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Evaluation of Some Habitat Characteristics of *Rosa iberica* (Case study: Nourdasht watershed in Esfahan, Iran)

Mojtaba Akhavan Armaki
Young Researchers and Elite club,
Karaj Branch, Islamic Azad University, Karaj, IRAN

(Corresponding author: Mojtaba Akhavan Armaki)
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ABSTRACT: Soil samples were taken by a systematic randomized method at elevation 2000-2400 m above sea level. Samples were taken from 0-30 cm depth. In the laboratory, N, P, K% and organic matter (OC%), soil acidity (pH), conductivity (EC) and soil texture were determined. The collected data were analyzed and principal component analysis was performed on 14 variables using PC-ORD software. Results showed that these species are scattered in the height of 2100-2300 m above sea level with 15-65% slope in North, Northwest, Southeast and Southwest as spot bulks. Mean precipitation of this area is 227.5 mm. It's vegetative, flowering and seed maturity stages occur in middle March, May and June, respectively. Plant roots permeate into the depth of 1.5 m and plant propagated by both seeds and rhizome. However, its seed has hard coat resulting in a difficulty in germinating so that the seed propagation is not sexual and it propagated normally by rhizomes. This species growth in the soil with EC = 0.08-0.36, Ph =7.30-7.98, limestone soil 0.50-19.5%, OC = 1.09-0.27%, saturation (SP%) = 18.3-38.2%, N = 0.02-0.10 %, P = 4.8-40.6 ppm, K = 155-652 ppm, and the soil texture was clay to clay-loamy. Results of PCA analysis indicated that the first three axes explained total variation.

Key words: Habitat Characteristics, *Rosa iberica*, Nourdasht watershed.

INTRODUCTION

Regarding the plant species diffusion in various parts of the country and region and their importance in natural resource management, it is necessary to recognize the effective ecological factors. This leads to achieve the required knowledge for appropriate use of plant species in improving the ecosystem and scientific management of ecosystems. The major purpose of this research is to identify the ecosystem features and behavior of plant species in the rangelands of Nourdasht in Nourdasht watershed in Esfahan, Iran. There are many researches done on the individual ecology of rangeland species in various locations of Iran. Kianipour and Shahmoradi (2002) in studying *Cyperus eremicus* ecology in Isfahan concluded that this plant with relatively limited ecologic range grows in the regions with a sand or loamy soil texture in 750-1150 m above sea level. Azhir and Shahmoradi (2006) studied *Ferula ovina* ecology in Tehran province and reported that this species grows in the height of 2000-3200 m with no limitation for slope and its direction. Precipitation in this habitat is more than 900mm and average annual temperature is 8°C. Kaya and Aksakal (2007) investigated the morphological and ecological features of *Salvia rosifolia* in Turkey and determined that there is a relationships between P, N and K concentrations and plant distribution in the area. Farahani and Shahmoradi (2008) in study of Autecology of *Stipa barbata* in Tehran argued that this plant grows in the shallow to deep soils. Hoveyzeh and Shahmoradi (2009) studied *Cenchrus ciliaris* in Khuzestan province and concluded that the ecologic range of this specie being 60-420 m above sea level in the southern and eastern slopes of mountains.

Abolghasemi *et al.* (2009) in the study of *Stipegrostis pennata* in Yazd province concluded that this species prefers the sandy soils and has static branches. This plant protects the habitat soil against sand storms and wind erosion because of above-ground organs and provides suitable forage for the live stock. Fakhyrh *et al.* (2010) examined *Desmostachya bipinnata* in Systan Province, Iran and indicated that this specie exists in loamy soils and is relatively resistance to grazing, fire and natural adversities, this plant can be used in the management and modification programs in Systan. Aria *et al.* (2010) in the study of ecologic characteristics of *Mentha mozaffarianii* found that this species is seen in the height of 250-2400 m above sea level on the coarse alluvium in mountains on the bed rivers with loamy-sand soils.

Jangjoo *et al*. (2010) studied three species, *Agropyron cristatum, Stipa turkestanica* and *Stipa arabica* in the rangelands of Khorasan, Iran and argued that these three species growth in area with 8-12 >8-12 and >8-16°C and 240, 220, 150 mm precipitation, respectively. Bagheri *et al*. (2011) in the study of Autecology of *Stipagrostis plumosa* in Qom province found that this specie is resistant against cold and hard conditions and exists in various ecosystems. Aoshibnataj *et al.* (2011) had a survey on *Lolium perenne* ecology and concluded that this plant grows in the height of 1700-2200 m above sea level along roads, near irrigation channels, clay slopes, etc. This study aims to recognize the ecosystem features and plant behavior in the rangeland ecosystems to provide effective information for modification management and economic use of similar ecosystems.

MATERIALS AND METHODS

A. Botanical characteristics and natural habitats

Rosa iberica is known as Persian rose, is a rangeland plant from Rosaceae family. This plant is a wild plant in rangelands known as wild Iranian rose. It is a perennial and inedible plant and propagates by seeds and rhizome. Its height is 50-60 cm with yellow flowers which having brown to red spots. Wild rose covers a vast area of country including North, Northwest, West and Northeast and East of country in Gorgan, Mazandaran, Gilan, Western and Eastern Azerbaijan, Zanjan, Khorasan, Tehran, Ghazvin, Semnan and Esfahan provinces (Ghahraman, 2000).

B. Study area

Study area is 670 ha^{-1} located in 28 km far from Esfahan, Iran with 48°41'5"-48°43'17" Eastern longitude and 34°41'34"- 34°42'16" Northern latitude. This area belongs to central part of Esfahan province (Anonymous, 2000). Its height is 1982-2477 m above sea level and mean annual precipitation and temperature are 227.5 mm and 12°C, respectively (Iran Meteorological Organization, 2011).

C. Methodology

Information and statistics obtained from near weather station were used to study the climatic characteristics of the study area. In order to study the soil characteristics, the samples were taken from the depth of 0-30 cm and soil characteristics including relative percents of clay, silt and sand particles were determined using Bycas hydrometric method. Soil pH was determined with a pH-meter. The soil salinity was estimated from the Electrical Conductivity (EC) of a soil saturated paste. The N, P and K% were determined by mean of Kejeldal, Olsen and extracting methods with Flam photometer, respectively. Density, frequency and coverage percent were measured by the plots. Each plot size was determined using minimum surface method (Moghaddam, 2007). For evaluation of phenological stages, the site were visited every 7 days and every 14 days and start of growing, flowering date, full flowering, end of flowering and seed falling were documented. The plant vegetation data and its relationships with environmental data were analyzed using multivariate statistical method using PC-ORD statistical software. All measured soil properties were compared with Principle Component Analysis (PCA) and only factors with eigen values> 1 were used (Mesdaghi, 2000).

Table 1: Measurement method soil factor.

Soil Factor	Abbreviation	Measurement Method
Saturation Percent	S.P	Weight method
Electrical Conductivity	EC	Electrical Conductivity (EC) of a soil saturated paste
Ph	pH	Was determined with a pH meter
Total Neutralizing Value	T.N.V	Tytromtry method
Organic Carbon	OC	Walkly and Black (Oxidation method)
Phosphors	P	Elson
Potassium	K	Flam photometer
Nitrogen	N	Kajdal
Clay	Clay	Bouyoucos Hydrometer
Silt	Silt	Bouyoucos Hydrometer
Sand	Sand	Bouyoucos Hydrometer

RESULTS

The soil test results showed that soil pH values ranged from 7.30-7.98, EC (0.08-0.36), Ammunia (0.5-19.5), OC % (0.27-1.09), Saturation % (18.3-38.2), N (0.06-0.10%), P (4.8-40.6 ppm) and K (155-652 ppm) and soil texture was loamy-sand. The results of PCA analysis of soil factors are presented in (Table 2).

The results indicated that the variables of EC, slope and SP had positively and silt and aspect had negatively correlated with the first axis. The variables SP, OC%, pH had positively and N% and sand% had negatively associated with the second axis indicating that by increasing sand properties the pH values will decreased.

Table 2: Results of principle component analysis for topography and soil factor.

Variables	Axis 1	Axis 2	Axis 3
Electrical Conductivity (EC)	**0.373**	-0.220	0.246
Slope	**0.427**	0.216	-0.276
Silt	**-0.605**	0.229	-0.193
Aspect	**-0.739**	0.001	-0.138
Saturation Percent (SP)	**0.585**	**0.582**	0.176
Ph	-0.343	**0.605**	0.247
Organic Carbon (OC %)	-0.235	**0.507**	-0.385
Sand	-0.106	**-0.572**	0.420
Nitrogen (N %)	-0.229	**-0.309**	0.199
Phosphors (P)	-0.007	**0.434**	**0.444**
Potassium (K)	0.288	-0.136	**-0.402**
Total Neutralizing Value (TNV)	-0.355	0.122	**0.604**
Clay	0.299	0.214	**0.352**
Height	0.116	0.052	0.147

The underlined and bold values has significant correlation with appropriate axes.

Table 3: Eigen value, variance% and broken-stick eigen value for the three axes in PCA analysis.

Axis	Eigen value	Relative Variance %	Cumulative Variance %	Broken-Stick Eigen value
1	5.65	40.40	40.41	3.25
2	4.64	33.15	73.56	2.25
3	1.66	11.86	85.42	1.75

A. Vegetation characteristics

Density and cover percent *Rosa iberica* are presented in (Table 4). The Northwest area with average values of 93% had the highest cover percent. However its density was relatively lower. In addition, to these features, plants along with *Rosa iberica* are *Euphorbia virgata, Carthamus oxyacantha, Artemisia fragrans, cirsium alatum* (Gmelin) *Bobrov, Echinops macrophyllus, Gundelia tournefortii, Stipa parviflora, Marrubium anisodon, Phlomis bruguieri, Astragalus verus, Sophora alopecuroides.*

Table 4: Density and cover percent *Rosa iberica* in altitude 2300-2100 m.

Position	Density in m^2	Density in Hectares	Cover Percent
North	6.00	1666	52.70
Northwest	6.68	1499	93.18
Southwest	6.37	1569	54.90
Southeast	5.86	1706	56.13

B. Plant phenology stages

The phenological stages of *Rosa iberica* is presented in (Fig. 1). The plants start to grow from late March because of warming the weather and decreasing the humidity. Then, it continues growing in April, flowers in May to June and then go to full flowering. After this step, it enters into the seed germination from July to September. Seed falling is from September to November. The plants go to winter dormancy by the end of December (Fig. 1).

The relationships between soil and topography factors using biplot the first and second axis: The (Fig. 2) shows the biplot the first and second axes. According biplot, some factors including Slope, SP and EC in the right side and aspect, silt and TNV in the left side of biplot were separated by the first axis.

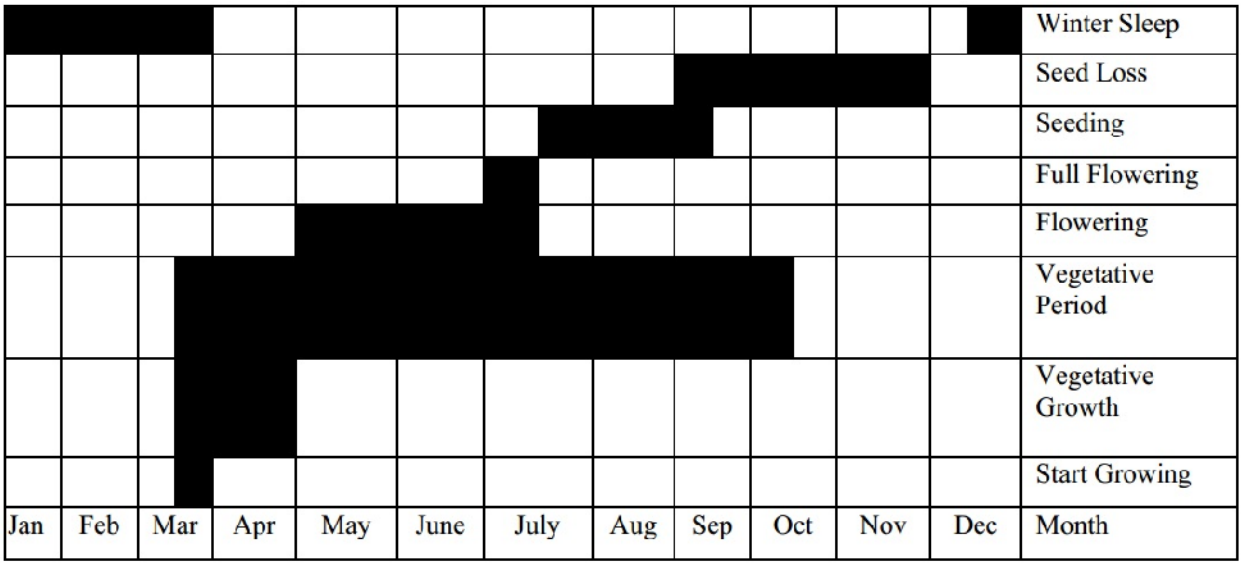

Fig. 1. Duration of phonological appearance phenomena of *Rosa iberica*.

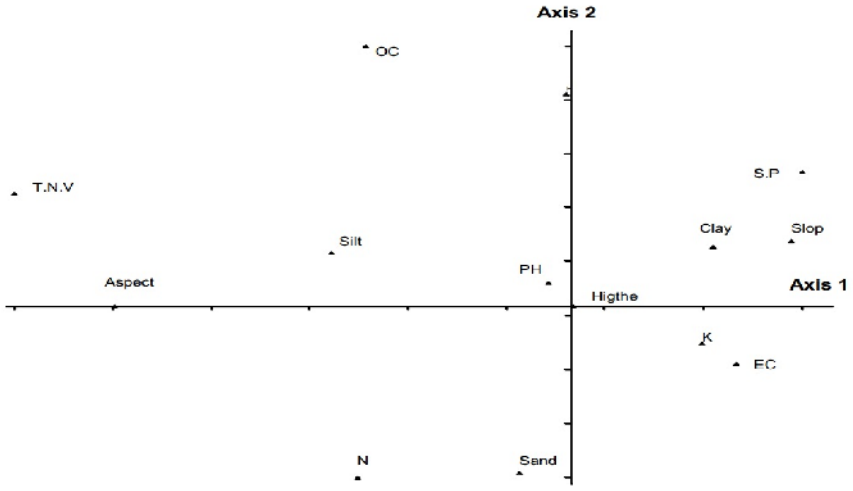

Fig. 2. Biplot the first and second axis for soil properties and topography factors with axis1 and axis 2 in analysis PCA.

Similarly, OC%, SP, P in the above of biplot and sand and N% in below of biplot were separated. Some other elements such as TNV% and OC% being above axes. In general, it can be concluded that the elements placed above the first axis have a reverse correlation with those being below the axis.

DISCUSSION AND CONCLUSION

Regarding to the results of studies, it was clear that this plant grows in low heights and slopes with mean precipitation of 227.5 mm, average annual temperature of 12°C, maximum temperature of 39.6°C and minimum temperature of -31.1°C.

Mean annual humidity is 49.4%. According to Domarten climate method, this location is cold semi-arid. Considering the same climatic and topographic conditions of study area, the most important factors in the establishment and distribution are height and slope directions, so the maximum density is seen in the height of 2100-2300 m in 4 aspects in 18-65% slopes. In a plant with vertical and horizontal root system, vertical roots penetrate into the deep soil layers and horizontal roots spread in surface layers to 80 cm and a new plant grows from this root rhizome. Vertical roots can penetrate to the depth of 1.5m.

They are connected by under-ground organs leading to their spot diffusion in north-west, south east, south west and north directions. These results being compatible with results obtained by Fakhyrh *et al.* (2010) argued that the reason for *Desmostachya bipinnata* developing is its propagation manner. Abrsaj *et al.* (2007) concluded that non- uniform distribution of *Hedysarum kopetdaghi* results from the wrong entrance of cattle and heavy grazing. But *Rosa iberica* is inedible. Based on the experiments, include soil texture clay to clay-loamy is effective for canopy cover growth and spreads and roots development this plant species. EC of soils ranges from 0.08-0.36, so the soil of study area has low salinity. pH was between 7.30-7.98 which is lower than 8 in all study areas so they have low alkalinity. Ammonium rate is between 0.50-19.5. Its rate in the soil up to 10% is normal but higher rate is not suitable. Two samples out of 8 soil samples had more than 10% ammonium. Results of PCA analysis indicated that in the first three axes explained total variation.

The variables of SP, EC and slope had positively and silt and aspect negatively correlated with the first axis. The variables of SP, pH and OC% had positively and sand and N% had negatively correlated with the second axis. Indicating that by increasing sand properties the pH values will decrease. There was also a negative correlation between vegetation coverage and slope, ($P<5\%$) suggested land coverage reduction by increasing the slope. Height, slope and Aspect had the most effects on the species distribution. This plant as an invasive and non-palatable plant can form a type and be developed in the agriculture boundaries and pastures as a wide band.

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