

## Short Communication

# The use of geographical information system (GIS) for the extension of *Echium amoenum* Fisch. et Mey., a medicinal plant, in the Northern part of Iran

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Viper's bugloss (*Echium amoenum* Fisch. et Mey.), a medicinal plant, grows as wild and cultivated in Eshkevarat area located in the northern mountains of Iran. Information layers from environmental factors affected on the growth of this plant was prepared by geographical information system (GIS) and overlaid in order to the plant extension and preservation, as well increasing of rural society's economic conditions. Results showed that *E. amoenum* Fisch. et Mey. grows as wild in the area with average temperature of 12.5°C and precipitation of 750 to 800 mm. The surface under cultivation of this species may be increased up to 3 multiple by query.

**Key words:** Information layers, geographical information system (GIS), *Echium amoenum* Fisch. et Mey., query, Iran.

## INTRODUCTION

*Echium amoenum* Fisch. et Mey. (Boraginaceae) is a wild annual herb, which is known in Iran as ox-tongue, and is capable to grow and blossom on altitude of 1500 to 2000 m (Zargari, 1993; Ghassemi et al., 2003). This medicinal plant grows in northern mountains of Iran, especially Eshkevarat area as wild and cultivated (Zargari, 1993), as well in the western Mediterranean region, Spain, North Africa and hot regions of Europe in direction of south and south west as wild. *E. amoenum* is one of the important medicinal plants in Iranian traditional medicine and its dried flower has been used as an anxiolytic, anti-inflammatory, analgesic and mood enhancer (Zargari, 1993; Sayyah et al., 2009). Demand for the use of medicinal plants for treating various diseases is increasing in the entire world. The use of medicinal plants

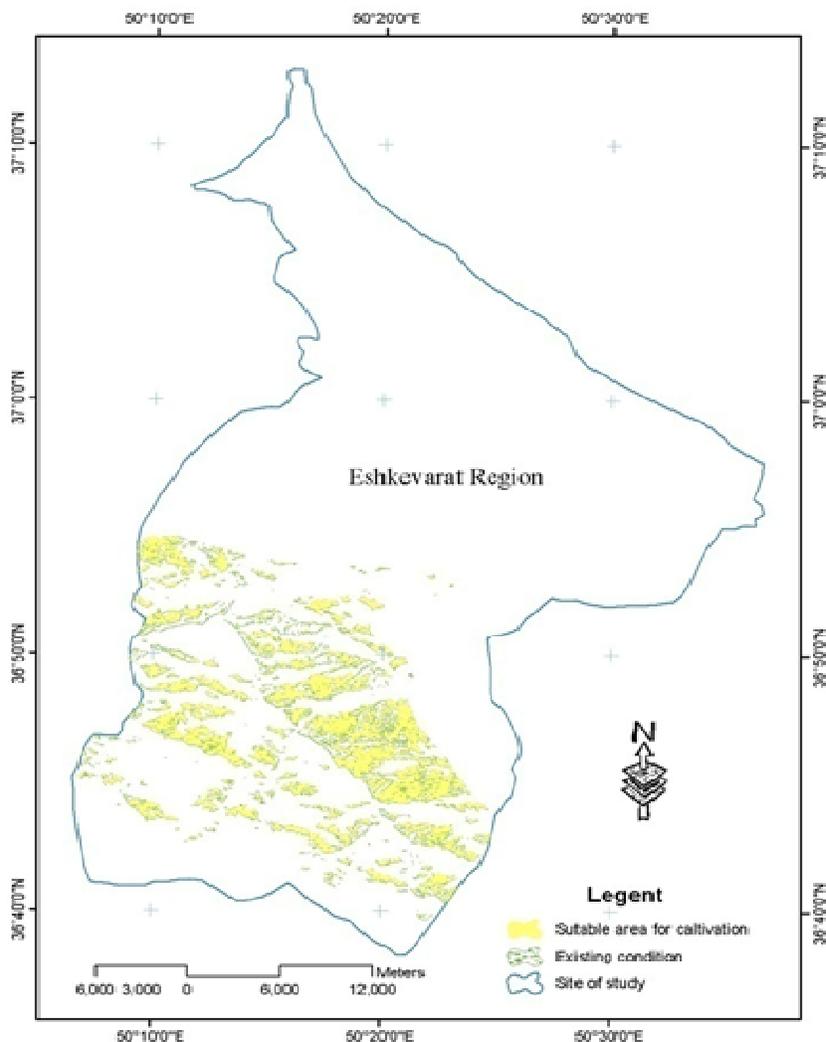
without having academic plan is causing damage to nature and even the extinction of the plant. The most important principle to exploit of forests and pastures is continuous production (Eslami, 2008). The species query and development of planting the plants cause rising rural incomes and conservation of natural resources. GIS is a suitable method for query of the plant species. Many studies showed the importance of GIS for query, extension and preservation of the plants (Lie et al., 2002; Liu et al., 2006; Dilek et al., 2007; Eslami et al., 2010; Eslami et al., 2010). The purpose of this research was to query and investigation of possible to increase the surface under cultivation of *E. amoenum* Fisch. et Mey. using GIS.

## MATERIALS AND METHODS

The scope of the study was Eshkevarat area located in Rudesar city in Guilan Province in the northern part of Iran. *E. amoenum* Fisch. et Mey. grows as wild and cultivated in the area. Climate conditions of Eshkevarat were analyzed using data obtained from

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**Abbreviations:** GIS, Geographical information system.



**Figure 1.** Query of *Echium amoenum* planting by using of geographic information

meteorological stations in the region. Maps of isohyets, isotherms, slope, aspect and soil were drawn using GIS by ARCGIS 9.3 software. The scope of *E. amoenum* Fisch. et Mey. cultivation in Eshkevarat area was determined using satellite images of IRS, providing July, 2007, and its coordinates were obtained and added to the maps of isohyets and isotherms as a table. Finally, the suitable places for extension of the species were determined using overlap of information layers and the use of interest tool according to the ecological needs from an appropriate climate point for growth and development.

## RESULTS AND DISCUSSION

Qualitative and quantitative distribution of the active ingredients in medicinal plants is related to environmental conditions of each region. Active ingredients of each local native plant are not readily available in other regions. Because vegetation is the source of primary production for habitat, changes in the distribution of vegetation can

be affected on many elements of an ecosystem (Kerns and Ohman, 2004). *E. amoenum* Fisch. et Mey. is a valuable medicinal plant. So to expand the plant it needs to query. The results provided from the maps of both isohyets and isotherms of region and satellite images showed that *E. amoenum* Fisch. et Mey. grows at a temperature range of 10 to 15°C (mean, 12.5°C) and precipitation of 750 to 800 mm. Climate and soil conditions of cold mountainous regions and semi-humid which have alternate rainfall during spring and summer are suitable for cultivation. Also, this plant has significant growth in the southern slope, which agrees with the results obtained by Javadzadeh (1996). The regions containing similar conditions were determined on the map in terms of possible development by overlap of different layers and compute a geometric intersect of the input features to obtain their interface (Figure 1).

At present, 519 ha of lands in Guilan province are

dedicated to the cultivation of *E. amoenum* Fisch. et Mey., which 400 ha of this amount is allocated to Eshkevarat mountains. Present study revealed that this surface can be increased to 1200 ha. This increase, in addition to raising rural incomes, causes preservation of natural resources and restoring endangered species extinction. This subject gain access just by the accomplishment of a sustainable forestry project. One of the effective and applicable methods is providing agro-forestry projects with emphasis on economic and social vigor of rural communities and development of medicinal plants in forest areas (Eslami, 2008). The studies of Eslami et al. (2010) and Shahadat and Kwei (2003) showed the importance of GIS in selection of suitable species for afforestation in southern forest of Caspian Sea and mangrove species in coastal areas of Bangladesh, respectively. Different species have different ecological requirements. Successful settlement of a species in a given region is dependent on the availability of desired conditions or environment optimization, so these species have the best growth. The species selection for an area should be based on all environmental conditions. The new technologies, such as GIS can be used for this purpose.

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