per the standard procedure given by Jackson (1973).

Results and Discussion

Juniperus polycarpus K. Koch is a large gregarious, evergreen shrub or a moderate size tree, with a stout trunk, having resin canals in the leaves and wood. Rarely, the tree attains a height of more than 50 ft. and seldom does it reach to about 80 ft., usually monopodial but at times tends to become multi-stemmed. As is the case in the majority of the monopodial trees, the trunk is usually erected, straight and columnar, terete and sometimes buttressed. It has light open foliage and dimorphous leaves, with spreading sharp pointed leaves on lower branches, with scale-like leaves on the upper branches

and branchlets. The leaves are closely adpressed to the stem and possess a large resinous gland on the back. The tree rarely forms a clean bole, with the trunk often being crooked and gnarled. The bark is thick and scaly at the base with the colour of the bark being reddish-brown in young trees, and the hue turning towards grey in the older trees, exfoliating in long fibrous strips or plates. The tree grows at a very slow rate and ages considerably, may be over many a thousand years. The flowers are minute in size (male flowers 0.1-0.2 in. long), appear in spring and the fruit ripens in next fall. The fruit is a sub-globose, 2 to 5-seeded berry (0.25-0.35" in diameter), blue-black when ripe and resinous as well. It is better to collect the fruits as soon as possible after ripening to reduce losses by birds and animals and to the frequent snow avalanches in these parts. Seeds can be stored either as dried fruits or as cleaned seeds.

In Himachal, it is the only conifer tree species found in the Spiti valley, however in Lahaul Forest Division it is associated with other conifers like blue pine (*Pinus wallichiana*), deodar (*Cedrus deodara*) and even silver fir (*Abies pindrow*) and spruce (*Picea smithiana*) at a few places in Tindi Forest Range along the river Chenab. Other associates here also include *Betula utilis*, *Crataegus oxyacantha*, *Juglans regia*, *Populus ciliata* and *Salix alba*, etc. In Pooh Forest Range under the Kinnaur Forest Division it is associated with stunted formations of *Pinus gerardiana*, *Populus caspica*, *P. ciliata*, *Prunus armeniaca* and *Fraxinus xanthoxyloides*. Its distribution under the cold desert areas of Pooh Sub-Division was observed at Tashigang, Dubling, Ropa Kanda, Giabong Kanda, Shasho, Asrang, Labrang, Nesang, Lambar, Kunu Charang and Pooh Kanda.

In Spiti Forest Division majority of the terrain is barren with no vegetation and tree cover as such. *Juniperus polycarpus*, here is in its extinct state (Negi, 1996), with degraded old trees dotting a few sites, especially protected near habitations. The Spiti Forest Division comprises of only two forest ranges viz. Kaza and Tabo Forest Range. The Kaza Forest Range is characterised by the absence of any tree cover, with only a few scattered shrubby species. A very open xerophytic juniper formation is met with in the innermost valleys of Kaza (Rangrik and Shego), associated mainly with dwarf shrubby vegetation of *Caragana-Lonicera-Artemisia* formation (Osmaston, 1922) along with the sporadic presence of *Ephedra gerardiana*. Likewise in Tabo Forest Range majority of the landscape is bereft of any vegetation, with sporadic incidence of spiny shrubs and herbs during summers. Pin valley is unique in the sense that it is the only green valley in Spiti. Big size and much-exploited trees of juniper dot the vicinity of villages

Sangam, Tangti Yongma, Tangti Gongma and Gulling. There is however a larger population of scattered small sized trees of junipers, deeper into the Kheer nallah, at an altitude of 3500 mts to 3800 mts. A thick, lone patch of juniper is found in the Ula nallah in the Pin Valley National Park, associated with *Betula utilis* and a thick growth of *Hippophae rhamnoides* sub sp. *turkestanica*. The Schling block comprises mainly of the inaccessible Lingti river valley. The vegetation in the entire valley is very sparse, discontinuous and rugged, dominated by bushes forming spinescent cushions. Big sized trees of junipers are located along habitations only, while the small sized, bushy forms are scattered in deeper, inaccessible valleys. Small populations of this juniper are located near villages at Lalung, Rama-Siulling, Chubrang and Tissu nallah. However, the juniper population increases in the Phibu, Sharma and Kibbri forests, located in the deeper inaccessible valleys of the river Lingti. The trees found here are scattered, dwarfed and bushy; being associated with *Hippophae* spp, *Rosa webbiana* and in higher damp locations the birch, *Betula utilis* joins in small numbers. The last patch of this juniper forest in the Lingti valley is at Dangmarna forest, situated at an altitude of 3800 m, below the Chaksa-chin La. The best condition of the juniper trees is met with at Mane village, in another portion of the Schling block. Here, the population of the trees is small, but are in a healthy condition, primarily due to high religious sentiments. Few good quality trees of junipers are also found on the opposite side of the valley at Lundup Din (Suman Dogri). In the Poh beat of Tabo block, juniper is found surrounding Poh village and the deeper streams near its vicinity. The condition of the trees near the village is one of over exploitation, where the branches have been lopped and the bark peeled off in shreds. The trees seem to be of very old age, which strengthen the fact that, in the past there was a rich juniper forest in this region. Juniper population increases considerably in Poh nallah and the Pomerang nallah. However, here the trees are smaller in size, mainly pole crop and bushy in appearance. Other pockets of small, bushy and scattered junipers are the deeper sub valleys of Ladang, Kukuma (Near Poh), Tabo and Kurith.

In Lahaul Forest Division scattered population of *Juniperus polycarpus* were found under Tindi and Udaipur Forest Range and on the slopes of Darcha under Keylong Forest Range. Its population was mostly observed on right river bank side of Chandra and Chenab river and consists of mainly poles intermitted with a few saplings. Towards the upper limits the trees were bushy in appearance with stunted growth. Regeneration is almost negligible and the undergrowth is also scanty and comprises of a few shrubs, herbs and grasses. The

maximum population of this tree juniper was recorded at Stingri, near Keylang. The Keylang range comprises of three beats viz, Keylang, Jispa and Kardong. The major distribution of juniper forest is around Keylang with a fairly thick patch at Stingri. In other localised places of Kardong, Darcha, Jispa, Barbog, Namchii, Lapkiang, Piukar and Jolling, the crop consists of poles mainly intermitted with a few saplings towards the upper limits the trees give a bush like appearance with stunted growth. The Udaipur Range comprises of three blocks viz., Udaipur, Trilokinath and Miyar. The majority of the portion has a southern aspect, except for the portion draining into the Miyar Khad, which has an eastern aspect. The region is represented by scattered growth of juniper scrub, depicting stunted growth. The forest on the left bank of the Miyar Khud towards the north-east of Karpal village, between Wang and Karpal nallahs, is very open and cut irregularly in well defined strips by huge snow avalanches. On the right bank of the Chandrabhaga, near Mudgram, this species is associated with *Cedrus deodara*, *Betula utilis* and *Pinus wallichiana*.

The *Juniperus polycarpus* forest in India has multiple values for the region of inhospitable climatic conditions. It provides fuel-wood for the local populace and is sometimes also used as timber, which is a scarce commodity in these parts. The young branches are used in medicine for remedy of kidney trouble. The fruits and young branches contain aromatic oil, which possesses carminative, stimulant and diuretic properties. This aromatic oil is extracted as juniper oil, for use in the medicine industry (Chauhan, 1999). The young tender branches and branch-lets are lopped extensively by the local populace for burning, as it exercises a pleasant deodorising and cleansing influence (incense, dhup), which is considered religious and sacred in the region of its occurrence. Also, the wood is considered very durable and of good quality (Vidakovic, 1991). Moreover, this juniper species is well adapted to withstand extremes of cold and desiccation and plays a key role in the ecology of cold deserts through binding the soil.

The understory composition varies from place to place and reflects both regional floristics and adjacent vegetation types. A characteristic element found in *J. polycarpus* stands is that at places it supports luxuriant undergrowth, while at some stands the association is absent. The undergrowth frequently consists of three steps: tall shrubs, medium shrubs/ tall herbs, and low herbs. The uneven age distribution of this species in some stands shows indications of it being self-perpetuating without necessarily requiring a major rejuvenating disturbance. But, the ever-increasing anthropogenic pressure over the years, coupled with the

lack of co-ordinated management, has left these *Juniperus* forest in a woeful condition. The commonly met plant species associated with the *J. polycarpus* are:

Trees: *Betula utilis*, *Elaeagnus latifolia*; (In Pattan valley of Lahaul, it is found in association with *Cedrus deodara*, *Pinus wallichiana*, *Abies pindrow*, *Betula utilis* along with *Populus ciliata*, *P. balsamifera*, *Juglans regia* and *Prunus armeniaca* near habitations).

Shrubs: *Artemesia brevifolia*, *A. dracunculus*, *A. siversiana*, *A. scoparia*, *A. salsoloides*, *Astragalus coluteocarpus*, *Atriplex crassifolia*, *Berberis jaeskeana*, *B. aristata*, *Caragana versicolor*, *Capparis spinosa*, *Clematis tibetana*, *Colutea nepalensis*, *Cotoneaster nummularia*, *C. acuminatus*, *C. affinis*, *Ephedra gerardiana*, *Fraxinus xanthoxyloides*, *Hippophae rhamnoides* subsp. *turkestanica*, *H. salicifolia*, *Lonicera spinosa*, *L. obovata*, *L. microphylla*, *L. alpigena*, *L. asperifolia*, *Myricaria germanica*, *Ribes alpestre*, *R. orientale*, *Rosa moschata*, *R. webbiana*, *R. macrophylla*, *Salix flagellaris*, *Sorbaria tomentosa*.

Herbs: *Aconitum heterophyllum*, *Agropogon repens*, *Allium carolinianum*, *A. przewalskianum*, *Anemone* spp., *Aquilegia fragrans*, *Arnebia benthamii*, *A. euchroma*, *A. guttata*, *Artemesia brevifolia*, *A. parviflora*, *Astragalus chlorostachys*, *A. candolleanus*, *A. hoffmeisteri*, *A. melanostachys*, *A. rhizanthus*, *Chenopodium album*, *Codonopsis ovata*, *Cynoglossum wallichii*, *Geranium pratense*, *G. wallichianum*, *G. himalayense*, *Heracleum candicans*, *Medicago sativa*, *M. falcata*, *Melilotus officinalis*, *Mentha longifolia*, *M. sylvestris*, *Nepeta discolor*, *N. longibracteata*, *N. floccosa*, *N. eristachya*, *Pedicularis cheilanthis*, *P. oederi*, *P. punctata*, *P. pyramidata*, *Picrorhiza kurroo*, *Podophyllum emodi*, *Potentilla anseriana*, *P. atrosanguinea*, *P. bifurca*, *P. cuneifolia*, *P. desertorum*, *Rumex nepalensis*, *Rubus saxatilis*, *Taraxacum officinale*, *Trifolium pratense*, *T. repens*.

Grasses: *Agropyron* spp., *Agrostis* spp., *Poa* spp.

The absence of natural regeneration is the most important problem in these juniper forests. Much of this problem is mainly due to the seed physiology and the high influx of anthropogenic pressures. Seedlings appear naturally to a varying extent but the great majority perishes, probably from drought. A heavy snowfall has been found to assist regeneration by increasing the moisture in the soil, while in fairly moist, sheltered situations seedlings occasionally spring up in some quantity (Troup, 1921). It's usually found more or less gregariously in open forests, where moderate amount of moisture present in the soil. It is excellently regenerating naturally in many parts (Stingri, Jispa, Pangrang,

Kukumsari, Pattan valley) of Lahaul sub-division, mostly east facing slopes. However, in Pooh Sub-division and Spiti valley its natural regeneration was very scanty or almost negligible probably due to problem in seed germination. This may be due to the immature embryo or hard seed coat. Field observations have shown that the regeneration occurs mostly along the river and that too on alluvial soil deposits of rivers and of glacial moraines. These factors might have contributed towards providing the least possible requirements for natural regeneration of the species.

The *Juniperus* forests have been exposed to various injuries caused by biotic and abiotic factors, as explained below:

Abiotic Factors: The junipers, over the ages, have suffered greatly by the vagaries of nature, such as snow and rockslides, avalanches, high wind velocity and the extremes in temperature. There is visible damage of snow to the trees. The boulders rolling from the steep cliffs above as a result of snowmelt injure most of the trees. Snow damages the tree crop by bending or breaking the trees by its weight. The damage being more prominent in congested pole crop and in saplings. Avalanche damage is very significant on a larger scale, breaking and uprooting trees and saplings. At a few sites the damage is caused by the sliding of the glacial avalanche on the opposite slope of the mountain, as found at Thirot where the majority of the trees have perished due to the backlash of the glacial avalanche on the opposite facing slope. The other natural factors that contribute to the damage are the steep slopes; strong winds, negligible rainfall and weathering by the strong ultra-violet sun rays.

Biotic Factors: *Juniperus* has suffered greatly on account of heavy and irregular lopping and the maximum damage to these *Juniperus* forests is visible near habitations. The lower branches of the trees are lopped, leaving it exposed to bear the wrath of the high-speed winds or the fury of an avalanche. The main requirements of the people are timber, fuel wood and fodder, which under present circumstances is unable to meet the requirement of the people from the available resources. The weather conditions being severe, has resulted in a local custom of hoarding stocks of firewood and fodder, resulting in excessive stress on the forest resources. Harmful effects of excessive grazing are more pronounced in the alpine regions. Continuous overgrazing in these regions has more or less destroyed the soil cover, contributing to the failure of natural regeneration of the species. There were no indications of any serious damage caused to the juniper trees by insects, but the fungus *Barchyella deformis* was found in

a few sites, recognised by the characteristic orange tassels formed on the young shoots. Additionally, the tree is also susceptible to the attack of a partial parasite, *Arceuthobium* (dwarf mistletoe), which causes considerable damage to the tree. Signs of infestation in host trees include growth loss, deformities (witches' brooms) and tree mortality (Ceisla, 1993 or 1993). The dwarf mistletoe is of common occurrence along the upper Chenab river and its tributaries the Chandra and Bhaga in the greater Lahaul valley.

Drying of *Juniperus* stands in Lahaul Valley: Drying in young crops of *Juniperus excelsa* was observed in approximately 5 hectare area of DP 11, Shisher Gompa of Keylong Forest Range under the Lahaul Forest Division. The site is east facing in direction with the affected crops of the juniper mostly in sapling stage having an average diameter of around 15 cm. Here, the exudation of resins from the tree was found more in comparison to the unaffected crop. Old leaves/foilage was dried, however, reoccurrence of new leaf foliage was observed. No such type of symptoms was observed in those trees growing across the water channel and shady portion of the site. The soil of the affected stands (1.74%) containing less moisture content in comparison to the unaffected ones (4.54%). Drought is usually associated with low soil moisture, its injurious effects often are greatly increased by atmospheric factors such as low humidity, high temperature and wind, which favors high rates of transpiration and increase the severity of internal water deficits. Growth of plants probably is limited more often by internal water deficits than by any other single internal factor. The overall effect of internal water deficits is to reduce vegetative growth but this is brought about both directly and indirectly because water deficits affect almost every process occurring in tree. pH of the affected stand (8.76) was slightly more basic in comparison to the unaffected one (8.47) whereas electric conductivity of the affected stand (1.22 mS) was less in comparison to the unaffected one (1.25 mS). The details of the soil properties of the site are given in Table-1. It is concluded that the main factor associated with drying of the juniper trees are water deficiency/ drought and low humidity, which were due to climate changes in the form of low snow fall and increase in temperature.

Juniperus woodland is a distinct habitat in the cold

deserts of North West Himalayas. Although biotic and abiotic factors are the components of our natural ecosystems but here, they are acting either alone or in combination and have been effecting on the health, survival and productivity of these forests. In the associated areas of these valleys, dwarf mistletoe infections occur in almost all forests and there is high potential for tree to tree spread. Several methods exist for control of the dwarf mistletoe spread in related species, including mechanical and chemical controls. Chemical applications have been effective but the monetary cost in treating the trees will be unpractical. Manual removal of infected individuals by pruning or removing infected trees has also shown to limit the rate of spread of dwarf mistletoe (Johnson, 1998). This method is very labor intensive but, as the cost of chemical treatment is a limiting factor, pruning and cutting of the heavily infected trees and or their branches is the only cultural remedy available.

The *Juniperus polycarpus* forests are under threat in cold deserts of the Himachal Pradesh especially in Spiti Forest Division due to over exploitation of the species for meeting local needs of fuel wood, and its foliage is heavily lopped in the entire cold deserts for using as in essence/ 'dhoop' which was one of the major cause of dwindling its natural population. Its natural population would become extinct from its natural habitat, if the practices of removal of the foliage would be continued. The management can launch some scheme to prepare fuel efficient stoves and have them distributed among the local inhabitants to reduce the fuel wood pressure. Tribal communities especially women are playing an active role in its conservation in Lahaul valley though understanding the importance of the species. In Spiti, it is 'Buddhism', the peace loving religion practiced by the people who are playing a vital role in the conservation of the little sporadic populations of the species left. They now protect the tree and worship it, removing little part of the foliage strictly for religious purposes. Efforts should be made to enhance the germination percentage of the juniper seeds and raise seedlings for afforestation of the degraded forest patches. A study should be undertaken for valuation of goods and services accruing from the juniper forest ecosystem and the results shared with the tribal community for their awareness.

Table 1: Detail of the soil properties

Stand	pH	E.C. (mS)	Soil Moisture (%)	Organic carbon (%)	Available Nitrogen (kg/ha)	Available Phosphorus (kg/ha)	Available Potassium (kg/ha)
Affected	8.76	1.22	1.74	0.49	229.60	83.10	612.00
Unaffected	8.47	1.25	4.54	0.44	184.80	95.40	564.00

Conservation of the cold desert biodiversity is contingent on protecting the interconnected processes in the North West Himalayan ecosystem. For instance, several faunal species exhibit altitudinal seasonal migrations and depend on contiguous habitats that permit these movements. Moreover, the integrity of the watersheds of the Himalayan rivers, which originate in these high mountains ranges, depends on the intactness

of habitat, from the high elevations to the lowlands. If any of the habitat layers are lost or degraded, these processes will also be disrupted. Sincere efforts are required to improve the condition of the juniper forest ecosystem, in order to conserve biodiversity and increase the ecosystem's contribution to sustainable development in the fragile cold deserts of the North West Himalayas.

ज्यूनीपेरस पॉलीकार्पस सी. कौच फारेस्ट और उत्तर-पश्चिमी हिमालय में हिमाचल प्रदेश के शीत रेगिस्तानी भागों में इन वनों की संरक्षण स्थिति

विनीत जिस्तू तथा आर.एस. रावत

सारांश

इस लेख में हिमाचल प्रदेश के "शीत रेगिस्तानी जिलों यथा: लाहौल और स्पीती तथा किन्नौर जिले के पूंछ उप-प्रभाग में ज्यूनीपेरस पॉलीकार्पस सी. कौच के वितरण तथा पारितंत्रीय स्थिति पर किये गये अध्ययन के परिणामों को रेखांकित किया गया है। शीत रेगिस्तानी क्षेत्र में इस प्रजाति की उपस्थिति को घाटियों के अनुसार जांचा गया है और उपलब्ध रिकार्ड से प्रजाति की वर्तमान सम्पदा सूची तैयार की गई है। शीत रेगिस्तान की विभिन्न घाटियों में इस प्रजाति से संबंधित वनस्पतियों की पुनरुत्पत्ति स्थिति रिकार्ड की गई है। अध्ययन के परिणामों से पता चलता है कि कमजोर प्राकृतिक पुनरुत्पत्ति और बढ़ते हुये जैविक दबाव के कारण यह प्रजाति गंभीर रूप से खतरे में है। लेख में इस प्रजाति के संरक्षण हेतु उपाय भी सुझाये गये हैं।

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