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PCA

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Ecological Species Group

Michigan

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Wisconsin

Spies and Barnes

Barnes, et al.

TWINSpan

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PCA () () () *

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TWINSpan

PCA Windows PC-ORD

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TWINSpan () (PCA)

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Menta aquatica (

PCA (Principal Component Analysis)
 Guadal
 Pearson

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Brachypodium pinnatum (

Carex grioleti ()

() *Hedera pastuchovii* ()

Oplismenus undulatifolius ()

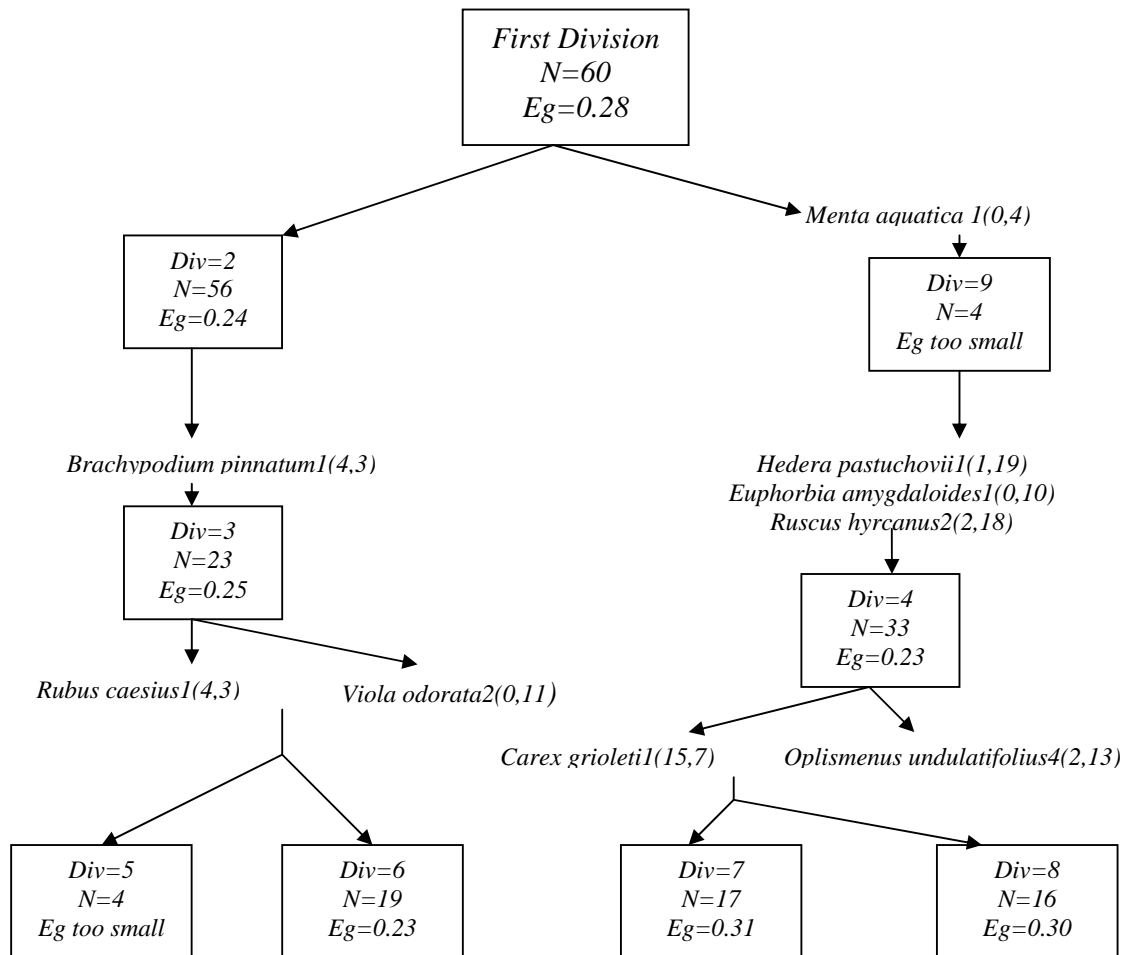
Ruscus () *Euphorbia amygdaloides*
hyrcanus

A,B,C,D,E

Rubus ()

caesius

Viola odorata ()



TWINSPAN

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<i>Carpinus betulus</i> L.	<i>Menta aquatica</i> L.	A
<i>Parrotia persica</i> (DC.) C. A. Mey. - <i>Ruscus hyrcanus</i> L.	<i>Hedera pastuchovii</i> L.- <i>Oplismenus undulatifolius</i> (AC.)	B
<i>Parrotia persica</i> (DC.) C. A. Mey. - <i>Ruscus hyrcanus</i> L.	L. <i>Hedera</i> <i>Carex grioletia</i> L. <i>Pastuchivii</i>	C
<i>Parrotia persica</i> (DC.) C. A. Mey. - <i>Cratagus</i> SP.	<i>Brachypodium pinnatum</i> L. - <i>Violaodorata</i> L.	D
<i>Parrotia persica</i> (DC.) C. A. Mey. - <i>Cratagus</i> SP. - <i>Quercus castaneifolia</i> C.	<i>Brachypodium pinnatum</i> L. - <i>Rubus caesius</i> L.	E

PCA

PCA

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Clayb CECc Na Ca

Clayc

PCA

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Bec Nec

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Sandc Sandb Nlit Wc Wb pHc pHb pHa

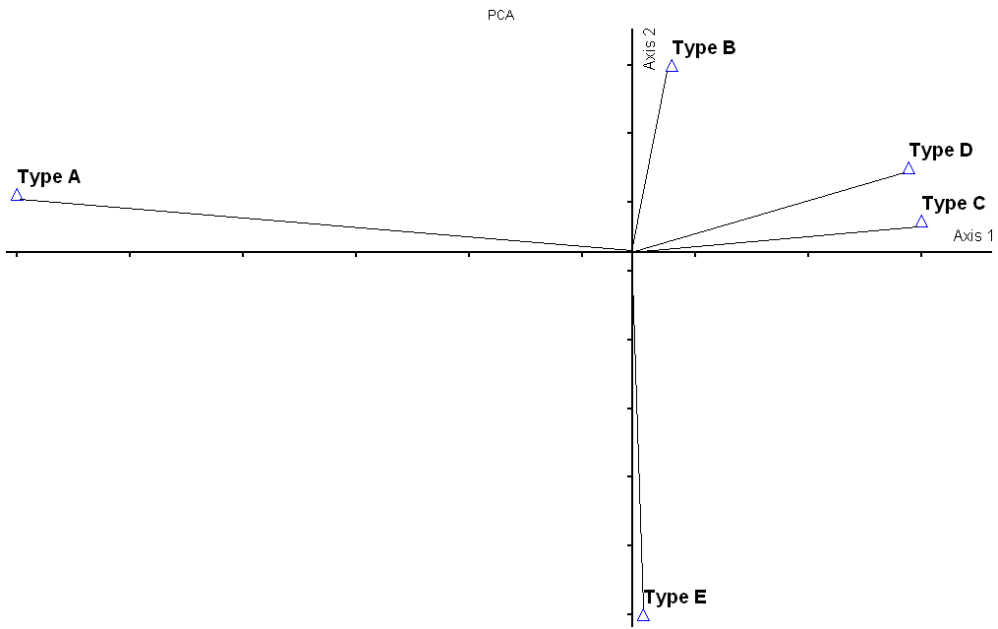
Claya Pa

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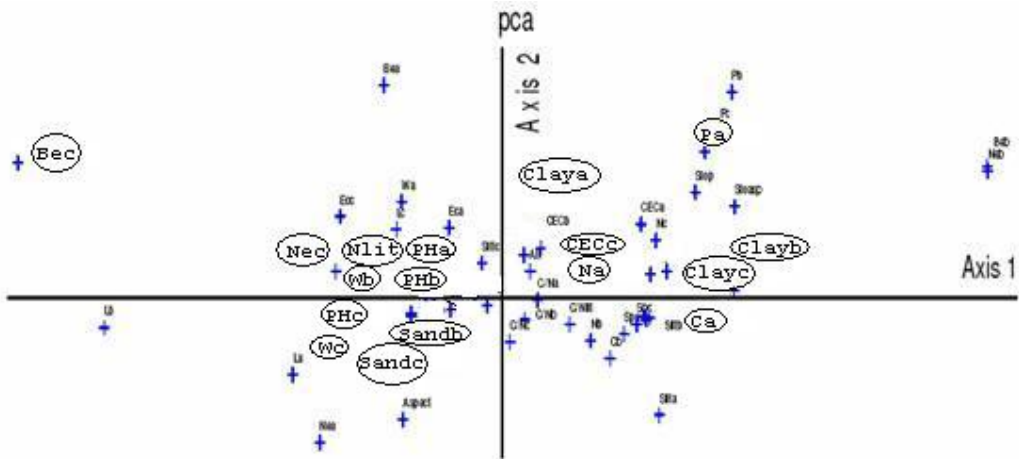
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PCA

a,b,c			
pHa, pHb, pHc			
Wa, Wb, Wc			
Spa, Spb, Spc			
Eca, Ecb, Ecc	Ds/m		
Ca, Cb, Cc			
Na, Nb, Nc			
C/Na, C/Nb, C/Nc			
CECa, CECb, CECc	p.p.m		
Pa, Pb, Pc	p.p.m		
Sanda, Sandb, Sandc			
Silta, Siltb, Siltc			
Claya, Clayb, Clayc			
La, Lb, Lc			
Nea, Neb, Nec			
Bea, Beb, Bec	gr		
Clit			
Nlit			
C/Nlit			
Alt	m		
Slope			
Aspect			
Sloasp			



PCA



PCA

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(*Menta aquatica*

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pHc pHb pHa Bec Nec

Sandc Sandb Nlit Wc Wb

Hedera pastuchovii

Ruscus hyrcanus Euphorbia amygdaloides

Oplismenus undulatifolius

Claya Pa

Euphorbia Hedera pastuchovii

Carex Ruscus hyrcanus amygdaloides

grioleti

Clayb Na Ca

Clayc

Viola Brachypodium pinnatum

odorata

Clayb Na Ca

CECc Clayc

CECc

Brachypodium

Rubus caesius pinnatum

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Differentiation of ecosystem units of Caspian lowland forests and its relation with some soil characteristics

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Abstract

Due to differentiation ecosystem units and related soil physico - chemical and biological characteristics, 268.7 ha⁻¹ of lowland forests in Khanikan were studied. Vegetation data and information (trees, shrubs, and herbs) were collected from 60 sample plots with systematically random method (20m×20m) which were then analyzed by using TWINSpan program. The data were classified into five ecological groups. Some of physical, chemical and biological characteristics of soil, such as soil acidity (pH), bulk density, saturation moisture, electrical conductivity (EC), organic carbon, total nitrogen, cation exchange capacity, available phosphorous, soil texture, lime, biomass of earthworms, litter carbon, and litter nitrogen were measured. Principal component analysis (PCA) was used to determine correlation as well as distribution in each ecological group of environmental factors. It was noticed that 1st, 3rd, 4th ecological groups had the highest correlation with the 1st axes whereas 2nd and 5th ecological groups demonstrated the highest correlation with the 2nd axes. The results indicated that the ecological group's distribution pattern was mainly related to soil characteristics such as pH, bulk density, texture, phosphorous, organic carbon, nitrogen, and CEC.

Keywords: Ecological species group, Classification, PCA, Soil characteristics, Caspian forests, Iran