

Rationale For Jeopardizing: The Aphrodisiac Fungus *Ophiocordyceps sinensis* in India

Gaurav Salaskar, Taufiq Shaikh, Asmita Mestry and Nitin Labhane

Department of Botany, Bhavan's college (Autonomous), Andheri (W)
gauravsalaskar007@gmail.com

ABSTRACT

Ophiocordyceps sinensis, which belongs to the family Cordycipitaceae, also known as Himalayan viagra, is an endoparasitoid fungus. The medical uses of *O. sinensis* indicate potential advantages such as immune support, anti-inflammatory characteristics, aphrodisiac enhancement, libido enhancement, anti-oxidant properties, respiratory health, stamina, and energy enhancement. Though it's medicinally and economically important, it is listed as an endemic herb on the IUCN red list of threatened species, and there is also a threat to the decline of this species in India. The reason for the decline of *O. sinensis* is influenced by human activities including overharvesting, tourism, the black market, illegal collection and supply, and other environmental issues like climate change and pollution. The purpose of this study is to draw attention to various reasons for the decline in the population of *Ophiocordyceps sinensis*.

KEYWORDS: Cordyceps, conservation, environmental factors, human activities

INTRODUCTION

Ophiocordyceps sinensis, an interesting endoparasitic fungus with a unique ecological habitat and medical value, is a member of the Ophiocordycipitaceae family. Known by many names, including "Himalayan Viagra," "Yarsagumba," or "Caterpillar fungus" (Wei et al., 2021). The high-altitude areas of the Tibetan Plateau and its neighboring regions, which include parts of India, China, Nepal, and Tibet, are home to this species in its natural habitat. It grows well in high-altitude regions in India, including Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh (Winkler, 2009). *Ophiocordyceps sinensis* has long been valued for its many beneficial pharmacological qualities in traditional Chinese medicine (TCM) (Chen et al., 2013). For millennia, people have utilized mushrooms for food, medicinal, and spiritual purposes. *Ophiocordyceps sinensis* is suggested by traditional healers in Sikkim for a number of health advantages since it is said to enhance vitality, endurance, and general well-being (Panda & Swain, 2011). *Ophiocordyceps sinensis* pricing fluctuates widely based on availability, ranging from NR 30,000 to 60,000 per kg in Nepal's local areas. In contrast, markets in Tibet and India price it above Rs one lakh (more than US \$2000) per kilogram. On the global market, *Ophiocordyceps sinensis* is anticipated to be valued between one and two million rupees per kg (US \$20,000–40,000) (Sharma, 2003).

The world's most expensive biological commodity right now is *Ophiocordyceps sinensis*, which is worth more than gold by weight. Because of its explosive demand and sharp price increases in recent years, the species is seriously threatened in its natural habitat (Shrestha & Bawa, 2013). The purpose of this study is to draw attention to the several human-caused reasons that are leading to the decrease in *O. sinensis*. These variables include overharvesting, illegal trading, tourism, and environmental issues, including pollution and climate change. It emphasizes how urgent conservation initiatives and sustainable management techniques are needed to ensure the continued existence of this priceless species.

DATA AND METHODOLOGY

The methodology entails Gather and go over current research on *O. sinensis* that has been done, including studies, reports, publications, and research papers. Pay attention to details regarding the fungus's social and economic importance, ecology, dangers, and medicinal qualities. To determine the primary threats that *O. sinensis* faces in India, analyse and synthesise the data that has been collected.

Result

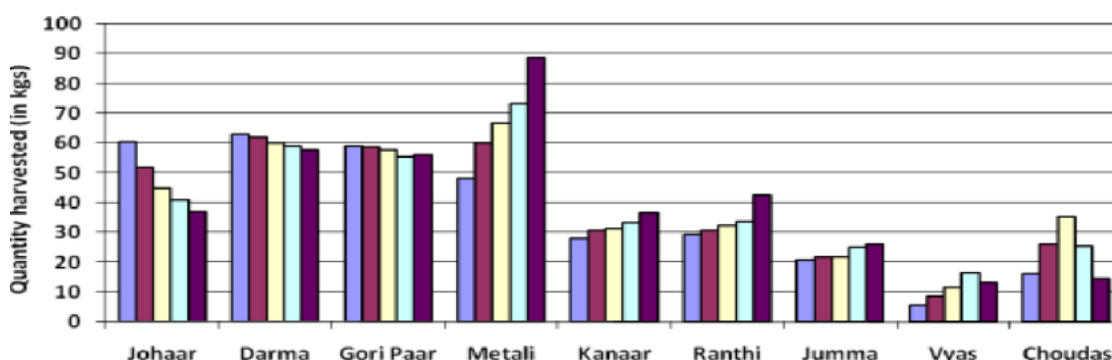


Figure 1: The amount of Yartsa Gunbu that was gathered between 2008 and 2012, a span of five years. An approximation of the overall yield based on the informants (N = 2511) [Negi, Chandra et al. (2016)]

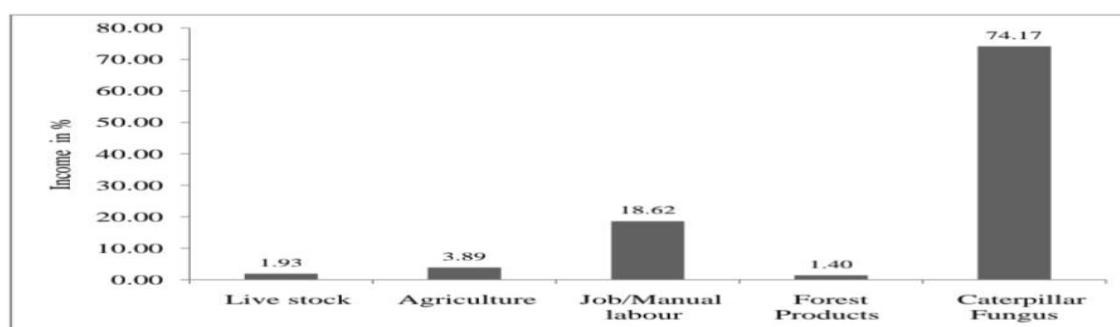


Figure 2: Income of harvesters during 2015 [Vihar, Aranya, and Dehradun Kaulagarh. Conserving *Ophiocordyceps sinensis* in the Nanda Devi Biosphere Reserve, India.]

DISCUSSION

Overharvesting:

The scarcity of alternative income sources has led to a heavy dependence on *O. sinensis*, resulting in its overexploitation. *O. sinensis* plays a significant role in contributing to household incomes in diverse Himalayan regions (Pradhan et al., 2021). A number of places in the vast Pithoragarh district, which is located in Uttarakhand's Kumaun Himalaya region, are affected by excessive exploitation. (Fig. 1) distinctly depicts the decline in the harvested quantity of Yartsa Gunbu in the Johaar, Darma, and Gori Paar valleys within the Pithoragarh district of Uttarakhand state. This decline prompts inquiries into its cause. These landscapes exemplify extensively explored habitat sites in the presence of Yartsa Gunbu (Negi et al., 2016). There is a huge influx of harvesters due to the caterpillar fungus's high income, which is causing aggressive harvesting. Because it may produce larger cash revenue more quickly than other sources, the caterpillar fungus accounts for about 74.17% of harvesters' cash income (Fig. 2). This shift in livelihood prospects is seen in the Nanda Devi Biosphere Reserve (NDBR), which is located in Uttarakhand's Western Himalayan areas of Garhwal and Kumaon (Vihar, A., & Kaulagarh, D. Conserving *Ophiocordyceps sinensis* in the Nanda Devi Biosphere Reserve, India.).

Illegal Trading:

The informal and covert activities that make up the majority of the trade and channels in the Indian subcontinent's *O. sinensis* harvest lack transparency. It is difficult to regulate or monitor the collecting and trade practises of *O. sinensis* in the area because these procedures are subterranean and lack clear visibility or regulation (Sharma, 2003). Illegal trading of this resource occurs in Sikkim (Pradhan, 2016). The illicit collection of *O. sinensis* by army porters and Tibetan yak herders presented collectors in Gnathang with a new challenge. Despite the fact that Sikkim made the informal trade in *O. sinensis* public in 2008, the tendency has continued despite government regulations (Pradhan et al., 2021).

Tourism Impact:

Tourism is vital for destination growth, but uncontrolled infrastructure development negatively impacts Himalayan states' charm. Uttarakhand faces tourism-related challenges like aesthetic pollution, biodiversity loss, and climate impacts due to unplanned development (Rana & Kumar, 2016). Uncontrolled tourism has seriously contaminated the water and soil, endangering the high-altitude Wetlands area of Arunachal Pradesh (Medhi & Saikia, 2020). The detrimental effects of tourism growth on Sikkim's delicate mountain ecology need to be addressed immediately. experiences increasing pressure from tourists on its wildlife and plants. This demonstrates how the quick rise in tourism may have a direct impact on the depletion of

natural resources (CIDIETRI, A. Environmental degradation in Sikkim with special reference to tourism).

Environmental Challenges - Pollution and Climate Change:

The life conditions of species in a given location are influenced by the weather and climatic differences in that area. (SAHOO, 2009). The population reduction of *O. sinensis* is attributed in part to climate change. In the last ten years, Sikkim collectors have noticed observable changes in the climate, including less predictable rainfall patterns, less snowfall, and warmer winters (Pradhan et al., 2021).

CONCLUSION

The IUCN Red List of Threatened Species lists *Ophiocordyceps sinensis* as facing numerous obstacles, such as overharvesting for financial gain, illegal trading, the effects of tourism, and environmental problems such as pollution and climate change. Because of overharvesting, the number of *O. sinensis* has significantly decreased in certain locations as a result of the great reliance on them for income. Regulation is challenging because of the profitable nature of *O. sinensis*, which has led to its illicit collection and sale.

The Himalayan states have also suffered from unchecked tourism, which has damaged the ecology and reduced their natural attractiveness. Issues including environmental contamination, loss of flora and fauna, and degradation of the landscape have been brought on by the increase in tourists. This has put further strain on the area's resources, contaminating the land and water. The growth of *O. sinensis* has also been influenced by pollution and climate change.

A comprehensive approach is required to overcome these difficulties. It's critical to enhance resource management, control the trade and harvesting of *O. sinensis*, and create environmentally friendly tourism practices. It's also critical to combat pollution and lessen the effects of climate change. It is imperative that local communities, governments, and environmental conservation organisations work together to tackle these problems and protect the Himalayan regions and their priceless natural resources in the future.

REFERENCES

1. Chen, P. X., Wang, S., Nie, S., & Marcone, M. (2013). Properties of *Cordyceps sinensis*: a review. Journal of Functional Foods, 5(2), 550-569.
2. CIDIETRI, A. Environmental degradation in Sikkim with special reference to tourism.
3. Medhi, B., & Saikia, S. (2020). High altitude wetlands in Arunachal Pradesh: A review on its importance and way forward for conservation and management. Journal of Critical Reviews, 7(3), 618-622.

4. Negi, Chandra & Pant, Mukesh & Joshi, Paras & Bohra, Sachin. (2016). Conserving the caterpillar fungus [*Ophiocordyceps sinensis* (Berk.) G.H. Sung et al.]: A case study of habitat ecology and sustainability in district Pithoragarh, Western Himalaya, India. International Journal of Biodiversity and Conservation, x. DOI: 10.5897/IJBC2014.0742.
5. Panda, A. K., & Swain, K. C. (2011). Traditional uses and medicinal potential of *Cordyceps sinensis* of Sikkim. Journal of Ayurveda and integrative medicine, 2(1), 9–13.
6. Pradhan, Bharat & Sharma, Ghanashyam & Chettri, Santosh & Chhetri, Dhani. (2021). Distribution, Harvesting, and Trade of Yartsa Gunbu (*Ophiocordyceps sinensis*) in the Sikkim Himalaya, India.
7. Pradhan B. K. (2016). Caterpillar Mushroom, *Ophiocordyceps sinensis* (Ascomycetes): A Potential Bioresource for Commercialization in Sikkim Himalaya, India. International journal of medicinal mushrooms, 18(4), 337–346.
8. Rana, G., & Kumar, S. (2016). Prospects and problems of tourism industry in Uttarakhand. Tourism Dimensions Innovations, Challenges & Opportunities, Edition: 1st, 277-284.
9. SAHOO, P. K. “Effect of Environmental Pollution on Indian Glaciers and its Solution” an Over view on Chemistry. ENVIRONMENT CONSERVATION, CHALLENGES THREATS IN, 31.
10. Sharma, Subrat. (2003). Trade of *Cordyceps sinensis* from high altitudes of the Indian Himalaya: Conservation and biotechnological priorities. CURRENT SCIENCE-BANGALORE-. 86. 1614-1618.
11. Shrestha, U. B., & Bawa, K. S. (2013). Trade, harvest, and conservation of caterpillar fungus (*Ophiocordyceps sinensis*) in the Himalayas. Biological Conservation, 159, 514-520.
12. Vihar, A., & Kaulagarh, D. Conserving *Ophiocordyceps sinensis* in the Nanda Devi Biosphere Reserve, India.
13. Wei, Y., Zhang, L., Wang, J., Wang, W., Niyati, N., Guo, Y., & Wang, X. (2021). Chinese caterpillar fungus (*Ophiocordyceps sinensis*) in China: Current distribution, trading, and futures under climate change and overexploitation. The Science of the total environment, 755(Pt 1), 142548.
14. Winkler, D. (2009). Caterpillar Fungus (*Ophiocordyceps sinensis*) Production and Sustainability on the Tibetan Plateau and in the Himalayas. Asian Medicine, 5(2), 291-316.