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Short Communication

Floristic-ecologic and Flavonoid Variation within and among *Astragalus verus* and *Astragalus glaucops* Populations from West of Iran

A. YAVARI AND S.M. SHAHGOLZARI[1]
Biology Department, Payame Noor University, 19395-4697 Tehran, I. R. of Iran
Department of Biology, Faculty of Science, Bu-Ali Sina University, Hamedan, Iran
[1]Corresponding author's e-mail: mehdi.shahgolzari@gmail.com; yavari.afagh@gmail.com

ABSTRACT

This study carried out for determination and discrimination of floristic-ecologic and flavonoid variation within and among *Astragalus verus* and *A. glaucops* from west of Iran. Floristic-ecologic data were collected using the unit of study as mean endogenous milieu (special station) by eco-phytosociologic method. In this survey, 31 special stations were studied. Then data obtained from seven different groups of releves for their species were analyzed by Anaphyto software with Factorielle Correspondence Analysis (FCA), Ascendant Hierarchical Classification (AHC) and Marquag methods. Also the study on flavonoids of their populations was carried out by thin layer chromatography. Obtained data were analyzed by MVSP software with UPGMA methods. Results of floristic analyses showed seven distinctive different groups of *A. verus* and *A. glaucops* in the study region. Seven groups resulted from floristic-ecologic study confirmed by flavonoid patterns. Between studied ecological factors, elevation was the most important for variation within and among both the species.

Key Words: *Astragalus* sp.; Eco-phytosociology method; Flavonoid variation; Elevation; Iran

INTRODUCTION

The view expressed by Tuxen (1942) that the plant can measure habitat factors better than any instrument is symptomatic of the scepticism with which the sociologist regards intensive ecological investigation, in spite of the fact that the only exact knowledge, which he possesses of the tolerance of species has been obtained by extrapolation (often unjustified) from original instrumental measurements.

The knowledge of the floristic composition of an area is a perquisite for any ecological and phytogeographical studies and conservation management activities. In studying any particular piece of vegetation, from an ecological point of view, our first step must be to determine the facts as they exist on the ground: facts regarding the vegetation, on the one hand; facts regarding the habitat, on the other (Nicholes, 1930). If there is any one set of facts, which is more susceptible to direct study and exact characterization than any other, it is the floristic composition of the vegetation. The mentioned studies did not use a special method in plant specimens collection process, while for collecting correct and precise floristic-ecologic data; we must apply an appropriate method that is according to factors governing nature. In this order, we used the unit of study (Endogenous milieu) in eco-phytosociological method.

Employing ecologic and phytosociologic criteria as eco-phytosociology (Atri, 1996) are not only suitable and exact in the data collection stage to determine the placement of releves, but also it is able to provide results, which conform and agree to the rules that govern the nature in the analysis and result interpretation stage. Some Investigations by using this method show that this method can suitable for ecological studies (Atri, 1996 & 1999; Atri *et al*., 2006 & 2007; Fakhre-Tabatabaei *et al*., 2000; Sefidkon *et al*., 2003 & 2005; Kalvandi *et al*., 2004). The aim of this project, was carried out from two different aspects, the studies of floristic-ecologic variation in these species belong to their stations and investigation on variation of flavonoid patterns in their populations.

MATERIALS AND METHODS

Different stations of *A. verus* and *A. glaucops* were determined by using the accessible reference, herbarium and available information. All Floristic–ecologic data (the study species & companion species as floristic marker) were collected from each endogenous milieu (each releve representing endogenous milieu). Study of ecological factors included elevation, EC, texture of soil and pH in each releve. Total of 31 endogenous milieu were selected

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for investigation in study area. The plant leaflets of different individual of *A. verus* and *A. glaucops* were collected in each releve, separated and ground in a grinder.

Flavonoids aglycone extracted (Joseph *et al.,* 2003) and flavonoid aglycone analysis was taken on all individuals of both species (Table I) using TLC method. The analysis was performed on silica gel plates [25 Fuelled aluminum CCM (20×20), Gel de silica 60 F254 (Merck)]. Rf of each band on chromograms were measured (Medica-Saric *et al.*, 2004). Data obtain from floristic were analyzed by using Anaphyto software (Briane, 1995) by means of FCA, AHC and Marquage methods. Ecologic and flavonoids data were analyzed by MultiVariate Statistical Package (MVSP) and Anaphyto software by means of Unweighted Pair Group Method with Arithmetic Mean (UPGMA), FCA and Canonical Correspondence Analysis (CCA) methods.

RESULT

Floristical results: Obtained results base on floristical composition analyses of 31 special stations showed seven main groups by using FCA method (Fig. 1). Group (A) include special station number 0031, 0022, 0020, 0015, 0014 group (B) number 0002, group (C) numbers 0042, 0043, 0044, 0045, 0046, 0047, 0048, 0049, 0050, 0018, 0007, group (D) number 0039, 0030, 0024, 0023, 0011 group (E) numbers 0032, group (F) number 0041, 0037, 0038, group (G) numbers 0006, 0005, 0004, 0003, and 0001. The mentioned seven groups obtained were based on similarity and dissimilarity of their floristic composition (as floristical marker). The obtained results from FCA method completed by AHC and Marquage methods (Figs. 2 & 3).

Flavonoid results: TLC chromatograms showed different flavonoid bands and also different quantity of bands in different individuals of *A. verus* and *A. glaucops* in study area. Analsis of flavonoid data separated 5 groups (Fig. 4). The obtained groups of flavonoid results had a good correlation with floristical composition groups.

Ecological results: Ecological factors data that were collected MVSP software with CCA method. The obtained results showed difference between studied ecological factors (elevation, pH, EC, texture of soil, slop direction & slop percent). These factors had the most important role in separating different determined groups (Figs. 5 & 6).

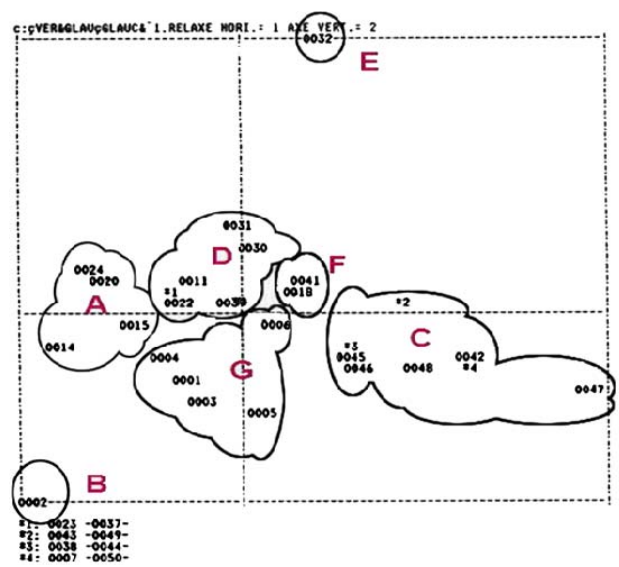
DISCUSSION

Present results show that *A. verus* and *A. glaucops*, from floristic-ecologic and chemical points of view, have high variation in the west of Iran. Any vegetation in particular place is influenced by the prevailing environmental factors including: climate, topography, soil, human activities and other biotic factors (Zahran, 1982). Analysis techniques are used in the present study classified the releves to seven groups (Figs. 1-3). At second phase,

Table I: The different studies special stations for *Astragalus verus and Astragalus glaucops*

Releve NO.	Voucher No.	Altitude	Place
1	7286	2425	Hamedan, Asad- Abad
2	7287	2417	Hamedan, Asad- Abad
3	7288	2408	Hamedan, Asad- Abad
4	7289	2424	Hamedan, Asad- Abad
5	7290	2416	Hamedan, Asad- Abad
6	7291	2344	Hamedan, Asad- Abad
7	7292	2563	Hamedan, Alvand
11	7293	1723	Hamedan, Nahavand
14	7294	1898	Hamedan, Razan
15	7295	1723	Hamedan, Razan
20	7296	1898	Hamedan, Touyserkan
23	7298	2213	Hamedan, Divijin
24	7299	2220	Hamedan, Divijin
30	7300	1840	Kermanshah
31	7301	1850	Kermanshah
32	7302	1800	Kermanshah
37	7303	1610	Kordistan, Sanandaj
38	7304	1995	Arak
39	7305	1940	Arak
41	7306	2008	Arak
7	7307	2563	Hamedan, Alvand
18	7308	2300	Hamedan, Touyserkan
42	7312	2540	Hamedan, Alvand
43	7310	2536	Hamedan, Alvand
44	7313	2547	Hamedan, Alvand
45	7309	2600	Hamedan, Alvand
46	7311	2650	Hamedan, Alvand
47	7314	2660	Hamedan, Alvand
48	7315	2723	Hamedan, Alvand
49	7316	2570	Hamedan, Alvand
50	7317	2598	Hamedan, Alvand

Fig. 1: Results floristical composition data analysis by FCA method



phytochemical studies create five groups of flavonoid (Fig. 4). Which approximately conform and affirm the obtained results of floristical studies. With different those in floristic analysis B, E and F separate each other (Figs. 1-3), but in flavonoid analysis this groups is together (Fig. 4).

Fig. 2: Results floristical composition data analysis by Marquage method

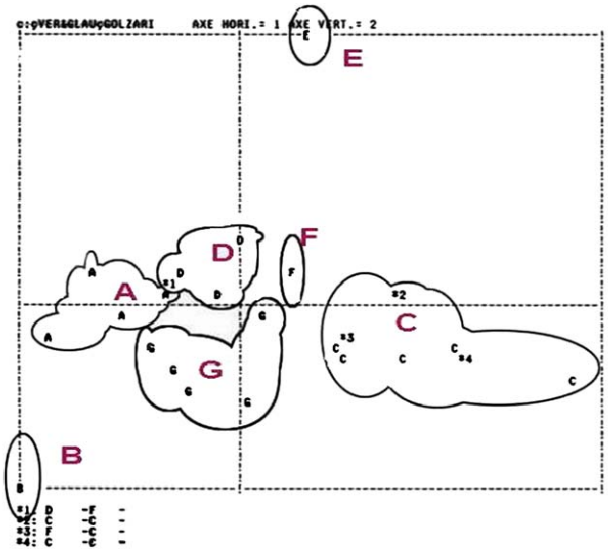
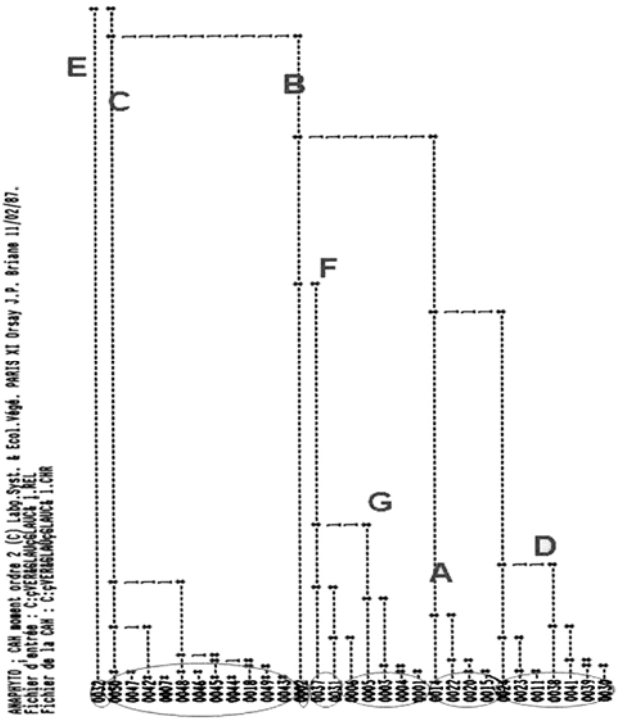


Fig. 3: Results floristical composition data analysis by AHC method



Separating special stations of *A. verus* and *A. glaucops* (Figs. 1-3), group (C) include numbers 0042, 0043, 0044, 0045, 0046, 0047, 0048, 0049, 0050, 0018, 0007 separated by floristic composition. They belonged to *A. glaucops* that conformed with flavonoid analysis (Fig. 4). On the other hand, flavonoid profile of *A. verus* and *A. glaucops* separated from each others that conformed to floristical

Fig. 4: Resulted cluster of aglycoside flavonoids studies of *Astragalus glaucop and Astragalus verus* individuals by UPGMA method

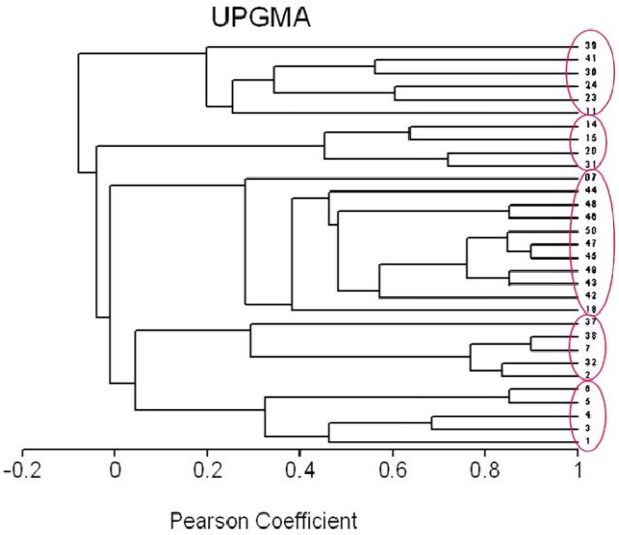
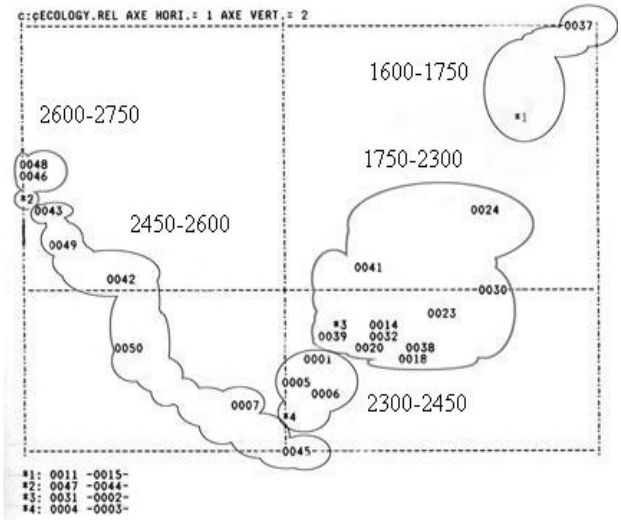


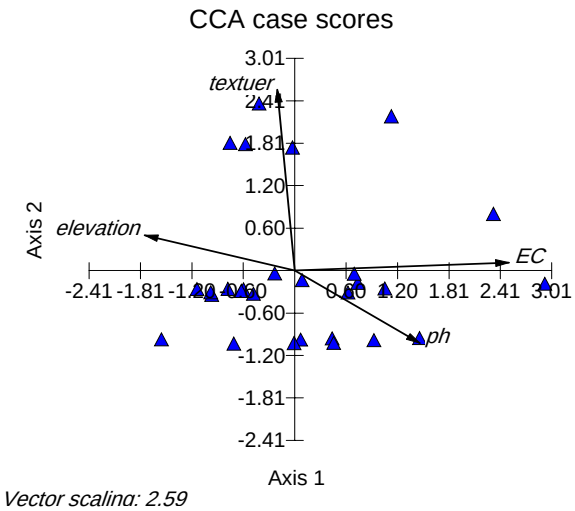
Fig. 5: Results of ecological factors studies by FCA method



composition. Between studied ecological factors, elevation is the most important ecological factor. *A. verus* located in low Lowe elevation between 1600 to 2450 m and for *A. glaucops*, elevation starts of 2450 to 2750 m (Figs. 5 & 6). Elevation has a considerable role in the variation within and among this two species of *Astragalus* (Massoumi, 2007). The results showed that elevation factor is a main cause separating *A. verus* and *A. glaucops* from each others that conformed to floristical composition and flavonoid results.

The present study shows that in studying the vegetation and determining ecological factors, employing ecological and phytosociologic criteria as eco-phytosociology (Atri, 1996) are not only suitable and exact

Fig. 6: Results of ecological factors studies by CCA method



in the data collection stage to determine the placement of releves, but also it is able to provide results, which conform and agree to the rules that govern the nature in the analysis and result interpretation stage.

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