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*Research Paper*

## **Geobotany of *Onosma* L. (Boraginaceae) genus in the middle part of the Central Zagros: A conservation approach**

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### **Introduction**

With the intensification of species extinction, management actions based on modern methods have increased to protect plant species with conservation priority. The establishment of species databases is the first step in conservation planning (Barberousse & Bary, 2019).

The genus *Onosma* is one of the most diverse genera of the borage family (Boraginaceae). Endemic areas and the most important centers of species diversity are located in the Iranian plateau as well as the Anatolian plateau and the Mediterranean region (Mehrabian & Amini Rad, 2018a; Mehrabian & Mozaffarian, 2018b). The present study was conducted to determine the distribution patterns and centers of diversity and endemism and to identify endangered species of this genus in the middle part of Central Zagros.

### **Methods and Materials**

During the field studies, 75 populations of 10 species of the genus *Onosma* were collected in the study area. Initially, the species distribution database was prepared using field studies by the authors, data on Iranian flora, as well as data from Iranian herbariums.

To prepare this database, geomorphological, geological and climatic data were prepared. Sampling was done by survey and based on the time of flowering to fruiting of the species from mid-April to mid-August at intervals of every 10 days to cover the flowering period of all species.

To evaluate the physicochemical properties of habitat soils, soil samples were taken from all studied populations from the surface to the root penetration depth (from the surface up to 20 cm) and factors such as pH, organic matter, phosphorus, and potassium.

The percentage of sand, silt, and clay were evaluated. Threatening factors were also assessed at each station.

## **Results & Discussion**

Based on our findings, the altitude distribution of the studied species ranged between 803 to 2952 m a.s.l, and the altitude range of *Asterotricha* is from 854 to 1203m a.s.l. Also, the *Heterotricha* is from 1785 to 2952 and the *Haplotricha* is from 272 to 1205 m. The species of this genus often occupy high mountain habitats (1500 to 2500 m) and foothills (900 to 1500 meters). This pattern of increasing diversity and high species richness in the direction of altitude gradient is consistent with the results of previous research on the whole genus in Iran (Mehravian, 2015; Moradi et al., 2019).

Most of the studied species are distributed in habitats with an average annual rainfall of 500 to 1250 mm and an average annual temperature of 0 to 10 and rarely 10 to 14 ° C. In addition, studied species are distributed mainly in sedimentary, igneous, and volcanic-sedimentary geological formations.

Additionally, pH, soil organic matter, soil texture, and percentage of phosphorus and potassium for *Onosma* species in the study area were analyzed. The studied species grow in alkaline soils and the pH of the studied soils is 7.33-8.48, so the lowest and highest values of which belong to *O. dasytricha* and *O. kotschyi*, respectively. The amount of organic matter in the studied soils is 0.5-31, the lowest of which is related to *O. dasytricha* and the highest is related to *O. platyphylla*. The potassium content of the studied soils is 38.59 to 524.7, the lowest of which is related to *O. dasytricha* and the highest is related to *O. nervosa*.

Threat assessment assessments showed that half of the species in the study area are endangered.

## **Conclusion**

In this region, rare species of this genus are highly endangered due to the destructive effects of livestock grazing, soil erosion, reduced fertility, and climate change. In addition, endemic species of this genus are highly endangered due to the high threat to habitats in the study area. Finally, poor habitat conditions emphasize the need for out-of-habitat protection for many species of this genus.

**Keywords:** *Distribution pattern, Phytogeography, Species richness*

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