

DISTRIBUTION PATTERNS OF THE GENUS ACANTHOLIMON (PLUMBAGINACEAE) IN IRAN

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The geographical distribution of the genus *Acantholimon* in Iran is discussed. Altogether 79 species are known in Iran of which 65 are endemics. Except for the Hyrcanian province, the other 7 provinces contain at least one species of the genus *Acantholimon*, the Nubo-Sindian province having only one species. The C. Iranian province with 29 species contains the highest number of the species. This province has 14 endemic species of *Acantholimon* which is again the highest number compared to the other provinces. The number of endemics in different phytochoria is quite high; that is an indication that the limitation of provinces is well defined.

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Keywords. *Acantholimon*, *Plumbaginaceae*, Phytogeography, Distribution, Phytochorion, Iran.

الگوهای انتشار جنس *Acantholimon* (Plumbaginaceae) در ایران

مصطفی اسدی

انتشار جغرافیایی جنس *Acantholimon* در ایران مورد بحث قرار می‌گیرد. در مجموع تعداد ۷۹ گونه از جنس *Acantholimon* در ایران تشخیص داده می‌شود که ۶۵ گونه آن انحصاری ایران است. تعلق گونه‌ها در نواحی رویشی شناخته شده در ایران شامل نواحی اروپایی سبیریایی (بدون گونه)، ایرانی تورانی (۷۹ گونه) و صحرائی سندی (۱ گونه) و حوزه‌های شناخته شده در ایران شامل حوزه‌های خزری (بدون گونه)، آذربایجانی (۲۳ گونه)، شمال خراسانی (۲۰ گونه)، کردستانی زاگرسی (۲۱ گونه)، مرکز ایرانی (۲۹ گونه)، فارسی کرمانی (۱۷ گونه)، شمال بلوچستانی (۲ گونه) و نوییایی سندی (۱ گونه) مشخص می‌گردد. تعداد گونه‌های انحصاری در حوزه مرکز ایرانی ۱۴، فارسی کرمانی ۱۲، شمال خراسانی ۹، آذربایجانی ۸ و کردستانی زاگرسی نیز ۸ گونه می‌باشد. سایر حوزه‌ها گونه انحصاری ندارند. وجود گونه‌های انحصاری بالا در حوزه‌های مختلف نشانه این موضوع است که محدوده حوزه‌ها خوب تعریف شده است.

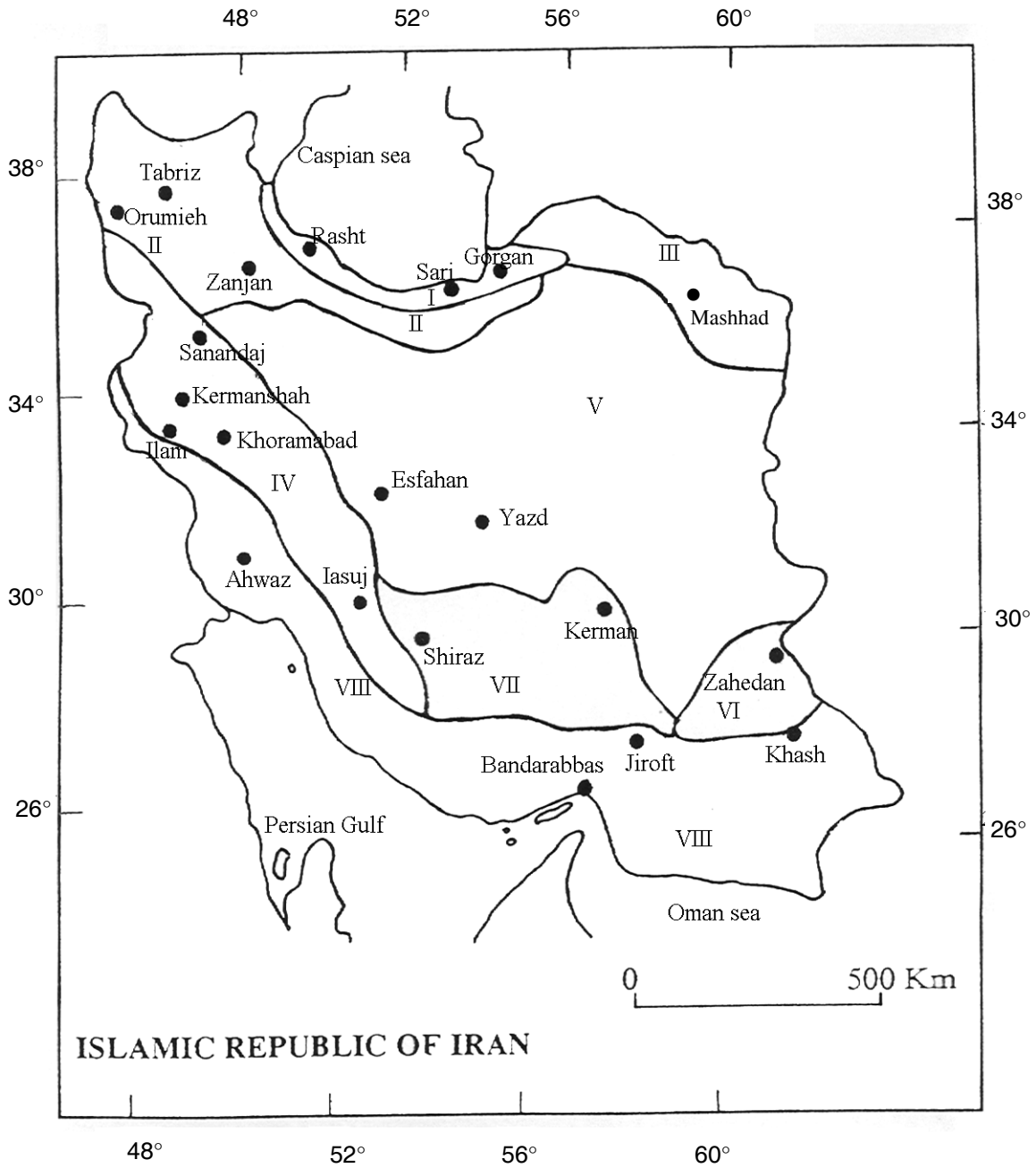
Introduction

The genus *Acantholimon* Boiss. was originally described by Boissier (1846) with 22 species. Later Bunge (1872) revised the genus as a monograph. He altogether recognized 83 species of which 45 species were reported from Iran. He published a distribution map of the genus from 42°-95° of E. longitude and 28°-43° latitude. The southernmost distribution of the genus was in S. Iran. It is clear from the map that 3 different centers of distribution are recognized for the genus, including Anatolia-Iran, Afghanistan and Tibet. However, Iran seemed to be the main distribution centre of the genus. Mobayen (1954) again revised the genus and recognized 119 species of which 84 were reported from Iran. Rechinger & Schiman-Czeika (1974) recognized 164 species from Flora Iranica area

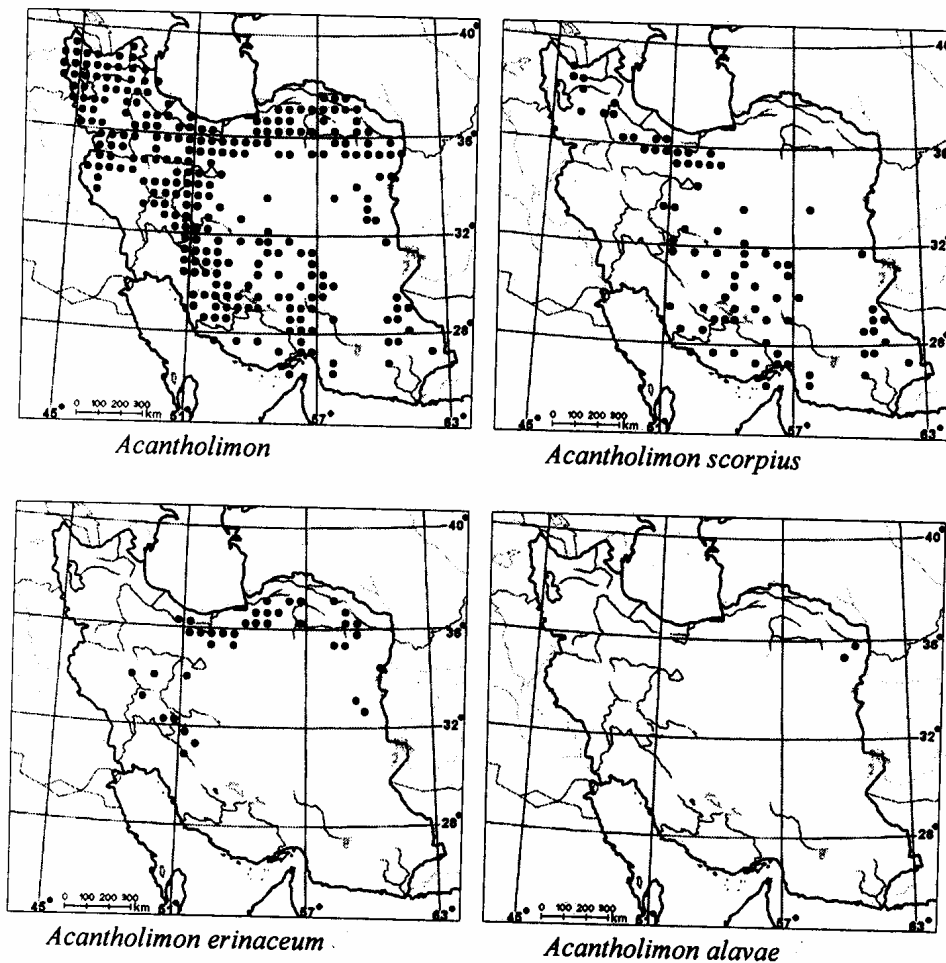
of which 84 were reported from Iran. The genus was revised by this author (Assadi 2005b) for the Flora of Iran. In this Flora 79 species were known from Iran. Meanwhile, some new species were described by this author (Assadi 2004; Assadi 2005a; Assadi 2005b; Assadi & Mirtadzadini 2006). In this paper the distribution pattern of the genus *Acantholimon* in Iran is to be understood.

Material and Methods

Based on the distribution of the species in Flora of Iran (Assadi 2005b) chorotypes of the species were determined. Modified phytogeographical phytochoria based on different authors were used. (Zohary 1963; Zohary 1973; Takhtajan 1986; White & Leonard 1991; Leonard 1989). Main phytochoria recognized in Iran



Map 1. Phytogeographical Provinces of Iran. –I. Hyrcanian; II. Atropatanean; III. N. Khorasan; IV. Kurdo-Zagrosian; V. Central Iran; VI. N. Baluchistan; VII. Fars-Kerman; VIII. Nubo-Sindian.



Map. 2. Distribution of the genus *Acantholimon* and some species of the genus.

are as follows. Euro-Siberian Region [Hyrcanian Province (N. facing slopes of Elburz mountain chains)]; Irano-Turanian Region [Atropatanean Province (Azerbaijan province eastward at high altitudes and S. facing slopes of Elburz mountain chains to about Semnan province); Northern Khorasan Province (mountains N. of Khorasan province westward to about Semnan province); Kurdo-Zagrosian Province (starts from S. of W. Azerbaijan province along the Zagros mountain chains through Kurdistan, Kermanshah, Luristan, Ilam, Kohgiluyeh-Boirahmad and part of Fars provinces to S. of Shiraz; N. Baluchistan Province (N. of Sistan and Baluchistan province from Zahedan to Khash); Central Iran Province (including central and

eastern mountains and plains of Iran)]; Fars-Kerman P (including mountains of Fars and Kerman provinces); Saharo-Sindian Region [Nubo-Sindian Province) (including plains and mountain slopes along the Oman sea and Persian Gulf in S. Iran from the sea level to about 800 m]. The distribution of these phytochoria is roughly shown on map 1.

Results and discussion

Altogether 84 taxa including 79 species occur in Iran. Of these 65 taxa (82.3%) are endemic to Iran. Therefore, compared to the other large genera of Iran such as *Astragalus* with 65% (Maassoumi 2005) has the highest number of endemism in Iran.

The genus is very well distributed in Iran (map 2). Some species are very well distributed all over the country, e.g. *Acantholimon scorpius* and *A. erinaceum*. But, some are known only from a limited area, e.g. *A. alavae* (map 3-4). Among the species *Acantholimon scorpius* has a curious distribution. Although it is very well distributed in all over the country, but still it is known as an endemic to Iran. However the species seems to be morphologically extremely variable. Most of the populations have their own characters that now and then were recognised as distinct species by different authors (Rechinger & Schiman-Czeika 1974). But, due to the minor and not correlated characters, this author did not recognize them as distinct species (Assadi 2005b). All the species are mainly Irano-Turanian, but only *A. scorpius* extends to the Saharo-Sindian as well. Distribution of the taxa in different phytochoria is shown in table 1. C. Iranian Province with 29 species contains the highest number of the

species, then *Atropatanean* (23), Kurdo-Zagrosian (21), N. Khorasan (20), Fars-Kerman (17), N. Baluchistan (2) Nubo-Sindian (1) provinces come afterward respectively.

Known phytochoria contain a number of endemics, which are shown in table 2. The C. Iranian Province with 14 species has the highest number of endemics. This is an indication that these phytochoria are well defined based on this study. Obviously, this phytochorian limitation should be based on the examination of many more species, and therefore is quite provisional.

A few species occur in 2 or more phytochoria. They are shown in table 3. N. Khorasan and C. Iran Provinces with 5 species have the highest number of common species. This is because the distribution of many species of this province extends to the mountains of East of Iran in one side and also the mountains of adjacent area in C. Iran.

Table 1. Provincial chorotypes of *Acantholimon* species of Iran (Atr.=Atropatanean, N. Kh.=Northern Khorasan, Kurd.-Zag.=Kurdo-Zagrosian, C. Iran.=Central Iranian, N. Bal.=Northern Baluchistan, Nub.-Sind=Nubo-Sindian, Fars-Kerm.=Fars-Kerman, End.=Endemic).

Species	Atr.	N. Kh.	Kurd.-Zag.	C. Iran	N. Bal.	Fars-Kerm.	Nub.-Sind.	End.
I Sect. Pterostegia Bge.								
1. <i>A. pterostegium</i> Bge.		+		+				+
2. <i>A. cymosum</i> Bge.				+				+
II Sect. Microstegia Bornm.								
3. <i>A. bakhtiaricum</i> Assadi			+					+
4. <i>A. schahrudicum</i> Bge.				+				+
5. <i>A. talagonicum</i> Boiss.	+			+				+
6. <i>A. austro-iranicum</i> Rech. f. & Schiman-Czeika						+		+
7. <i>A. horridum</i> Bge.				+				+
8. <i>A. schirazianum</i> Boiss.						+		+
9. <i>A. tomentellum</i> Boiss.			+	+				+
III Sect. Acantholimon								
10. <i>A. bracteatum</i> (Girard) Boiss.	+							
11. <i>A. wilhelminae</i> Rech. f. & Schiman-Czeika	+							+
12. <i>A. cephaloides</i> Rech. f.				+				+
13. <i>A. demawendicum</i> Bornm.				+				+
14. <i>A. mirtadzinii</i> Assadi						+		+
15. <i>A. kermanense</i> Assadi						+		+
16. <i>A. wendelboi</i> Rech. f. & Schiman-Czeika	+		+	+				+
17. <i>A. glabratum</i> Assadi				+				+
18. <i>A. latifolium</i> Boiss.			+					
IV Sect. Acmostegia Bge.								
19. <i>A. acmostegium</i> Boiss. & Buhse		+		+				+

Table 1. (Count.)

Species	Atr.	N. Kh.	Kurd.-Zag.	C. Iran	N. Bal.	Fars-Kerm.	Nub.-Sind.	End.
20. <i>A. restiaceum</i> Bge.		+						+
21. <i>A. alavae</i> Rech. f. & Schiman-Czeika		+						+
V Sect. Platystegia Rech. f. & Schiman-Czeika								
22. <i>A. collare</i> Koeie & Rech. f.		+						+
23. <i>A. heweri</i> Rech. f. & Schiman-Czeika				+				+
VI Sect. Glumaria Boiss.								
24. <i>A. bromifolium</i> Boiss. ex Bge.	+		+	+				+
25. <i>A. albocalycinum</i> Assadi & Mirtadzadini						+		+
26. <i>A. cupreo-olivascens</i> Rech. f. & Schiman-Czeik				+		+		+
27. <i>A. sirschense</i> Assadi & Mirtadzadini						+		+
28. <i>A. scirpinum</i> Bge.		+						+
VII Sect. Staticopsis								
29. <i>A. haesarensis</i> Bornm. ex Rech. f. & Schiman-Czeika						+		+
30. <i>A. flabellum</i> Assadi		+						+
31. <i>A. aspadanum</i> Bge.				+				+
32. <i>A. hormozganense</i> Assadi								+
33. <i>A. mobayenii</i> Assadi & Ghahreman			+					+
34. <i>A. scabrellum</i> Boiss. & Hausskn. in Boiss.			+					+
35. <i>A. oliganthum</i> Boiss.			+					+
36. <i>A. festucaceum</i> (Jaub. & Spach) Boiss.	+		+	+		+		+
37. <i>A. flexuosum</i> Boiss. & Hausskn. ex Bge.			+	+				+
38. <i>A. raddeanum</i> Czernjak.		+						
39. <i>A. avenaceum</i> Bge.		+						
40. <i>A. asphodelinum</i> Mobayen			+			+		+
41. <i>A. eschkerense</i> Boiss. & Hausskn.			+					+
42. <i>A. zaeifii</i> Assadi						+		+
43. <i>A. gilliatii</i> Turril	+							+
44. <i>A. nigricans</i> Mobayen				+				+
45. <i>A. serotinum</i> Rech. f. & Schiman-Czeika						+		+
46. <i>A. hohenackeri</i> (Jaub. & Spach) Boiss.	+	+	+	+				
47. <i>A. ophiocladum</i> Rech. f. & Schiman-Czeika			+					+
48. <i>A. sahenticum</i> Boiss. & Buhse	+							
49. <i>A. viscidulum</i> Boiss.				+				+
50. <i>A. brachystachyum</i> Boiss. Ex Bge.			+					
51. <i>A. melananthum</i> Boiss.			+					+

Table 1. (Count.)

Species	Atr.	N. Kh.	Kurd.-Zag.	C. Iran	N. Bal.	Fars-Kerm.	Nub.-Sind.	End.
52. <i>A. termei</i> Rech. f. & Schiman-Czeika	+							+
53. <i>A. densiflorum</i> Assadi	+							+
54. <i>A. caryophyllaceum</i> Boiss.	+							
55. <i>A. araxanum</i> Bge.	+							
56. <i>A. moradii</i> Assadi			+					+
57. <i>A. fominii</i> Kusn.	+							
58. <i>A. olivieri</i> (Jaub. & Spach) Boiss.			+					+
59. <i>A. atropatanum</i> Bge.	+							+
60. <i>A. senganense</i> Bge.	+		+	+				+
61. <i>A. blakelockii</i> Mobayen			+					
62. <i>A. bodeanum</i> Bge.	+	+						+
63. <i>A. gorganense</i> Mobayen		+						+
64. <i>A. blandum</i> Czernjak.		+						
65. <i>A. gadukense</i> Mobayen	+	+						+
66. <i>A. michaudaghense</i> Mobayen	+							+
VIII Sect. Tragacanthina Bge. VIIIa subsect. Stenostoma Bge.								
67. <i>A. karelinii</i> (Stschegl.) Bge.	+							
68. <i>A. quinquelobum</i> Bge.		+		+				+
69. <i>A. curviflorum</i> Bge.				+				+
70. <i>A. hystrix</i> Stapf				+				+
71. <i>A. heratense</i> Bge.		+		+				
VIII Sect. Tragacanthina Bge. VIIIa subsect. Tragacanthina								
72. <i>A. tragacanthinum</i> (Jaub. & Spach) Boiss.	+							+
73. <i>A. rhodopolium</i> Schiman-Czeika				+				+
74. <i>A. spinicalyx</i> Koieie & Rech. f.		+		+		+		+
75. <i>A. scorpius</i> (Jaub. & Spach) Boiss.	+	+		+	+	+	+	+
76. <i>A. chlorostegium</i> Rech. f. & Schiman-Czeika						+		+
77. <i>A. modestum</i> Bornm. ex Rech. f. & Schiman-Czeika						+		+
78. <i>A. erinaceum</i> Jaub. & Spach) Lincz.	+	+	+	+	+			
79. <i>A. gulistanum</i> Bge.		+						+
Total	23	20	21	29	2	17	1	65

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Table 2. Number of *Acantholimon* species endemic in different provincial chorotypes of Iran.

Phytochoria	Number of species	% to the total species
Atropatanean p	8	10
N. Khorasan p	9	11.4
Kurdo-Zagrosian p	8	10
C. Iranian p	14	17.7
Fars-Kerman p	12	15
Hyrceanian p	0	0
N. Baluchistan p	0	0
Nubo-Sindian p	0	0

Table 3. Number of *Acantholimon* species with two or more chorotypes.

Phytochoria	No. of species
N. Khorasan & C. Iran	5
C. Iran & Fars-Kerman	1
Atropatanean & C. Iran	1
Atropatanean & N. Khorasan	1
Three or more phytochoria	3