Numerical Study of *Smilax excelsa* L. in Mazandaran Province

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Introduction

The genus *Smilax* L. are climbing and dioecious plants and show wide phenotypic variation. *Smilax*, which has 350-400 species worldwide, is presented only by *Smilax excelsa* L. and *Smilax aspera* L. in Iran. This genus is cosmopolitan genus, primarily distributed throughout the sub-tropics and tropics. Furthermore, *Smilax* species are usually used by people due to their anti-rheumatic properties attributed to infusions of their roots and rhizophores. Because there is diversity in leaf morphology of *Smilax* spices, we decided to study morphometry of *Smilax excelsa* populations in Mazandaran Province to see it is true for this species or not. Also, we study morphometry characters of populations to see if there is new type or species between them.

Materials & Methods

In this study, morphological characters of vegetative and generative organs of 17 populations of *Smilax excelsa* from Mazandaran province are studied for the purpose of distinguishing significant characters that effective in segregation of populations. It was founded only *Smilax excelsa* in Mazandran Province, despite of earlier reports of being tow species of *Smilax excels* and *Smilax aspera* growing in north of Iran. Seventeen populations of *Smilax excelsa* were collected from different parts of the Mazandaran Province.

For the purpose of morphometry studying, 5 specimen of each population were selected randomly and were coded for morphometry data. 28 qualitative and 16 quantitative characters were identified and studied using suitable equipment and methods. The measurements was done by ruler, caliper and stereo microscope and then data were recorded in tables. The results were analyzed by principal component analysis (PCA) using the SPSS (Ver. 16) software and dendrogram constructed using within group method.

Results & discussion

The results have shown that characteristics such as Stem diameter, Stipule length and width max, Stipule length max/Stipule width max, Leaf shape, Leaf length and width max, Leaf length max/Leaf width max, Peduncle length, Inflorescent length max, Inflorescent peduncle length, Flower number in inflorescent and Berry length and width max are effective in taxonomic segregation of populations. In this study, among two component with 99% of the total variance, the first component with 43% of the variance shows a significant relationship with characters such as, stem diameter, stipule width max, leaf shape, peduncle length, inflorescent length max, inflorescent peduncle length, flower number in inflorescent and Berry length and width Max. The second component with 56% of the variance has a significant relationship with characters such as, petiole length, petiole diameter, stipule length max, stipule length max/stipule width max, leaf length and width max and leaf length max/leaf width max. The dendrogram has shown the existence of two main clusters, the first cluster includes the populations of Nowshahr, Kheyroud kenar Jungle, Nowshahr, Kojur, Firouzabad and Nowshahr Airport, and the second cluster is divided into two subclusters. One sub-cluster includes the populations of Ghaemshahr-the beginning of the Nizami road, Royan, Lengrod, Sari-the beginning of the Sari road, Dodange, Golugah and Neka, and the second subcluster is divided into two clades. In one clade, the populations of Tonekabon, Dohezar Road, Ramsar-Janatrudbar Road and Ramsar- Janatrudbar to Churte Road are placed, and in the other clade the populations of Kojur- Firouzabad Road, Kojur- Hassan Abad, Amol- Haraz Road to Tehran, after Highway Police , Haraz and Chalus road - Namak Abroud - Mesedeh village are located. The results also show there is a diversity in the length, width and the shape of the leaf of the studied populations. Leaf shape was arrow-head in Galugah and Neka populations, was Cordate in Tonekabon, Dohezar Road; Chalous- Namakabroud- Mesedeh village; Ramsar- Janatrudbar Road; Ramsar- Janatrudbar to Churte Road; Ghaemshahr, Nezami Road; Royan and Sari, Sari to Dodangeh Road populations, and Ovate in Nowshahr, Kheyroudkenar Jungle; Nowshahr-Kojur- Firuzabad; Nowshahr Airport; Kojur, Firuzabad Road; Kojur- Hasanabad; Amol, Haraz Road to Tehran, after Highway Police and Haraz Road populations. Leaf base was Attenuate in Ramsar- Janatrudbar Road; Ramsar- Janatrudbar to Churte Road; Ghaemshahr, Nezami Road; Royan; Sari, Sari to Dodangeh Road; Galugah and Neka populations, and Cordate in Nowshahr, Kheyroudkenar Jungle; Nowshahr- Kojur- Firuzabad; Nowshahr Airport; Kojur, Firuzabad Road; Kojur- Hasanabad; Amol, Haraz Road to Tehran, after Highway Police; Haraz Road; Tonekabon, Dohezar Road and Chalous- Namakabroud- Mesedeh village populations.

Conclusion

The present results showed that there is leave diversity among the studied populations and characters like Leaf shape, Leaf length and width max, Leaf length max / Leaf width max are variable between populations. Also, there is difference in the length, width and the shape of the leaf of the studied populations and this difference could depend on different altitudes and abiotic factors.

Keywords: Smilax excels, leaf variation, morphology, Mazandaran.

Declaration of conflict of interest

The authors have no conflicts of interest to declare.

Statement on ethics

We certify that the submission is original work and is not under review at any other publication.