

Mineral Elements in a Succulent Plant Species, *Orostachys spinosa* L. (Crassulaceae)

Shagjjav Oyungerel¹ and Dondog Purev²

¹Department of Botany, Faculty of Biology, National University of Mongolia, Ulaanbaatar, 210646, Mongolia, E-mail: oyungerel@biology.num.edu.mn

²Department of Biochemistry and Bioorganic Chemistry, Faculty of Biology, National University of Mongolia, Ulaanbaatar, 210646, Mongolia, E-mail: purev_21@yahoo.com

Abstract

Nine mineral elements (in oxide form) were revealed in the ash of leaves and stems of *Orostachys spinosa*. The content of Ca was the highest (62.63%), while the contents of other elements, such as K, Mg, P, Si (varied between 4.63 and 11.96% of absolute dry weight), S, Fe, Mn, Zn (varied between 0.05 and 2.89%) were relatively lower. After estimation of the content of mineral elements (in absolute dry weight) of *O. spinosa*, we revealed that the Ca, Fe, and Mn were relatively higher in *O. spinosa* than those in the other plants.

Key words: ash, element content, medicine, *Orostachys spinosa*

Introduction

A succulent plant species, *Orostachys spinosa* L. is growing in the steppe zone of Mongolia and other regions of Central Asia. Despite of its use in traditional medicine for many years, there are very few studies on medicinal values of this plant. Therefore, it is important to conduct a specific research on this species. The objective of our research is the determination of the macro- and microelements in the ash of *O. spinosa*, in order to define the chemical elements with medicinal values.

Before this work, we discovered Crassulacean Acid Metabolism (CAM) in a native Asian genus, *Orostachys* (Oyungerel *et al.*, 2004). The species studied here, *O. spinosa* also shows the CAM plant characters. The main characteristics are the higher night- and lower daytime acidity values, the leaf stomata open during the night and the higher transpiration intensity at night time than daytime. Due to ecological factors of the environment and duration of growing season, sometimes, CAM species easily switch to other types of photosynthetic pathway. However, *O. spinosa* keeps its CAM characteristics throughout the growing period and regardless of changes in the environmental conditions (Oyungerel *et al.*, 2004).

The CAM plants have ability to keep water in

their cells, can endure dry and hot conditions, and grow in desert areas. These plants are poorly studied in Mongolia.

A host of plants with CAM photosynthesis live in the shadows of humanity without most people recognizing their unique daily activities. Worldwide, CAM plants such as cacti and bromeliads can be found in countless homes and workplaces. CAM plants also occur naturally with high abundance, where they demonstrate powerful survival abilities, e.g., desert cacti in southwest of North America, the euphorbs of North Africa, bromeliads in rainforest canopies, the Aloe trees of the Kalahari Desert, or the spiny forests in Madagascar. Also they are important crops, e.g., the plantations of pineapple in Hawaii and South America or Agave in Central America (Black & Osmond, 2003).

In the steppe zone of Mongolia, *O. spinosa* is grazed by sheep and goats, and is used by humans as a cold drink, in soups, and for the medical treatments of scabs, hemorrhoids and inflammation (Khaidav *et al.*, 1985; Ulziikhutag, 1985; Chastukhina, 1995; <http://biodiversity.uno.edu/delta>).

Material and Methods

For our study we selected a leaf succulent plant species, *Orostachys spinosa* L. belonging to the