

***Cordyceps sinensis* (Berk.) Sacc.: Economy, Ecology, and Ethno-Mycolology of Yartsa Gunbu, a Medicinal Fungus Endemic for the Tibetan Plateau**

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Collection, trade, and use of Yartsa Gunbu (dbYar rTswa dGun 'Bu), “summer grass-winter worm” as the *Cordyceps sinensis* (Caterpillar fungus) is known to Tibetans, has a long-standing history in Tibetan medicine and culture. Although ancient local traditions warn that digging of Yartsa would provoke local spirits, its collection dates back centuries. It has been, and is now more than ever, one of the most important sources of income for rural Tibetans, especially nomadic communities, who often derive over 50% of their annual cash income from its collection in spring and early summer.

The 15th century scholar and doctor Zurkhar Nyamnyi Dorje [1439–1475] mentions Yartsa Gunbu in his text “Oral Instructions on a Myriad of Medicines [*sic*]” (Man nGag bYe Ba Ring bSrel). However, according to some Tibetan doctors, it might have been recorded under a different name

in the “four Tantras” (rGyud bZhi) by Yuthok Yontan Gonpo (8th to 11th century). In Tibetan materia medica, *Cordyceps sinensis* is placed in the category of “medicinal essences” (rTsi sMan), which includes several tonics. It is used for general strengthening, boosting the immune system, and virility and is prescribed for kidney and heart problems. It is also used for treatment of hepatitis B. In Tibetan medicine Yartsa is prescribed mostly in compound remedies, which contain a variety of ingredients to balance each other, thus optimizing their efficiency and minimizing side effects.

Field studies in Ganzi Tibetan Autonomous Prefecture, Sichuan (1999–2004), and Nyingchi (Linzhi) prefecture, Tibet AR (2005), analyze collection techniques and trends, local markets and their participants, and the quantity and value of the harvest. Individual specimens are sold by collectors

for 1–5 Yuan (1999) to 4–10 Yuan (2004). Results are contrasted to Chengdu and Lhasa market prices, which peaked at 40,000 Yuan/kg (\$4,900) in early 2004. The market is driven by demand in lowland China, where Yartsa Gunbu is known in Mandarin as “dong chong xia cao,” a verbatim translation of its original Tibetan name.

The mycology/biology of *Cordyceps* and Thitarodes as well as the geo-ecology of their habitat are presented. *Cordyceps sinensis* is a fungus parasitizing on a range of ghost moth larvae of the Thitarodes (Hepialus) genus, which live in alpine grassland ecosystems of the Tibetan Plateau. *C. sinensis* is distributed on grasslands that receive a minimum of 350 mm average annual precipitation. It is to be found in an altitude of 3300–5000 m rising from the east to the west of the plateau. Locally it occurs within an altitudinal range of 500 m around the potential treeline. Tibetan’s reliance on livestock herding has increased the habitat of *Cordyceps* substantially through continuous expansion of its pastoral areas at the expense of forest ecosystems.

While collectors complain about increased com-

petition and intrusion of outsiders during collection season, some researchers and government agencies worry about the sustainability of present harvesting and favor regulation beyond current collection fees and licenses. Inspecting freshly dug specimens in Kangding and Lithang, it was apparent that at the onset of the collection season sporocarps are collected before they have had the chance to mature their asci cells and release spores.

In this context, it needs to be taken into account that semi-artificial production of *Cordyceps sinensis*, whereby caterpillars are bred and exposed to *Cordyceps* propagules, be it indoors or outdoors, is being carried out successfully on an experimental basis in the Tibetan areas. Overall, the current pressure on natural populations of *Cordyceps sinensis* seems not to have seriously endangered the resource. However, ever increasing harvest pressure and the absence of reliable baseline data clearly necessitates more research to formulate sound management strategies to secure the long-term survival of *C. sinensis*, a valuable resource especially for marginalized Tibetan families and mankind in general.