The Sustainable Natural Resource Management Project (SNRMP II)
EPA and UNDP
Republic of Yemen

FLORA OF YEMEN

الحياة النباتية لليمن

(فلورا اليمن)

Prepared by اعداد

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The contents المحتويات

Summary خلاصة

This report mainly based on field study carried out by the author during 21 years period between 1990-2012. The more recent studies on flora of Yemen was carried out by a number of authors, among them the following, (see bibliography for details).

تم إخراج هذه الدراسة من خلال الدراسات الميدانية للحياة النباتية (فلورا) و للغطاء النباتي لليمن من الفترة بين 1990 و 2012م ، تم الاستعانة بدراسات أخرى في نفس المجال من هذه الدراسات مايلي:

1. Boulos, L. (1988)
2. Miller, A.G. & Morris M. (2004)
3. Gabali, S.A. & Miller, A.G (1992)
4. Gabali, S.A. (1998)
5. Hepper , list of plants collected for RBG Kew in 1975
6. Mies, B. (1994)
7. Miller, A.G. & Cope, T.A. (1996)
8. Wood, J.R.I. (1997)
9. Cope, T.A. (2007)

Most publications on vegetation and flora of Yemen and Arabia were utilized to identify the locality of the species (see the bibliography).
The author observation and collection of plant species are marked by **@**
The number from 1 to 9 marks the species mentioned by the above studies.
Endemic plant species of Yemen are marked by ***** and of Arabian Peninsula by ****.**
Yemen's flora is very rich.
This study identified a large number of species. Total plant species is about 2838 species, belongs to 1068 genera and 179 families, (2602 naturalized, 129 cultivated and 107 introduced). For more detail information see table (1) .
Yemen is rich in endemic and near endemic plants, with estimated to be 608, in which 457 are endemic (307 in Soqotra). Constituting some 16% of the flora which does not occur elsewhere.

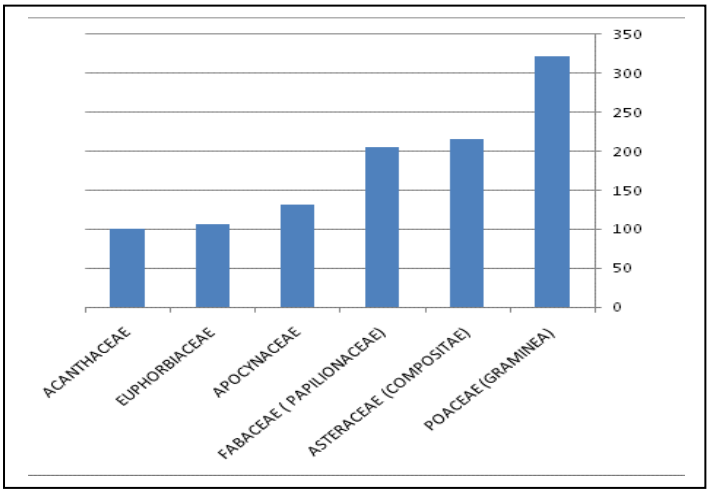
تم استخدام معظم المراجع التي تطرقت إلى الغطاء النباتي والحياة النباتية اليمنية (الفلورا) وذلك لتحديد مناطق تواجد النباتات الطبيعية (انظر للمراجع) . قد تم الإشارة بعلامة @ للنباتات التي شوهدت من قبل معد هذه الدراسة أما الأرقام من 1 إلى 10 فهي ترمز للدراسات العشر السابقة للذكر. تم الإشارة كذلك للنباتات المتوطنة والتي يقتصر تواجدها على اليمن فقط برمز (*) والنباتات شبه المتوطنة والتي يقتصر تواجدها علي الجزيرة العربية فقط برمز (**).

الحياة النباتية في اليمن غنية جدا، وقد سجلت هذه الدراسة 2838 نوعا نباتيا تتبع 1068 جنسا و 179 فصيلة (2602 تنموا طبيعيا، 129 منزرعا، 107 مدخلا)، للمزيد ينظر إلى الجدول (1)
الغطاء النباتي في اليمن غني بالنباتات المتوطنة وشبه المتوطنة، حيث تقدر بحوالي 608 نباتا منها 457 متوطنة أي يقتصر تواجدها على اليمن فقط، (307 تتواجد في سقطرى فقط)، والتي تشكل حوالي 16% من النباتات اليمنية.

The most important families regarding to the number of plant species are:

من أهم الفصائل النباتية في اليمن من حيث احتوائها على العدد الأكبر من النباتات

family	number
POACEAE (GRAMINEA)	322
ASTERACEAE (COMPOSITAE)	216
FABACEAE (PAPILIONACEAE)	205
APOCYNACEAE	131
EUPHORBIACEAE	106
ACANTHACEAE	100



The most important families regarding to the number of endemic are:

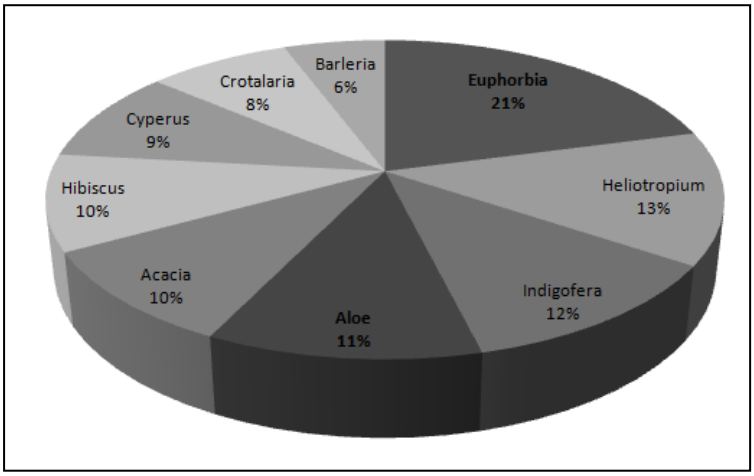
من أهم الفصائل النباتية من حيث احتوائها على العدد الأكبر من النباتات المتوطنة :-

Family الفصيلة	**النباتات المتوطنة endemic**
APOCYNACEAE	45
ASTERACEAE (COMPOSITAE)	45
EUPHORBIACEAE	30
ACANTHACEAE	28
FABACEAE (PAPILIONACEAE)	24
BORAGINACEAE	23
LAMIACEAE (LABIATAE)	23
ALOEACEAE	17
RUBIACEAE	17
SCROPHULARIACEAE	16
POACEAE (GRAMINEA)	15
CARYOPHYLLACEAE	14
MALVACEAE	12

Among the important genera:

من أهم الأجناس مايلي:

Genera الجنس	**The species الانوع**
Euphorbia	62
Heliotropium	40
Indigofera	35
Aloe	33
Acacia	29
Hibiscus	29
Cyperus	28
Crotalaria	24
Barleria	17



Acknowledgement شكر وتقدير

The first study of the flora of Yemen was carried out in 2000 with support of YEM/97/100 Sustainable Environmental Management Programme funded by UNDP in order to satisfy requirement of sub programme (2) Advices & Information on Land Resources Utilization at Agricultural Research and Extension Authority (AREA).

This update was presented out with active support of The Sustainable Natural Resource Management Project (SNRMP II) funded by UNDP.

During my work I have encountered many obstacles and provided with support and assistance from different institutions and personal, special thank to people provided support from Environmental Protection Authority (EPA), Agricultural Research and Extension Authority (AREA) and Royal Botanic Garden of Edinburgh (RBGE).

I would like to express special thanks to Dr. Muhammed Qaed al Sabiri the head of AREA Regional Station, Taiz. And the staff of AREA.

I would like to thank Mr. Ali Abdul Bari the manager of The Sustainable Natural Resource Management Project (SNRMP II), Mr. Abdul Hakim Rajeh, and Mr. Mahmud Shidewa the chief of EPA.

I would thank Mr. Abdul Habib Mahyub Al Qadasi (AREA, Taiz station) for providing important information on locality and local names of plant species, Mr. Anthony Miller (from RBGE) for providing plant pictures and sufficient information on the flora & Dr. Sabina Knees (from RBGE), Dr. Abdul Naser Al Gifri (univ. of Aden), Dr. Wadie Abdul Ghani Saeed (univ. of Aden), and Mrs. Nadia Qasem Mohammed (AREA, al Kod station) Mr. A. Al Naggar (AREA, Dhamar) for their support and for their information on the locality of plant species .

Dr. Abdul Wali Ahmed Al Khulaidi
2013

Forward: تقديم

I pleased to introduce this study of the flora and vegetation of Yemen which presents the vegetation and list of the whole known plant species in Yemen. Over used of plants and unplanned urbanization has led to biodiversity loss and degradation of vegetation and it's ecosystem. The needs of our food and medicines are depend mainly upon our plant biodiversity, the vegetation itself provides also many other genetic resources.

The Sustainable Natural Resource Management Project (SNRMP II) contracted Dr. Abdul Wali Ahmed Al Khulaidi (PhD in vegetation and plant ecology) who was identified by Agriculture Research and Extension Authority (AREA) to update and prepare the content of this study utilizing his experience and knowledge he accrued while working in the field of flora and vegetation research and identification in. AREA.

This study constitutes a requirement to output of SNRMP II information in vegetation and flora specifically the Biodiversity Unit, where Yemen Flora will be documented. The report is very important step in listing identified plant species of Yemen.

The study in our hands is divided to four sections (1) introduction, which gives background and information on Yemen flora and related issues, (2) Main vegetation types of Yemen (3) checklist of flora identified (4) Bibliography of Natural Resources.

The study in its format may not be attractive to the general readers, however it is an important and valuable reference to Taxonomists, University students, agriculture and environment libraries and specialized persons and will be the first step to output the detail studies of the vegetation and flora of Yemen.

I would like to thank the author of this study and everyone who contributed to this study including the staff of SNRMP

H.E Abdo Razzaz Saleh Khaled

Minister of Water & Environment

Introduction المقدمة

Main topographical units of Yemen (After Al Khulaidi, A.A. & El-Ghouri,M. (1996).
طبوغرافية اليمن

1. **Coastal plains: السهول الساحلية**

They extend along the coastal areas of the Red Sea, Gulf of Aden and Arabian Sea and form more than 2000 km along:

A) Western plain (Tihama plain): It is the coastal plain between the Red Sea and the Tihama foot hills. It is about 420 km long and about 40 km wide to the north, 50 at the middle and about 20 km at the south covering a total area of about 14,700 km2, with corresponds to approximately 2.6% of the area of Yemen. The altitude ranges between 0-300 meter above sea level. It is flat to undulating and intersected by several wadis (e.g. Wadi Mor, Wadi Rima', Wadi Zabid, Wadi Siham, Wadi Rusyan and Wadi Surdud) draining from the escarpment to the sea.

B) Southern and southern east plain:

It is the coastal plain between the Gulf of Aden, Arabian Sea and the southern and southern east mountains. They are about 1580 km long and 8 to 35 km wide in the west 8 to 25 in the middle and about 1 to 20 km in the east, covering about 44240 km2 (approximately 7.9% of the area of Yemen). The altitude ranges between sea level to 200 m. It is flat to undulating and intersected by several wadis (e.g. Wadi Bana, Wadi Hasan, Wadi Ahwar, Wadi Hagr, Wadi Tuban and Wadi Mayfa')**.**

2. Low altitude mountains: المرتفعات منخفضة الارتفاع

a) Western mountains (Tihama foothills): المرتفعات الغربية (سفوح التلال التهامية)

The Tihama foothills are located between the western lowlands and the escarpment below 1000 m, and range between 300 to 1000 m above the sea level. These mountains are facing the western mountains of Hajjah, Al Hudeydah, Al Mahwit, Dhamar and Rayma Governorates. The landscape comprises of steep to moderately steep mountains and hills. Important plant areas are located on these regions, example Jabal Bura' protected area, J, Milhan, Al Al H'adiyyah in Jabal and Rayma Mafraq (west of Taiz),

b) Southern and southern east mountains: المرتفعات الجنوبية والجنوبية الشرقية

These mountains are facing the southern or southern east plains of Abyen, Lahj, Shabwa and Hadhramaut governorates to the coastal areas of al-Mahara governorate. The altitude ranges between 400 to 1000 m above the sea level. The main wadi here is Wadi Hadhramaut Important plant areas are located on these regions, example Jabel al-Arays (Abyen governorate), Ras Fartak and Huf

3. Medium altitude mountains: المرتفعات متوسطة الارتفاع

a) Western mountains: المرتفعات الغربية

Comprise of the mountains located west of Hajjah and al-Mahwit governorates, around Jabel Milhan and Jabel Bura, Thaiz highlands, and mountains located around Madinat Ash Sharq west Huth and west al-Makhadir (Ibb). The altitude ranges between 1000 to 1800m above the sea level.

b) Southern and southern east mountains: المرتفعات الجنوبية والجنوبية الشرقية
The altitude ranges between 1000 to 1800 m above the sea level (high to the west and low to the east), and comprise the mountains of Taiz, Adhale, Mukairas, Yafe' Assufla, Jabel Eraf (south al-Maqatra), al-Awaleq Assufla, Lawdar, Modia, Jabel Jihaf (Lahj governorate) and mountain of Hadhramaut and Al Mahara

.

4. High altitude mountains: المرتفعات عالية الارتفاع

a) These mountains lie above 1800 m and comprise the mountains of Ibb, Sabir, at-Turba, Reyma, Dhamar, Jabel Alloz, Jabel An Nabi Shuaib, Mukeiras, Jabel Abran, Yafe al-Ulya, Hajjah and Sana'a.

5. Highland plains: السهول عالية الارتفاع

a) High altitude plains located over 1800 m and including those around Sada, Sana'a, Dhamar, Rada' and qa-Bakil.
b) low altitude plains(< 1800m) include those around al-Qaeda, Qa al-Hagl and Qa Shihara.

1. Eastern and northern east mountains: المرتفعات الشرقية والشمالية الشرقية

a) high altitude mountains > 1800 m.
They include the mountains which form the division between the wadis flowing west (Red Sea) and east into the desert, and comprise the mountains east mountain plains of Dhamar and Amran, east and north Rada', between Rada' and al-Baydha and between Abyen and al-Baydha.

b) Medium altitude mountains (1200-1800 m):
These mountains drop several hundred meters into the eastern desert plains and include the mountains east Sa'da, around and west Marib, north al-Baydha, around Bayhan, north Al Mahara and north Ataq (Shabwa).

7. Eastern desert: الصحراء الشرقية
Extend along the northern border of Yemen and drop from 1000 m towards north, east and northern east to less than 500 m, and include the areas east and north Marib north Shabwa, north Al Mahara, north Hadhramaut, the desert of Arrub' Al Khali and Ramlat As Saba'tein.

8- Soqotra Archipelago ارخبيل سقطرى
The topography consists of the followings:
1- The coastal plains it is flat to undulating, the altitude ranges between: 0-100 m
2- Mountain and hills, the altitude ranges between 100-600) m
3- limestone plateaus and rolling highlands, the altitude ranges between 600 and 900 m
4- granite mountains and highest parts of a limestone plateaus, the altitude ranges between 900 and 1300
5- peak parts of the granite mountains, the altitude ranges between 1300-1500

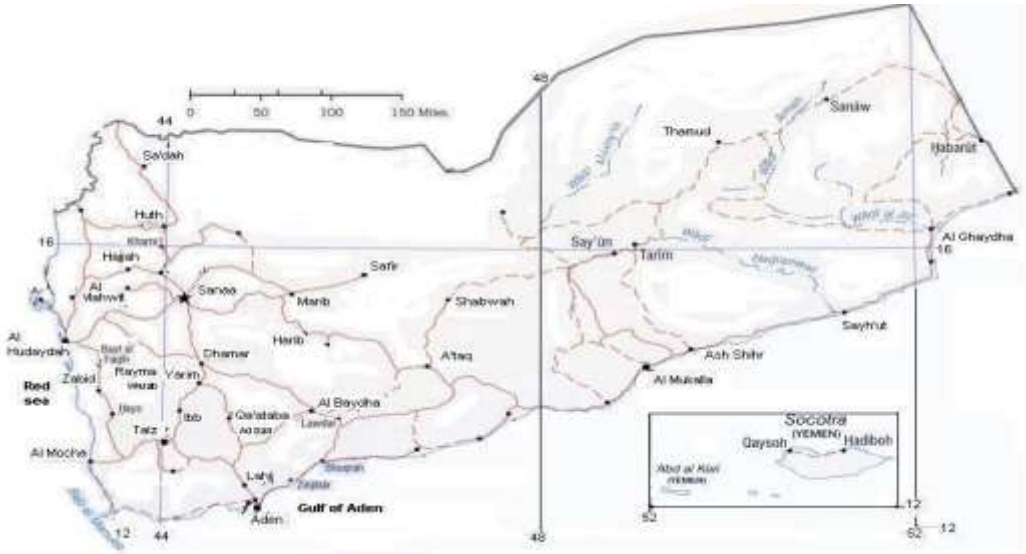


Fig. 1. main cities of Yemen اهم المدن

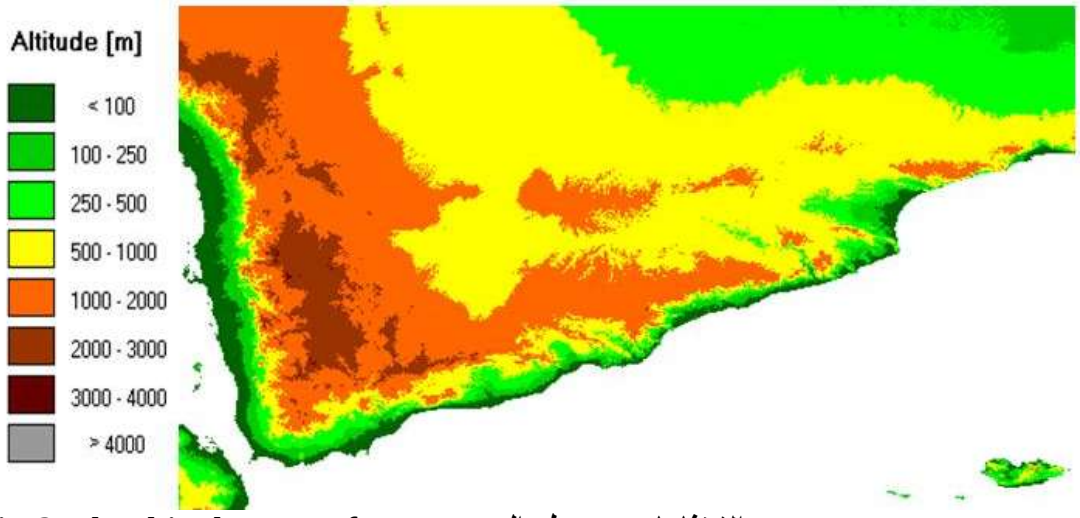


Fig. 2. The altitude range of Yemen الارتفاعات عن سطح البحر

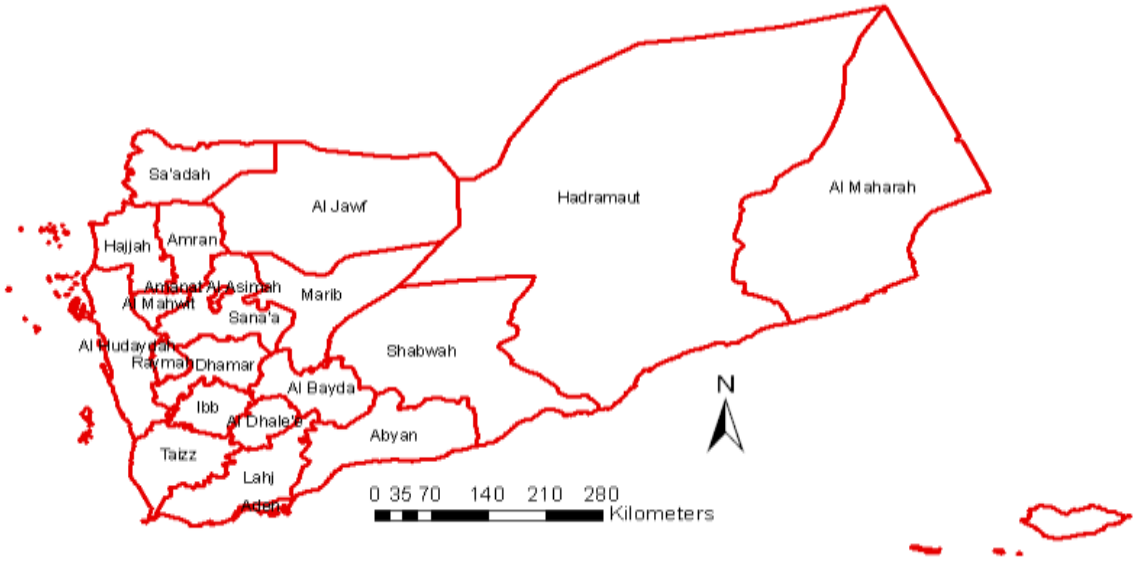


Fig. 3. The Governorates of Yemen المحافظات اليمنية

The flora of Yemen الحياة النباتية لليمن

Yemen's flora is very rich. This study identified a large number of species. Total plant species is about 2838 species, belongs to 1068 genera and 179 families, (2602 naturalized, 129 cultivated and 107 introduced). For more detail information see table (1). In addition there are 4 endemic varieties, 3 near endemic varieties, 3 endemic sub species and 1 near endemic sub species.

الحياة النباتية في اليمن غنية جدا، وقد سجلت هذه الدراسة 2838 نوعا نباتيا تتبع 1068 جنسا و 179 فصيلة (2602 تنموا طبيعيا، 129 منزرعا، 107 مدخلا)، للمزيد ينظر إلى الجدول (1)

Phytogeography of Yemen الجغرافية النباتية

The flora of Yemen is a mixture of the tropical African, Sudanian plant geographical region (Paleotropical origin) and the Saharo-Sindian or Saharo-Arabian region (Holarctic origin) with very few of Irano-Turanian.and Mediterranean regions. Most of Yemen's flora belong to Sudanian regin (Eritreo-Arabian province of Sudanian region, Zohary, 1973) or (Somalia-Masai region center of endemism, white, 1983). The Sudanian element dominates the western mountains and parts of the high land plains which is characteristic by relatively high rain fall. The Saharo-Arabian element dominates in the coastal plains, eastern mountain and the eastern and northern desert plains.

تنتمي معظم نباتات اليمن إلى الإقليم السوداني حسب تقسيم زوهري (1973) أو الإقليم الصومالي المساي (Somalia-Masai regionL center of endemism) حسب تقسيم وايت (1983) وتسمى التقسيمات السابقة بالباليوتروبيكل (Paleotropical floristic Kingdom)وهي تشمل الجزء الشرقي من أفريقيا شرق وجنوب إثيوبيا وجنوب شرق السودان وشمال شرق أوغندا ومعظم كينيا ووسط تانزانيا والصومال وجنوب الجزيرة العربية .

كما تنتمي بعض نباتات اليمن أيضا الى الإقليم الصحراوي العربي Saharo-Arabian أو الصحراوي السندي-Saharo Sindian والتي تمتد الى كل من مصر وفلسطين وجنوب العراق وجنوب غرب سوريا وايران (Zohary, 1973) او ما يطلق عليه ب (Holarctic origin). وتنتمي القليل منها الى اقليم البحر الابيض المتوسط والاقليم الايراني الطوراني. (شكل4 و 5).

تسود نبتات الاقليم الافريقي في المرتفعات الغربية وبعض مناطق سهول المرتفعات العالية كثيرة الامطار. اما نباتات الاقليم الصحراوي العربي فانها تسود في مناطق السهول الساحلية والجبال الشرقية والسهول الصحراوية الشرقية والشمالية.

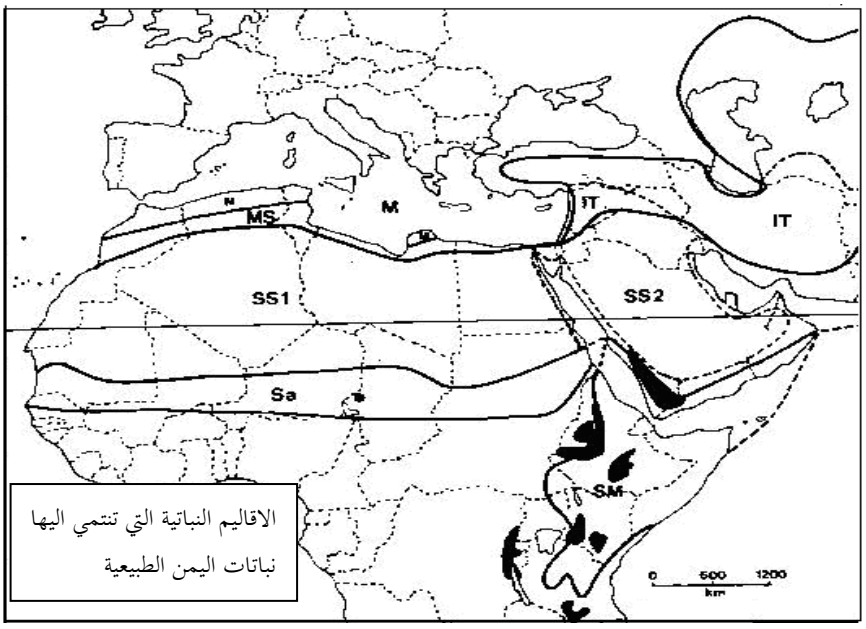


Figure 4. General limits of the main phytogeographical regions of Africa and south west Asian; IT, Irano-Turanian regional centre of endemism; MS, Mediterranean-Sahara regional transition zone; SS, Saharo-Sindian regional zone further divided into the Arabian regional sub-zone (SS1), the Nubo-Sindian local centre of endemism (SS2); SM, Somalia-Masai regional centre of endemism; shaded black, Afromontane archipelago-like regional centre of endemism. After White and Leonard (1991).

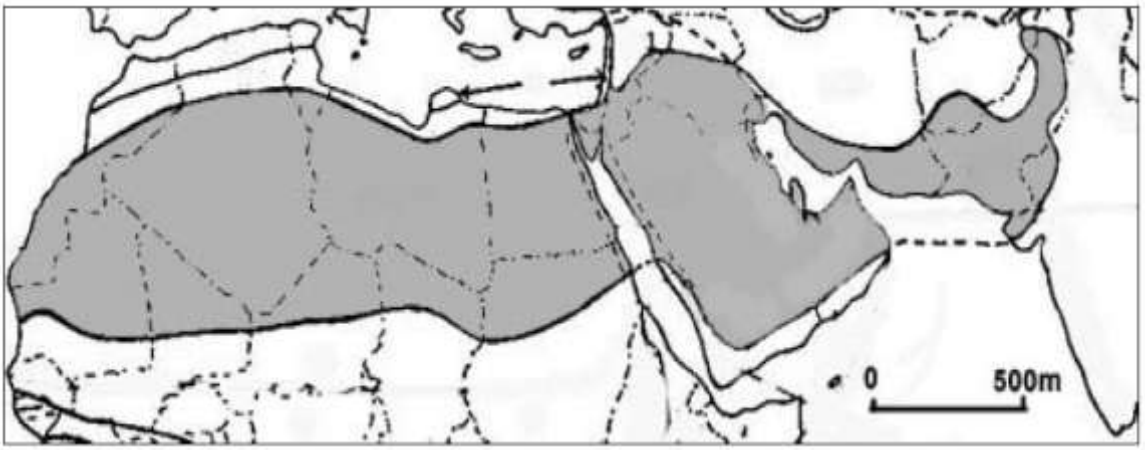
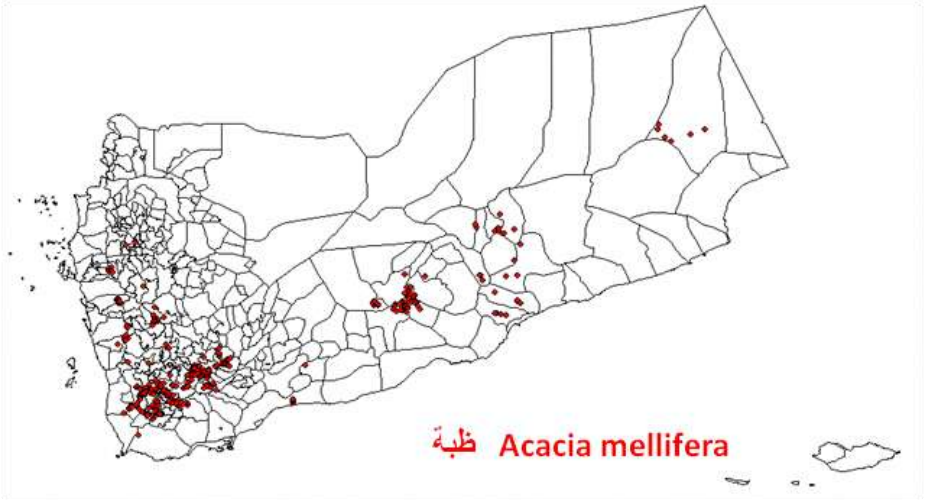
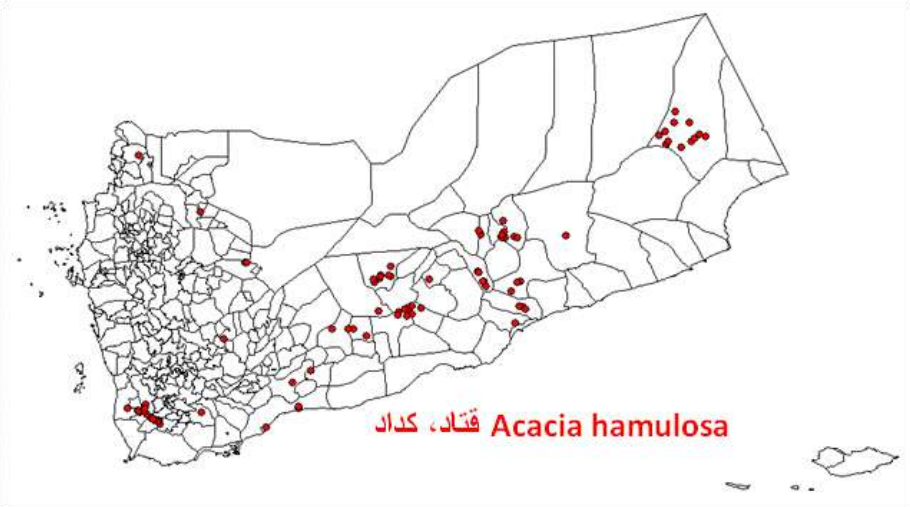


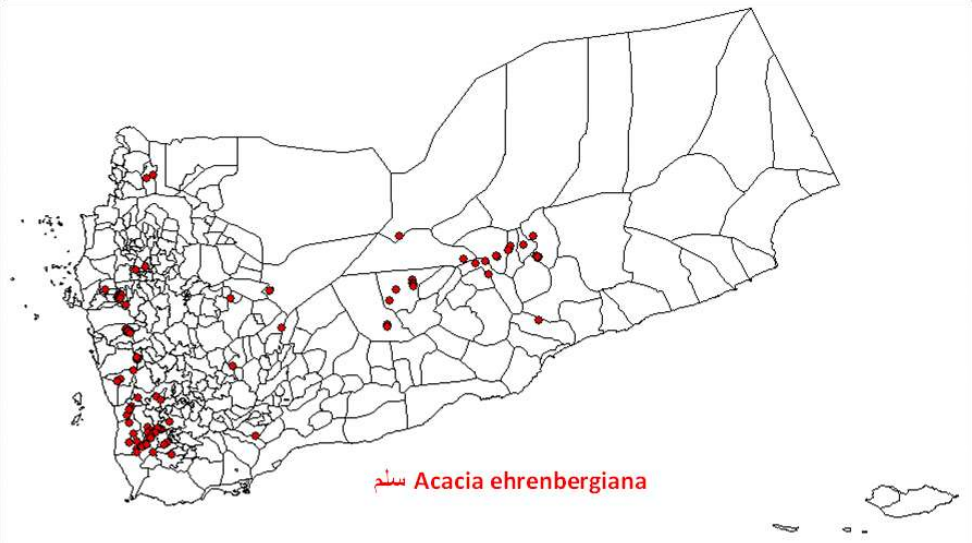
Fig. 5. Saharo-Sindian regions (After Thomas , et al, 2008) الاقليم الصحراوي السندي

Plants of Sudanian reign: نباتات الإقليم السوداني

Acacia mellifera, A. tortilis, A. hamulosa, A. ehrenbergiana, A. gerrardii, A. origena, A. seyal, Aerva javanica, Asparagus africanus, Buddleja polystachya, Cadaba farinose, Capparis spinosa, Carissa spinarum , Cenchrus ciliaris, Cissus quadrangularis, Cissus rotundifolia, Cordia africana, Cordia quercifolia, Combretum molle, Commiphora gileadensis, Commiphora habessinica, Commiphora myrrha, Dactyloctenium scindicum, Dobera glabra, Ficus palmate, Ficus vasta, Grewia villosa, Hibiscus deflersii, Hypoestes forskalei, Indigofera oblongifolia, Indigofera spinosa, Maerua crassifolia, Myrsine africana, Mimusops laurifolia, Lasiurus scindicus, Leptadenia pyrotechnica, Olea europaea, Panicum turgidum, Rosa abyssinica, Salvadora persica, Sarcostemma viminale, Solanum incanum, Tamarix aphylla, Teclea nobilis , Tephrosia apollinea, Trichilia emetica, Withania somnifera, Ziziphus mucronata, Ziziphus spina-christi and others.




Acacia hamulosa قتاد، كداد


Acacia ehrenbergiana سلم

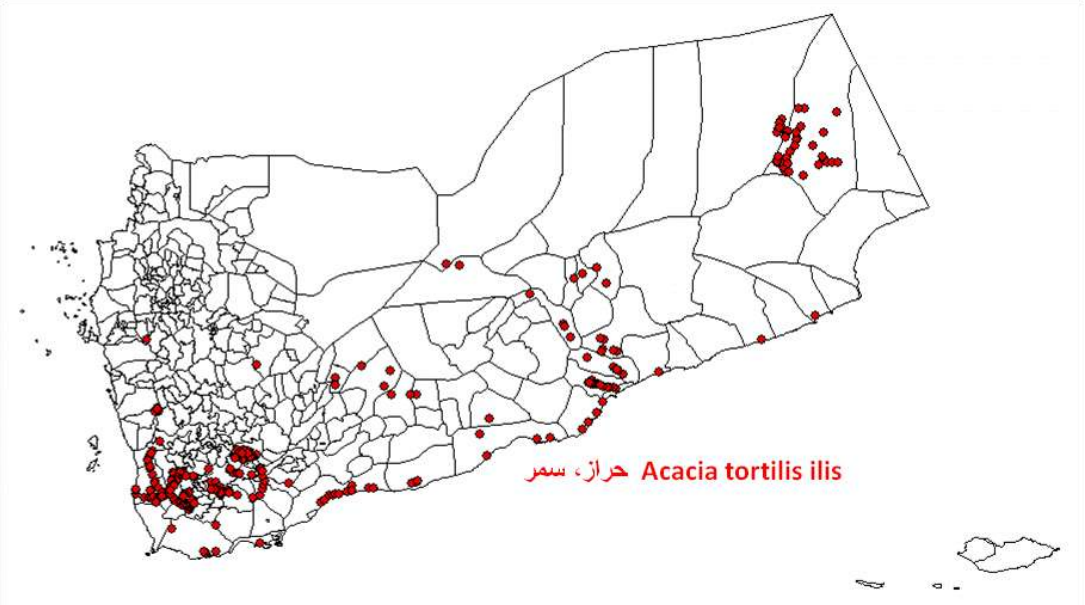

Acacia tortilis ilis حراز، سمر

Fig. 6. The distribution of 4 plant species (*Acacia hamulosa, A. mellifera, A. ehrenbergiana and A. tortilis*) of the Sudanian element. مناطقالانتشار لأربع نباتات من الإقليم السوداني

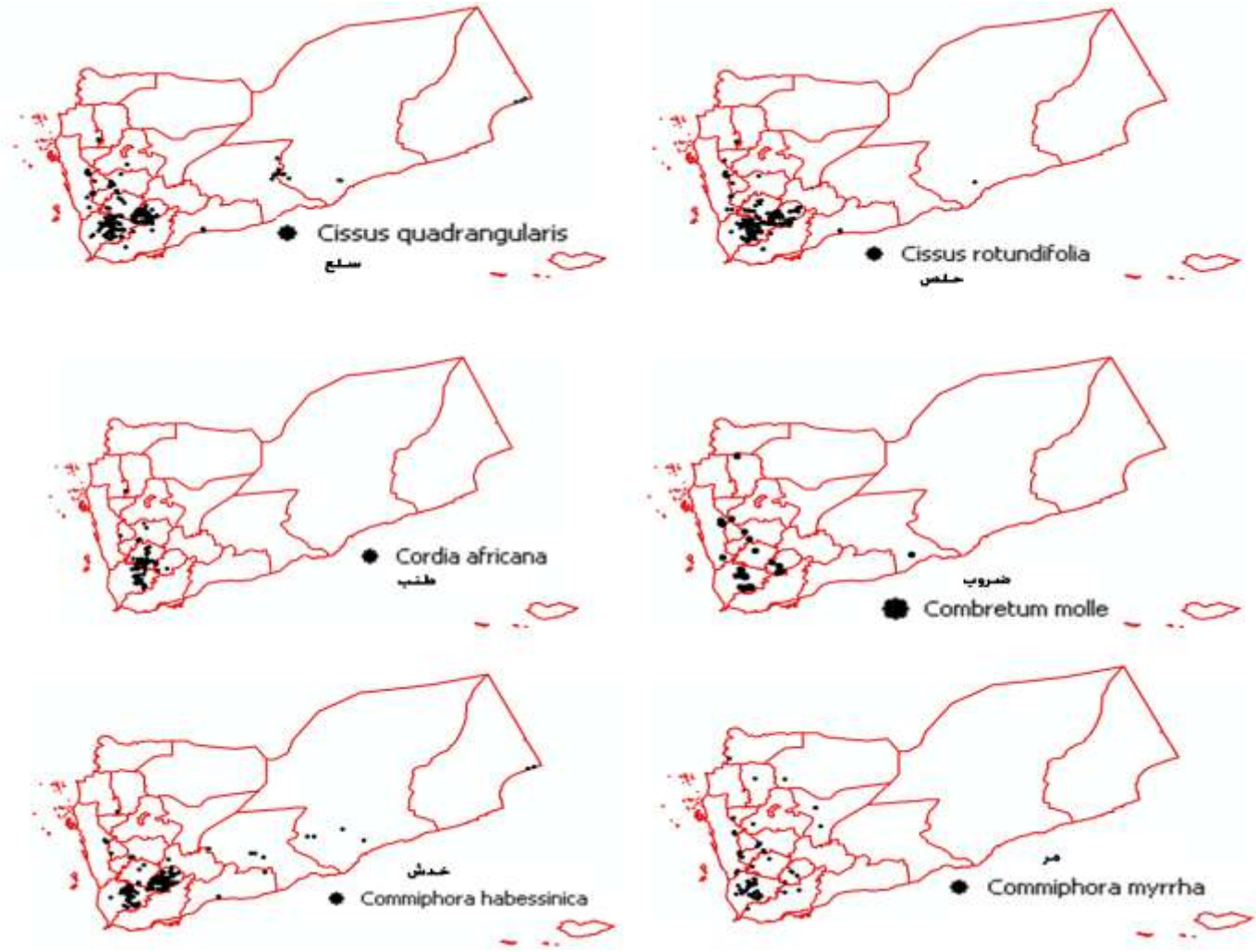


Fig. 7. The distribution of 6 plant species of the Sudanian element.

مناطق انتشار 6 نباتات من الإقليم السوداني

ومن النباتات التي تنتمي للإقليم الصحراوي العربي والتي تمتد الى كل من مصر وفلسطين وجنوب العراق وجنوب غرب سوريا وايران (Zohary, 1973) والتي تتواجد في السهول الساحلية وفي الوديان الرئيسية الواقعة في مارب وحضرموت وشبوة والمهرة :

Among the Saharo-Arabian elements (Holarctic origin) in the Yemen that extends to Egypt, Palestine, Arabia, southern Iraq and south western Syria and Iran (Zohary, 1973) are:- *Aerva javanica, Althaea ludwigii, Anastatica hierochuntica, Asphodelus fistulosus, Astragalus sparsus, Cadaba glandulosa, Capparis cartilaginea, Capparis decidua, Chrozophora oblongifolia, Citrullus colocynthis, Cleome amblyocarpa, Cymbopogon schoenanthus, Cyperus conglomeratus, Dichanthium annulatum, Dipterygium glaucum, Euphorbia scondifolia, Fagonia indica, F. paulayana, F. bruguieri, Forsskaolea tenacissima, Halopeplis perfoliata, Heliotropium rariflorum, Iphiona scabra, Lasiurus scindicus, Leptadenia arborea, Ochradenus baccatus, Oligomeris linifolia, Panicum turgidum, Periploca visciformis, Phoenix dactylifera, Pulicaria undulata, Rhazya stricta, Seddera latifolia, Senna italica, Tribulus arabicus, Withania somnifera, Zygophyllum simplex, Z. album, Z decumbens, Z. Coccineum.*

These species are well represented in the main wadis of Marib, Hadhramaut, Shabwa and Al Mahara as well as in the coastal areas.

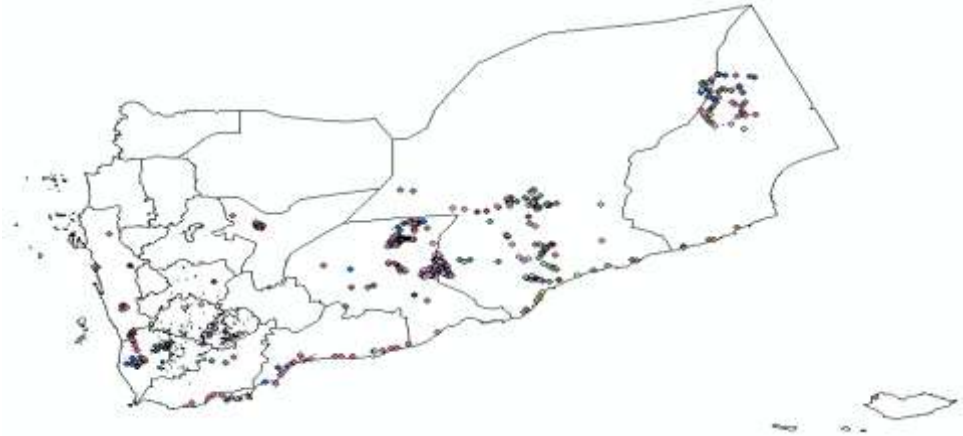


Fig. 8. The distribution of Plant species of Saharo-Arabian/ Saharo-Sindian regions, these species are scattered and represented well in the desert and semi desert of Al Mahara, Hadhramaut, Shabwa and Marib Governorates as well as the coastal areas .

مناطق انتشار نباتات الاقليم الصحراوي العربي وتتواجد خاصة في المناطق الصحراوية من مارب حتى المهرة وكذلك المناطق الساحلية من اليمن

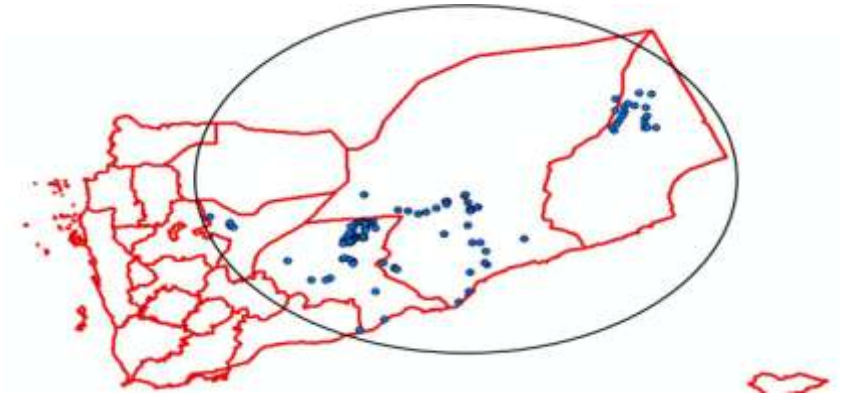


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Fig. 9. The distribution of the Saharo-Sindian elements ***Rhazya stricta***, it occurs on the semi desert areas from Marib west to Al Mahara east.

التوزيع الجغرافي لاحد نباتات الاقليم الصحراوي العربي (الحرمل *Rhazya stricta*) والذي يمتد من مارب غربا الى المهرة شرقا.

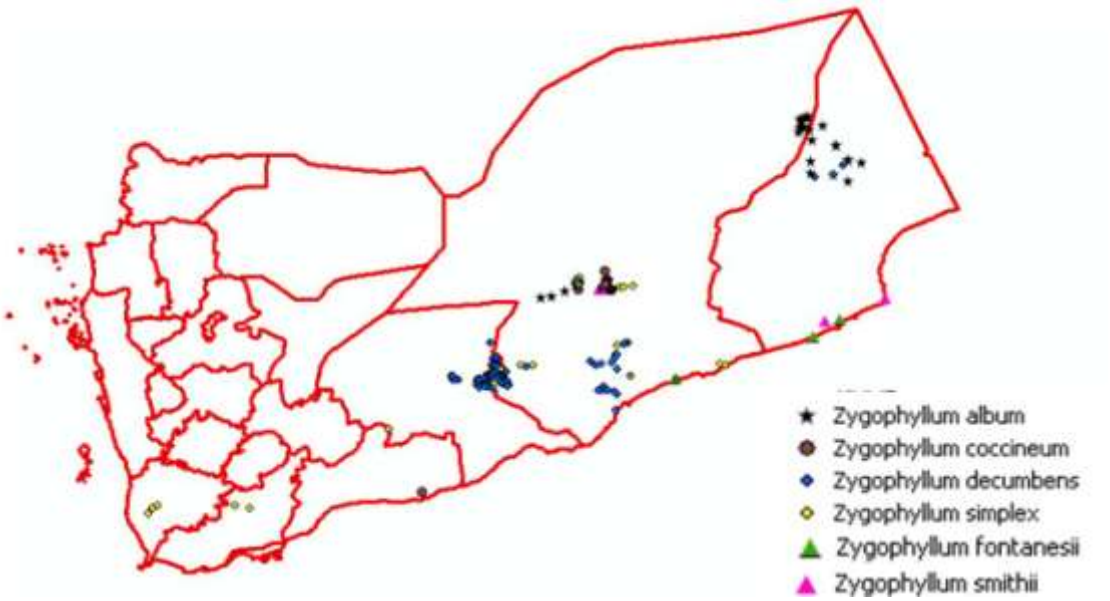


Fig. 10. The distribution of Saharo-Arabian elements Zygophyllum spp. Most of species are seen further east and north east in the desert and semi-desert environment of Shibam, Hadhramaut and Al Mahara Governorates. Few species such as Z. *simplex* are recoded from the coastal plains further west. The near endemic Z. smithii is only recorded from Ras Fartak (Al Mahara) while *Z. fontanesii* is recorded from Sayhut-Qashin (Hadhramaut) and Ras Fartak al Mahara.

مناطق انتشار 6 انواع من نباتات الاقليم الصحراوي العربي لجنس ال Zygophyllum . سجلت معظم الانواع في المناطق الصحراوية وشبه الصحراوية من اليمن (مثل شبوة وحضرموت والمهرة) بعض الانواع مثل النوع Z. *Simplex* *سجل ايضا غرب البلاد*.

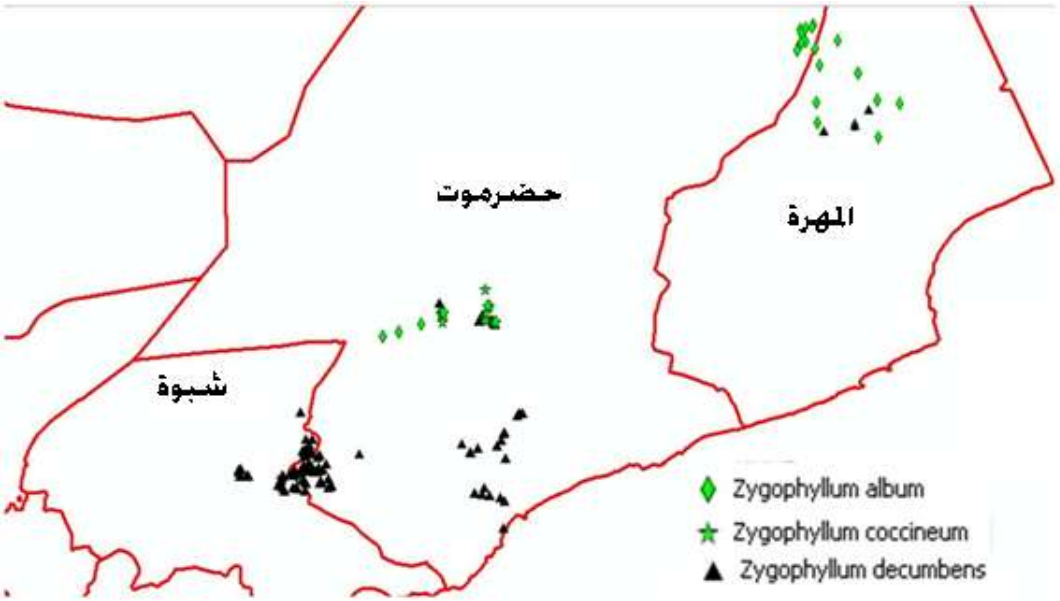


Fig. 11. The distribution of three of Saharo- Arabian elements Species (*Zygophyllum album, Z. Coccineum and Z. Decumbens*) in the Shibam, Hadhramaut and Al Mahara Governorates.

التوزيع الجغرافي لثلاث انواع من نباتات الاقليم الصحراوي العربي في محافظات شبام وحضرموت والمهرة.

The characteristic genera and species of the Irano-Turanian which occur in the eastern and northern east of the country are:

من نباتات الاقليم الايراني الطوراني

Calligonum spp. Cymbopogon spp., Alhagi graecorum, Prosopis farcta and *Typha elephantina.*

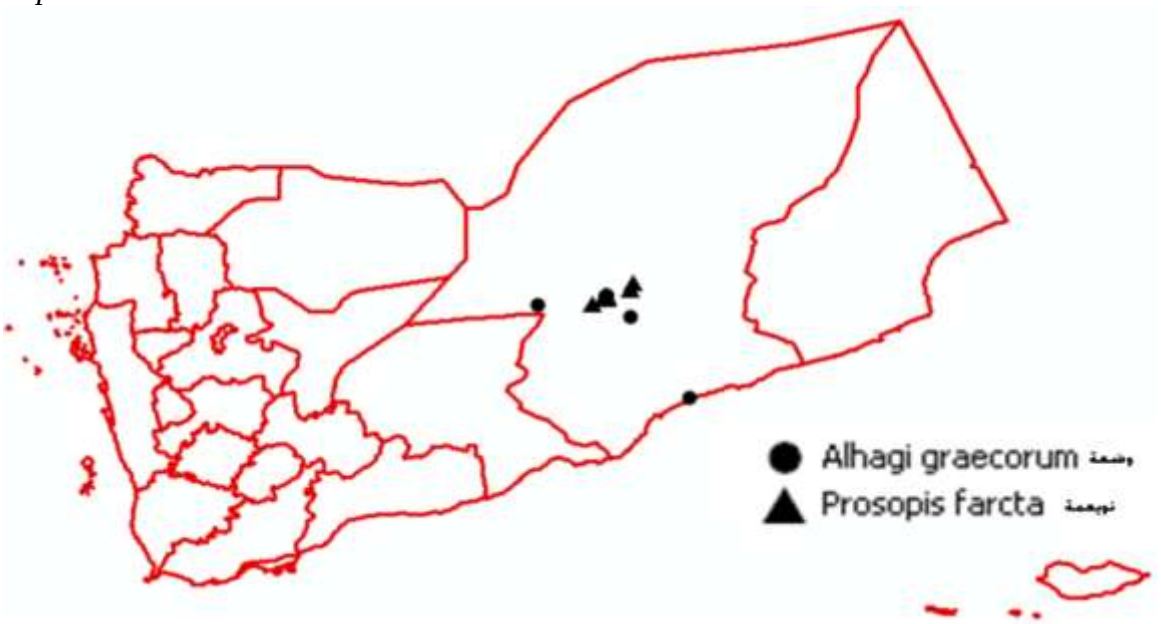


Fig. 12. The distribution of the Irano-Turanian species (*Prosopis farcta and Alhagi graecorum.*) which occur in the eastern and northern east of the country such as Hadhramaut.

التوزيع الجغرافي لنوعين (وضعة ونويعمة) من نباتات الاقليم الايراني الطوراني والتي تتواجد في شرق وشمال شرق اليمن، مثل حضرموت.

وهناك ايضا بعض من نباتات الاقليم الايراني الطوراني سجلت في المناطق الجبلية عالية الارتفاع مثال ذلك:

Other characteristic Irano-Turanian species represented in the high mountains areas of Yemen are:

Polygonum corrigioloides, Sterigmostemum sulphureum, Piptatherum holciforme and *Pterocephalus pulverulentus*

The characteristic genera and species of Mediterranean regions are*:*

نباتات وأجناس البحر الأبيض المتوسط:

Ammi majus, Anagyris foetida, Anarrhinum forskahlii, Bellardia trixago, Biserrula pelecinus, Capparis spinosa. Ceratonia siliqua, Diplotaxis erucoides, Ephedra foeminea, Erica arborea, Ferula communis, Hyoscyamus albus, Iris albicans, Lamarckia aurea, Lavandula dentate, Lavandula pubescens, Linum strictum, Ruta chalepensis, Marrubium vulgare, Myrtus communis, Ononis reclinata, Sedum hispanicum, Scrophularia arguta, Sisymbrium irio, Teucrium, Umbilicus horizontalis, Urtica pilulifera, Vulpia bromoides, Juniperus, and *Brassica,* These species are scattered and represented well in the highlands mainly in Ibb and Taiz Governorates.

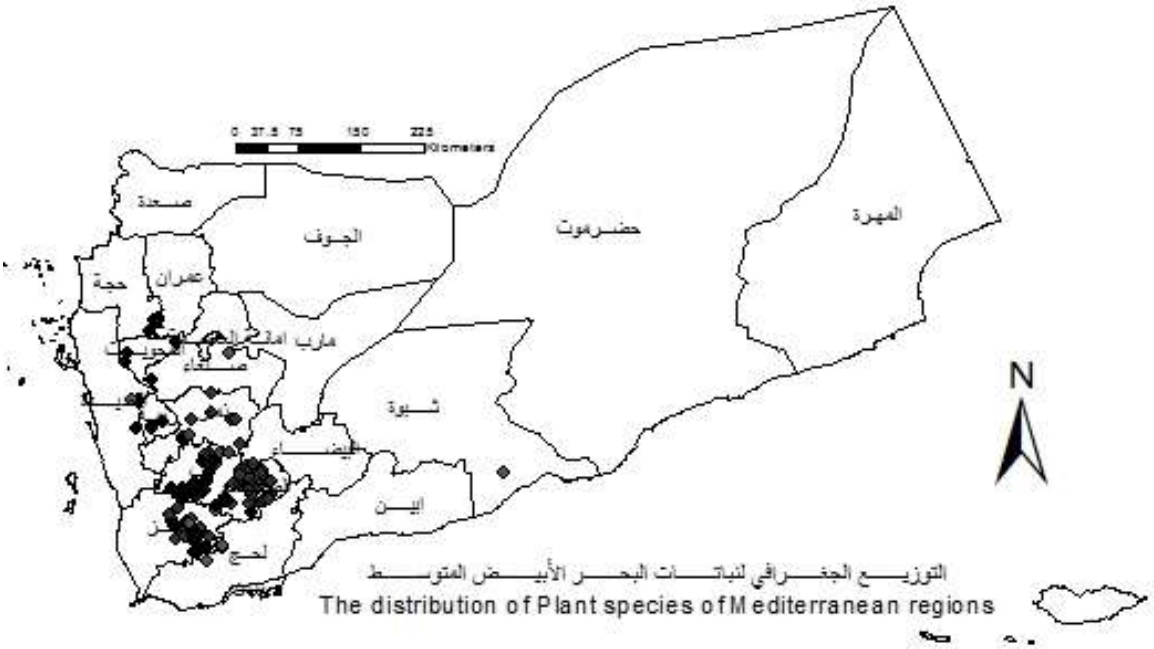


Fig. 13. The distribution of Plant species of Mediterranean regions, these species are scattered and represented well in the middle to highlands mainly in Ibb, Lahj and Taiz Governorates

التوزيع الجغرافي لنباتات البحر الأبيض المتوسط، وتتواجد أساسا في المرتفعات متوسة الى عالية الارتفاع من محافظتي اب وتعز ولحج.

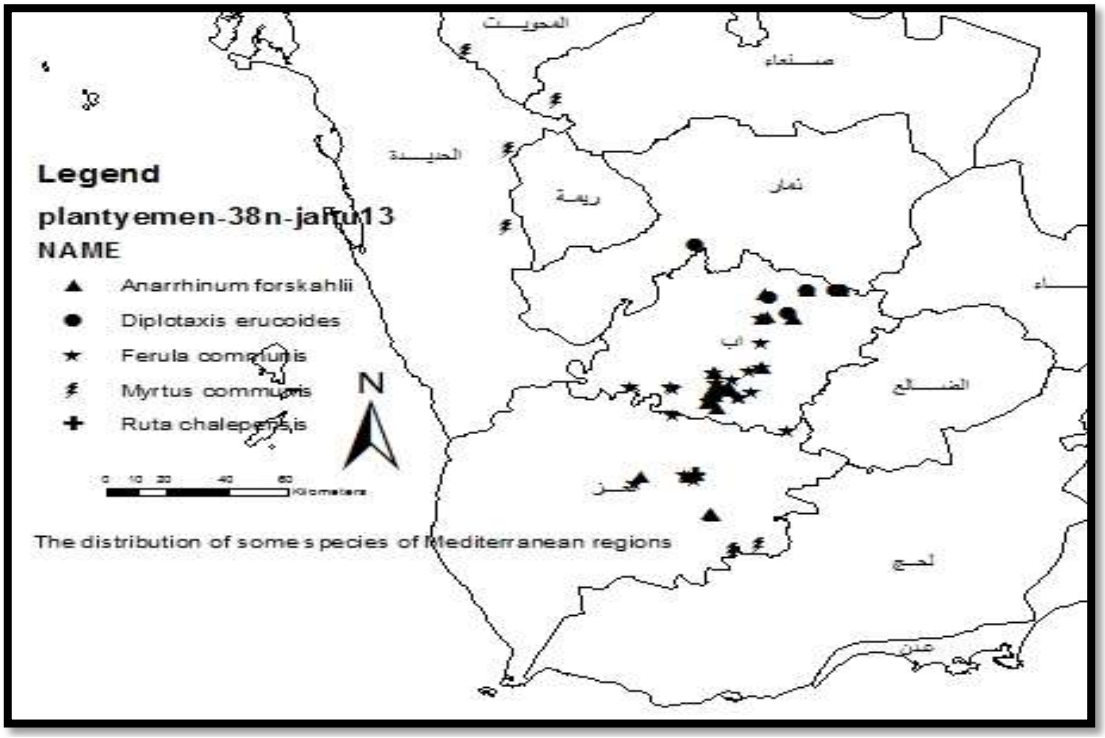


Fig. 14. The distribution of some species of Mediterranean regions *: Anarrhinum forskahlii,. Diplotaxis erucoides, Ferula communis, Ruta chalepensis* and *Myrtus communis.* Almost all species are recorded from the wet highlands of Ibb and Taiz governorate, *Myrtus communis* is also found on the dry areas further north and south.

التوزيع الجغرافي لبعض نباتات اقليم البحر الأبيض المتوسط، كل النباتات سجلت تقريبا من المرتفعات الغربية الرطبة من محافظتي اب وتعز، وقد سجل نبات الهدس *Myrtus communis من مناطق ابعد باتجاه الشمال والجنوب*

Endemic and near endemic plant species النباتات المتوطنة وشيه المتوطنة

Yemen is rich in endemic and near endemic plants, with estimated to be 611, in which 461 are endemic (307 in Soqotra). Constituting some 16% of the flora which does not occur elsewhere.

اليمن غنية بالنباتات المتوطنة (أي التي يقتصر تواجدها على اليمن فقط) وشبه المتوطنة (أي التي يقتصر تواجدها على الجزيرة العربية فقط)، وتقدر هذه النباتات بحوالي 611 نباتا منها 461 نباتا متوطنا (307 في ارخبيل سقطرى)، تشكل هذه النباتات المتوطنة حوالي 16% من الحياة النباتية اليمنية.

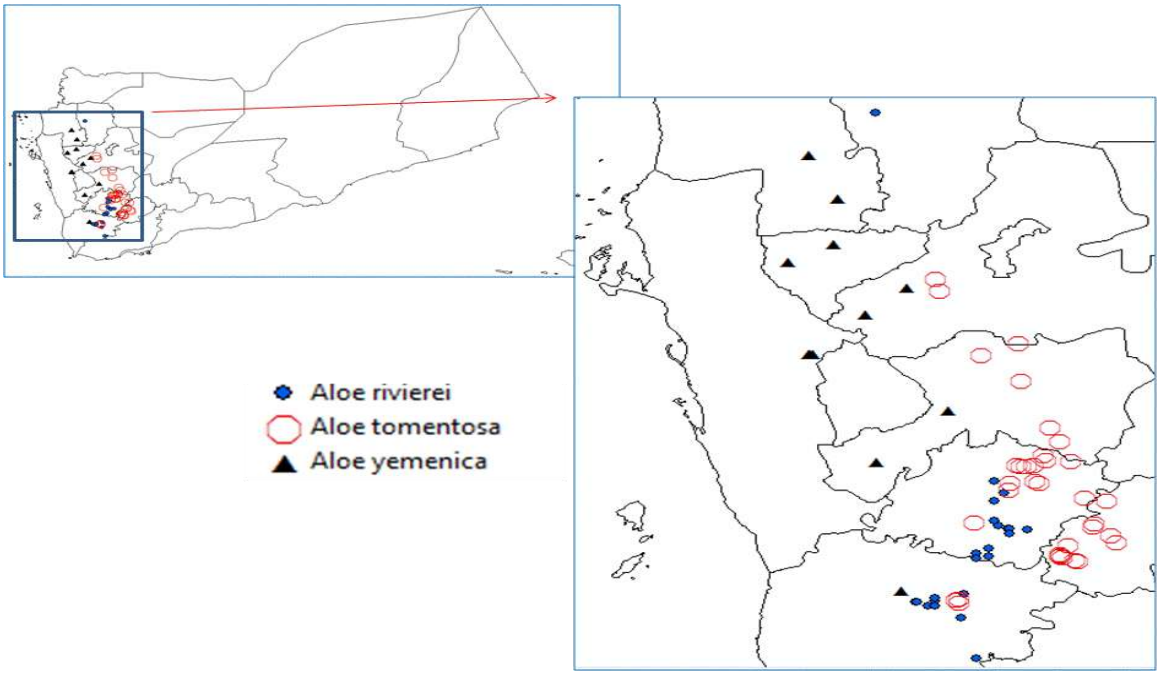


Fig. 15a. The distribution of thee endemic plant species
التوزيع الجغرافي لثلاث نياتات متوطنة في اليمن

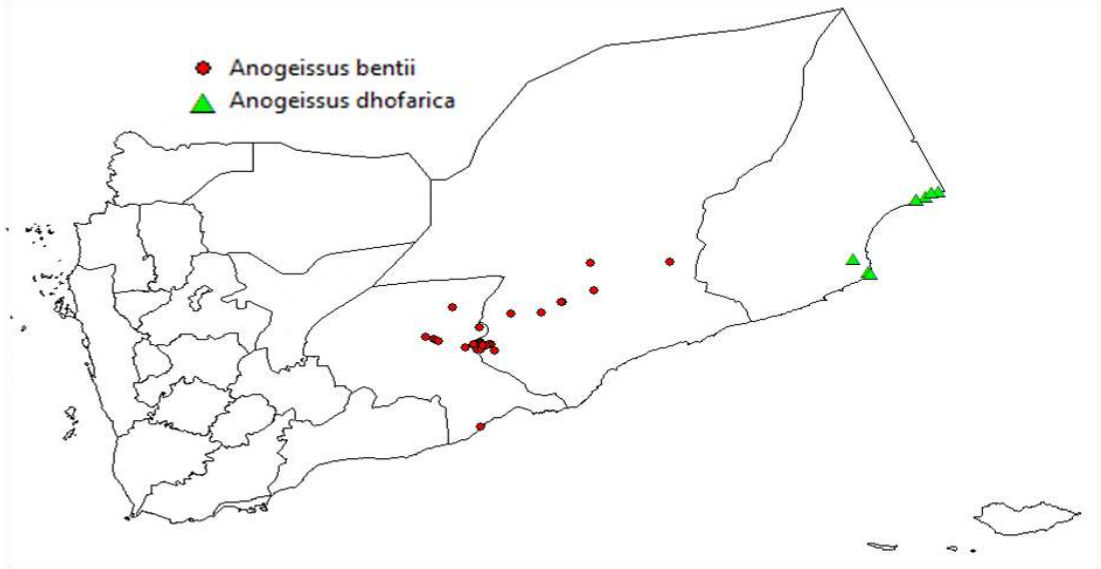


Fig. 15b. The distribution of Anogeissus bentii (endemic) and A. dhofarica (near endemic) التوزيع الجغرافي لنوعي المشط احدهم متوطن والاخر شبه متوطن

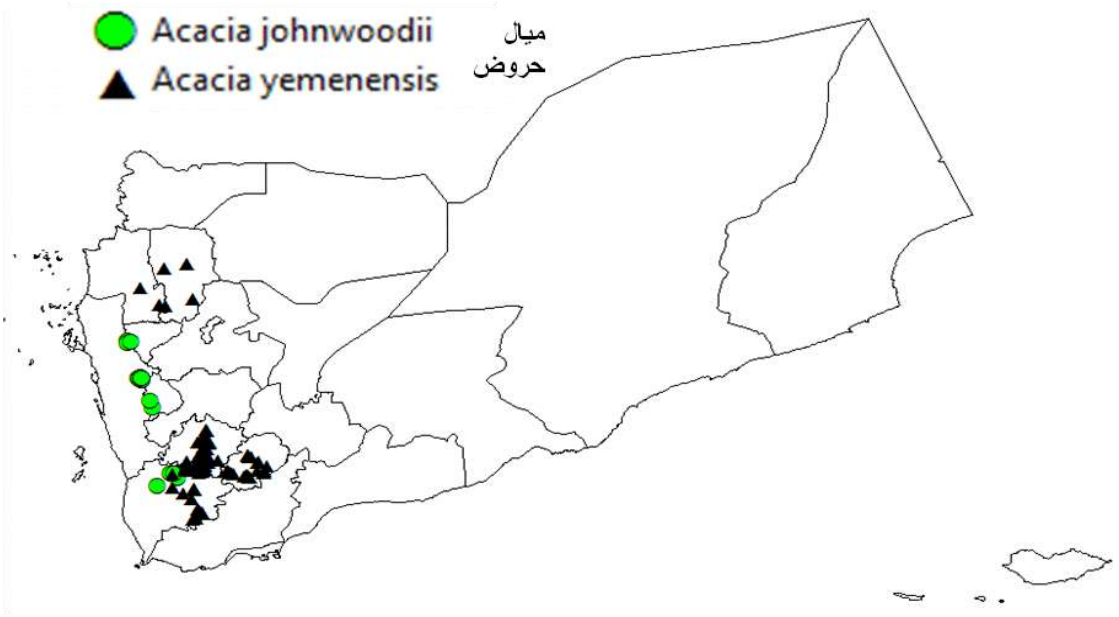


Fig. 15C. The distribution of 2 endemicspecies Acacia johnwoodii and A. yemenensis
التوزيع الجغرافي لنوعين من النباتات المتوطنة (ميال وحروض)

Near endemic plant species with very limited distribution, only recorded from Al Mahara (Yemen) and Dhufar (Oman) – near endemic- examples are:

نباتات شبه متوطنة وذات توزيع جغرافي محدود وقد سجلت فقط من المهرة (اليمن) و ظفار (عمان)

Aloe dhufarensis, Aloe mahraensis, Aloe praetermissa, Anogeissus dhofarica, Blepharis dhufarensis, Blepharispermum hirtum, Campylanthus chascaniflorus, Centaurea dhofarica, Cleome omanensis, Croton confertus, Dhofaria macleishii, Dichanthium micranthum, Dyschoriste dalyi, Ecbolium strictum, Euphorbia orbiculifolia, Euphorbia smithii, Exacum arabicum, Fagonia maharana, Gymnocarpos dhufarensis, Helianthemum citrinum, Heliotropium fartakense, Herniaria maskatensis, Hyoscyamus flaccidus, Jatropha dhofarica, Kleinia saginata, Lavandula dhofarensis, Leucas dhofarensis, Withania qaraitica, Maytenus dhofarensis, Mitreola petiolata, Ocimum dhofarense, Portulaca dhofarica, Pulicaria nobilis, Suaeda moschata, Teucrium nummularifolium, Zygocarpum dhofarense, Zygophyllum smithii.

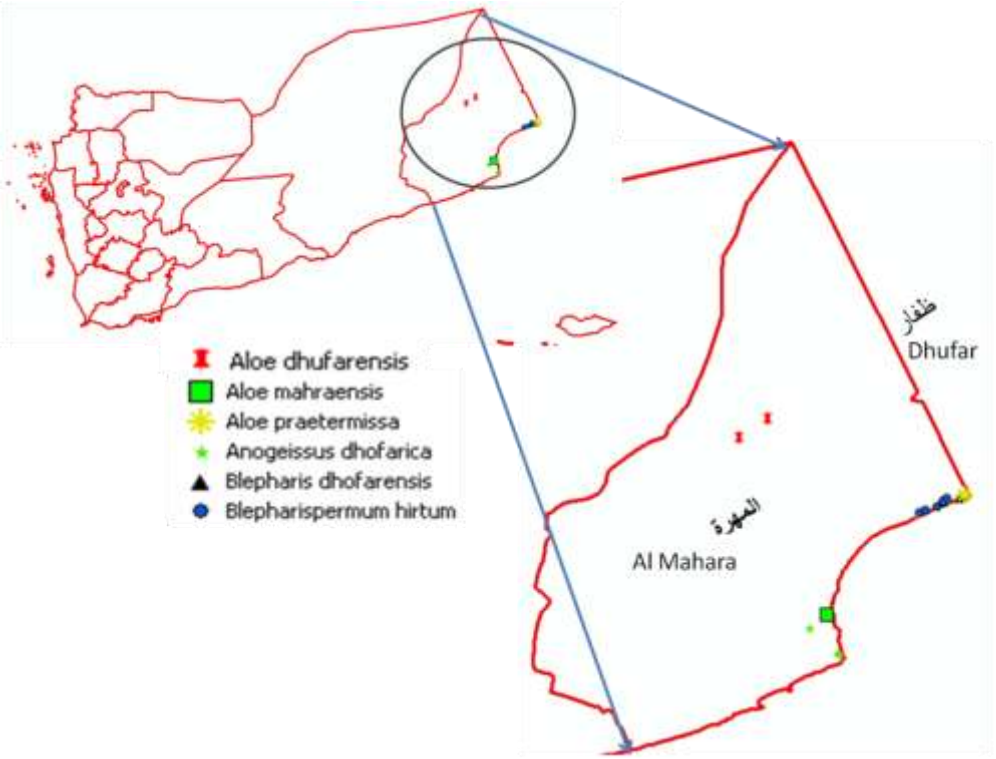


Fig. 16a. 6 Plant species with very limited distribution, only recorded from Al Mahara (Yemen) and Dhufar (Oman)

6 نباتات شبه متوطنة وذات توزيع جغرافي محدود وقد سجلت فقط من المهرة (اليمن) و ظفار (عمان)

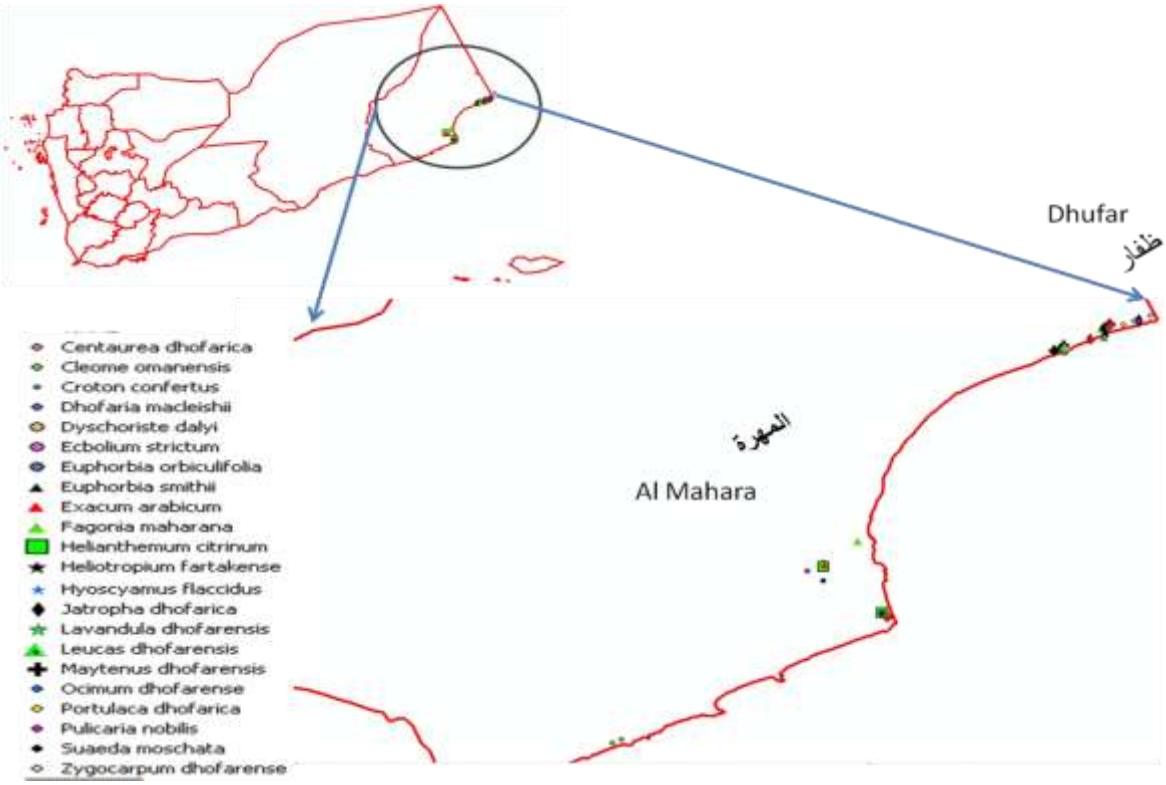


Fig. 16b. 22 Plant species with very limited distribution, only recorded from Al Mahara (Yemen) and Dhufar (Oman).

22 نبات شبه متوطنة وذات توزيع جغرافي محدود وقد سجلت فقط من المهرة (اليمن) و ظفار (عمان)

Plant species that only recorded from east and northern east of Yemen (Shabwa, Hadhramaut and al Mahara) and Dhofar (Oman) – near endemic- such as:

نباتات شبه متوطنة سجلت في المناطق الواقعة بين شرق وشمال شرق اليمن (شبوة وحضرموت ومنطقة ظفار (عمان)

Blepharis dhufarensis, Echiochilon arabicum, Echiochilon callianthum, Farsetia dhofarica, Gymnocarpos rotundifolius, Helianthemum argyraeum, Heliotropium wissmannii, Indigofera rubromarginata, Justicia areysiana, Launaea almahrahensis, Launaea castanosperma, Nogalia drepanophylla, Ochradenus gifrii, Pluchea arabica, Portulaca dhofarica, Pulicaria cylindrica, Pulicaria omanensis, Schweinfurthia spinosa, Xerotia arabica, Ziziphus leucodermis..

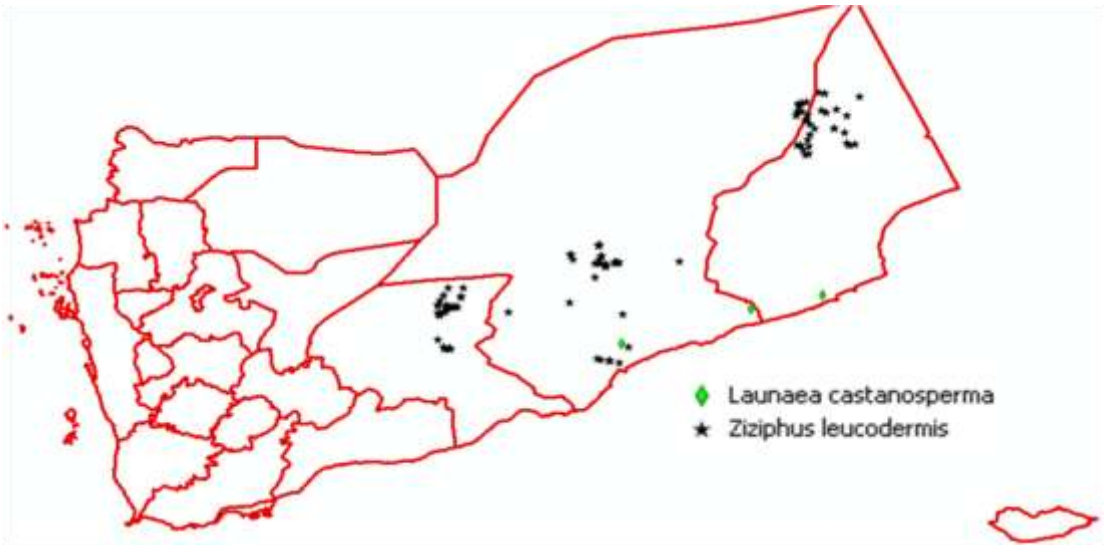


Fig. 17. The distribution of 2 Plant species (*Launaea castanosperma*, and *Ziziphus leucodermis)* that only recorded from east and northern east of Yemen (Shabwa, Hadhramaut and al Mahara) and Dhofar (Oman)

نباتات شبه متوطنة سجلت في المناطق الواقعة بين شرق وشمال شرق اليمن (شبوة وحضرموت) ومنطقة ظفار (عمان)

.

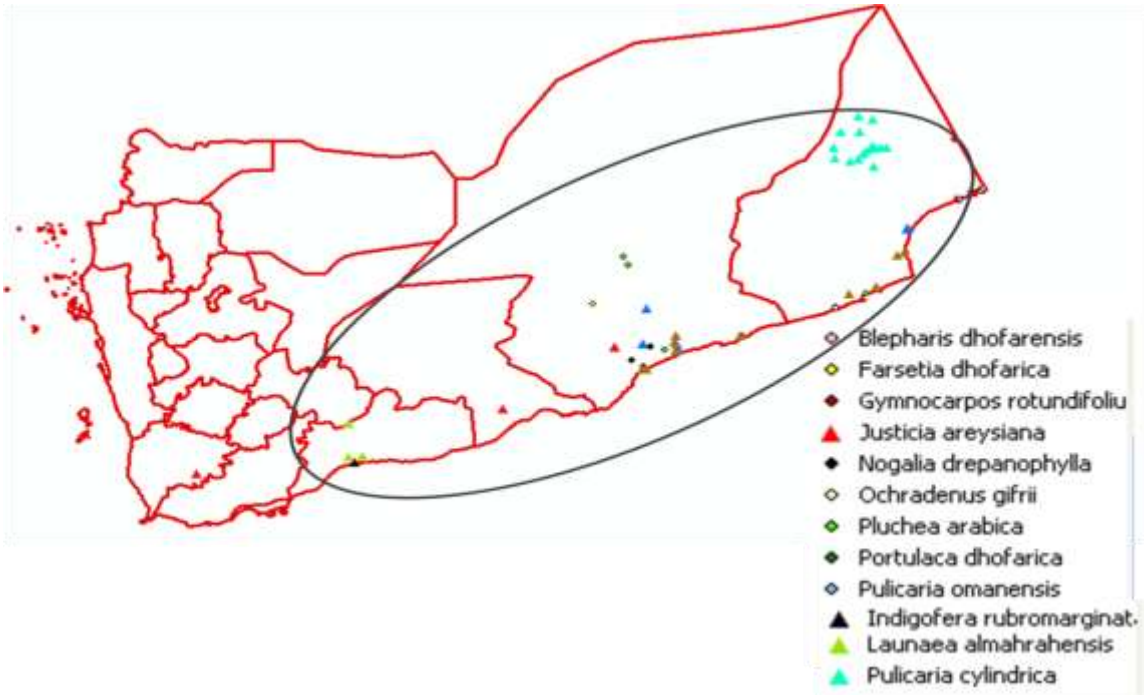


Fig. 18. The distribution of 12 near endemic plant species that only recorded from east and northern east of Yemen (Abyen, Shabwa, Hadhramaut and, al Mahara) and Dhofar (Oman).

12 نباتات شبه متوطنة سجلت في المناطق الواقعة بين شرق وشمال شرق اليمن (المهرة، شبوة وحضرموت، ابين) ومنطقة ظفار (عمان)

(Yemen-east Africa connection).

There are many species that, outside Arabia only found in Africa (regional endemic) such as Sudan, Somalia, Ethiopia, Eretria, and Kenya) example are:

نباتات يقتصر تواجدها على الجزيرة العربية وشرق أفريقيا (مثل السودان، إثيوبيا، الصومال، اريتريا، كينيا).

Acacia edgeworthii, Acacia etbaica, Acacia hamulosa, Acacia origena, Acacia tortilis, Acokanthera schimperi, Andropogon crossotos, Anisotes trisulcus, Barbeya oleoides, Barleria mucronifolia, Barleria orbicularis , Buddleja polystachya, Aristolochia rigida, Cadia purpurea, Cadaba baccarinii, Carissa spinarum, Ceropegia affinis, Ceropegia somalensis, Chloris mensensis, Cienfuegosia welshii, Commiphora gileadensis, Commiphora habessinica, Commiphora kataf, Commiphora myrrha, Crotalaria leptocarpa, Crotalaria pteropoda, Diceratella incana, Dracaena serrulata, Duvalia somaliensis, Duvalia sulcata, Duvalia velutina, Dyschoriste longicalyx, Dyschoriste radicans, Ecbolium gymnostachyum, Echiochilon longiflorum, Erythrina melanacantha, Euphorbia schimperi, Justicia caerulea, Kleinia odora, Lavandula macra, Megalochlamys violacea, Phoenix caespitos, Pistacia aethiopica, Pistacia falcate, Pluchea sordida, Psiadia punctulata, Rosa abyssinica, Rhus natalensis, Rhus retinorrhoea, Rhigozum somaliense, Ruellia discifolia, Senecio hadiensis, Tarchonanthus camphorates, Taverniera multinoda, Taverniera schimperi, Trianthema crystallinum, Trianthema portulacastrum, Trianthema sheilae, Trianthema triquetrum, Trichodesma hildebrandtii, Ficus vasta, Mimusops laurifolia, Grewia erythraea and Selaginella yemensis..

The following plant species have remarkable distributions between southern Arabia and the horn of Africa:

نباتات سجلت من جنوب الجزيرة العربية والقرن الأفريقي فقط

Caralluma arabica, Caucanthus edulis, Fagonia (F. lahovari and F. luntii), Cystostemon heliocharis, Indigofera sedgewickiana, Lavandula setifera, Limoniastrum rechingeri, Neuracanthus robecchii, Pupalia robecchii, Rhus somalensis, Wendlandia arabica, Tephrosia dura, Rhytidocaulon macrolobum.

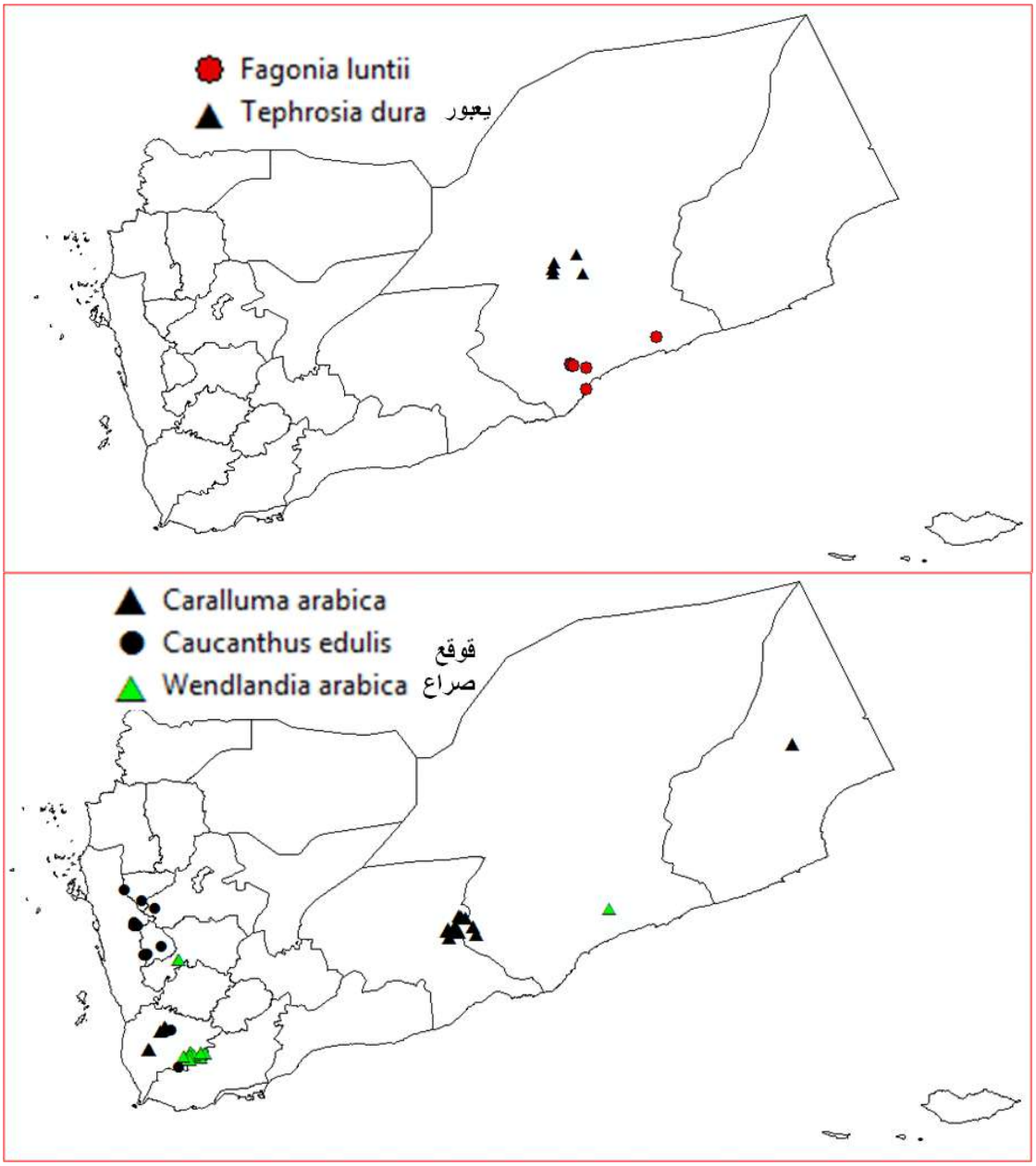


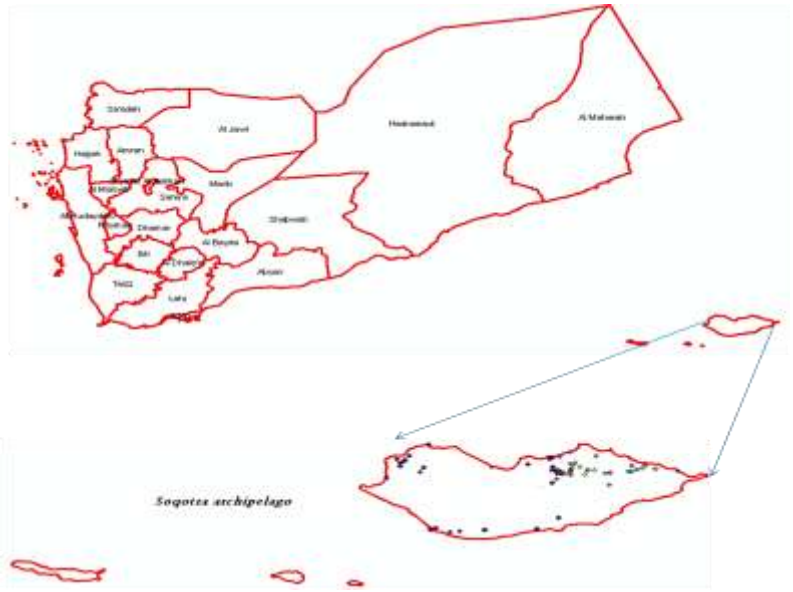
Fig. 19. The distribution of five species with limited geographical range between the horn of Africa and Yemen

التوزيع الجغرافي لخمس نباتات ذات توزيع جغرافي ضيق يمتد من القرن الافريقي واليمن

Important Plant Areas with high endemism

المناطق البيئية الهامة نباتيا والتي تتركز فيها ايضا النباتات المتوطنة وشبه المتوطنة

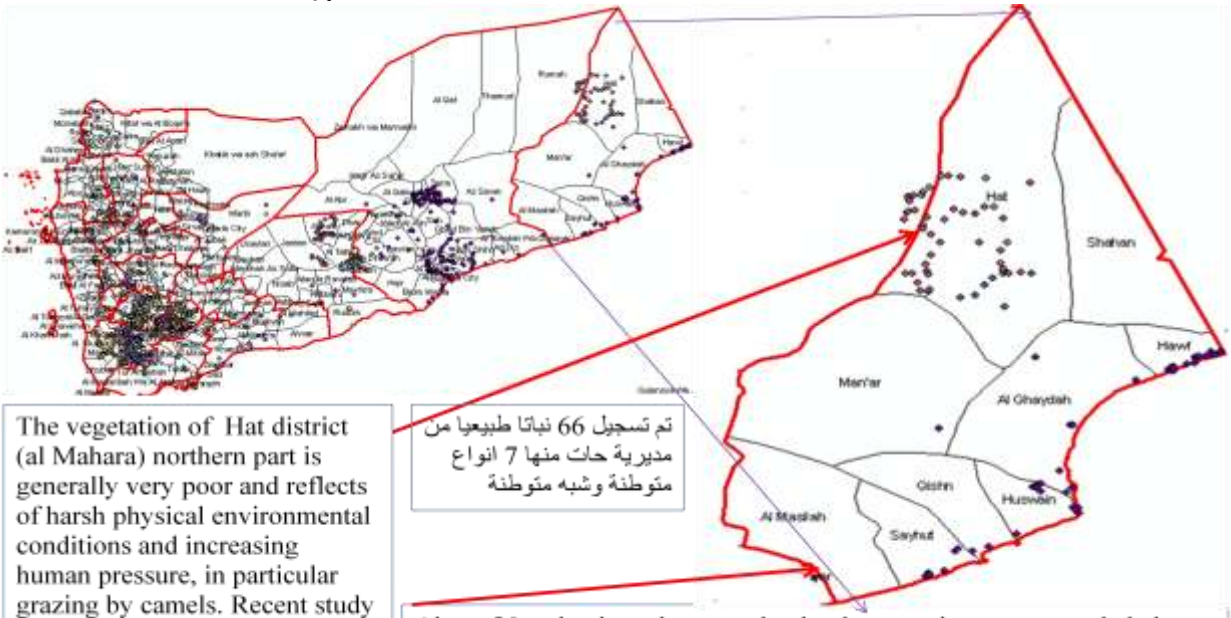
1. Soqotra archipelago ارخبيل سقطرى



The Soqotra archipelago has high percentage of endemic plant species, the recent study (Miller and Morris, 2004) recorded 307 endemic plant species comprising about 67% of Yemen's endemics.

تحتوي ارخبيل سقطرى على نسبة عالية من النباتات المتوطنة حيث سجلت في دراسة حديثة (Miller and Morris, 2004) عدد 307 نبات والتي تقدر بنسبة 67 % من النباتات المتوطنة في اليمن.

2. Al Mahara المهرة



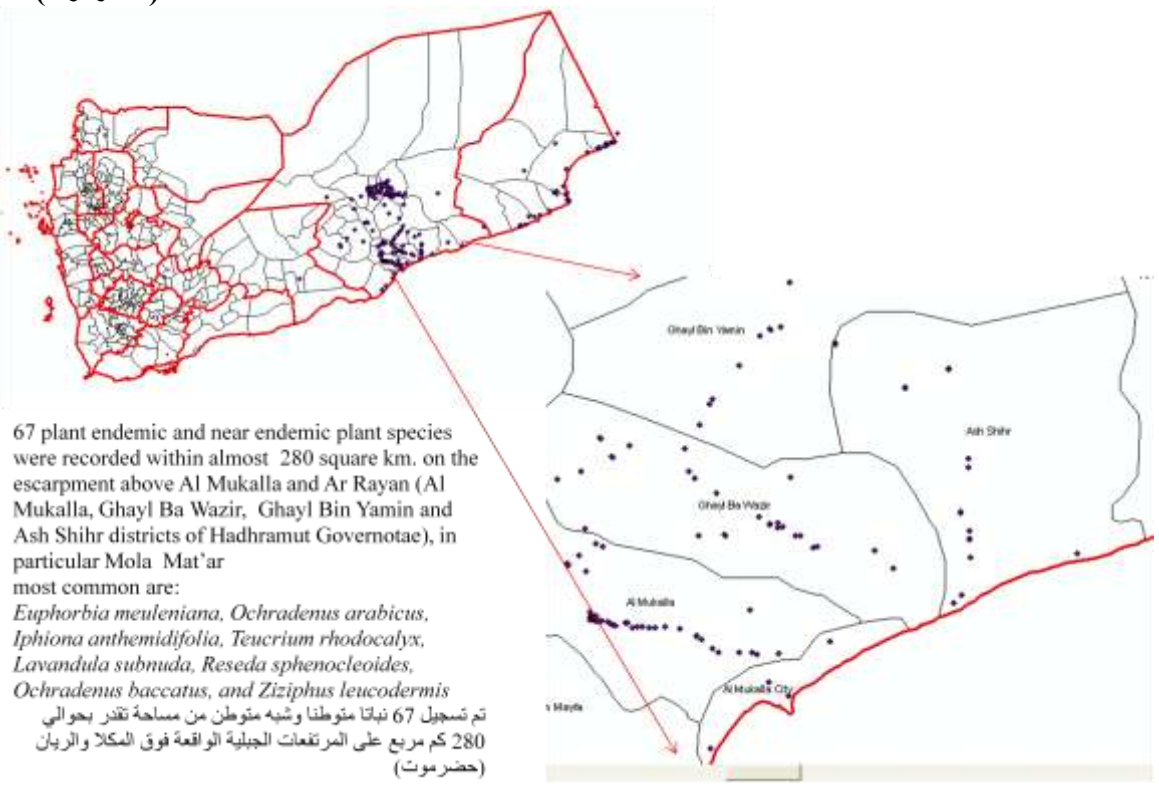
The vegetation of Hat district (al Mahara) northern part is generally very poor and reflects of harsh physical environmental conditions and increasing human pressure, in particular grazing by camels. Recent study (Al Khulaidi, 2010) revealed 66 plant species, in which one is endemic and 7 are near endemic, most common are: *Ziziphus leucodermis, Heliotropium fartakense* and *Pulicaria cylindrica* .

تم تسجيل 66 نباتا طبيعيا من مديرية حات منها 7 انواع متوطنة وشبه متوطنة

About 56 endemic and near endemic plant species were recorded along the escarpment and within about 635 square km. in Hawf, Al Ghayda, Huswein, Qishin, and Sayhut, districts (Al Mahara Governorate) in particular Ras Fartak and Huf protected areas. The most common species are: *Anogeissus dhofarica, Maytenus dhufarensis, Croton confertus and Jatropha dhofarica.*

تم تسجيل 56 نباتا متوطنا وشبه متوطن في مساحة تقدر بحوالي 635 كم مربع من مديريات حوف والغيضة وحصوين وقشن وسيحوت (محافظة المهرة)

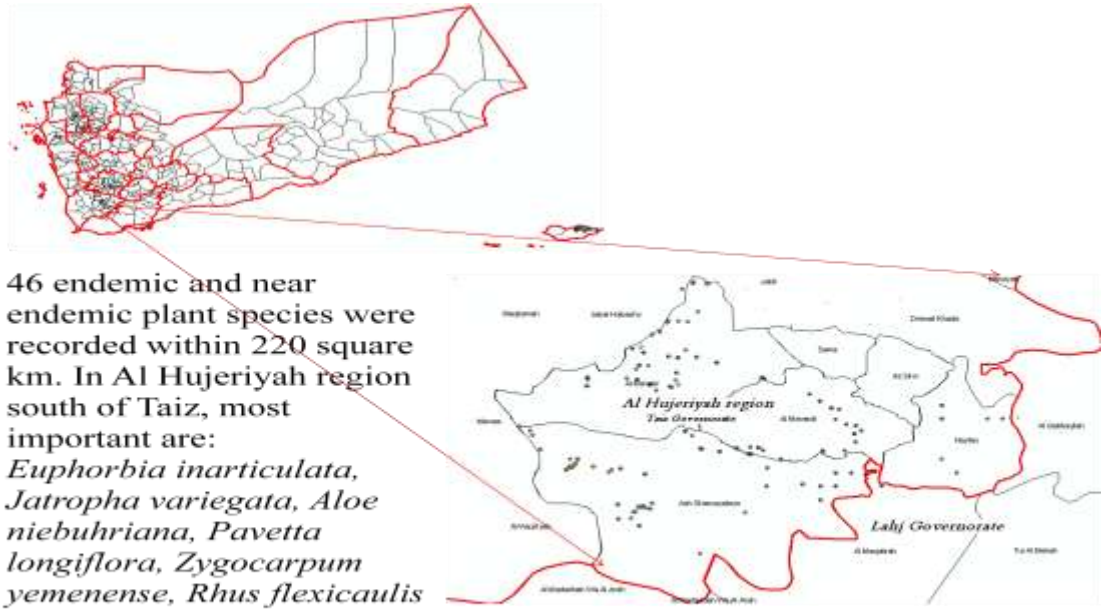
3- Above Al Mukalla and Ar Rayan (Hadhramaut) المرتفعات المطلة على المكلا والريان (حضرموت)



67 plant endemic and near endemic plant species were recorded within almost 280 square km. on the escarpment above Al Mukalla and Ar Rayan (Al Mukalla, Ghayl Ba Wazir, Ghayl Bin Yamin and Ash Shihr districts of Hadhramut Governotae), in particular Mola Mat'ar
most common are:
Euphorbia meuleniana, Ochradenus arabicus, Iphiona anthemidifolia, Teucrium rhodocalyx, Lavandula subnuda, Reseda sphenocleoides, Ochradenus baccatus, and Ziziphus leucodermis

تم تسجيل 67 نباتا متوطنا وشبه متوطن من مساحة تقدر بحوالي 280 كم مربع على المرتفعات الجبلية الواقعة فوق المكلا والريان (حضرموت)

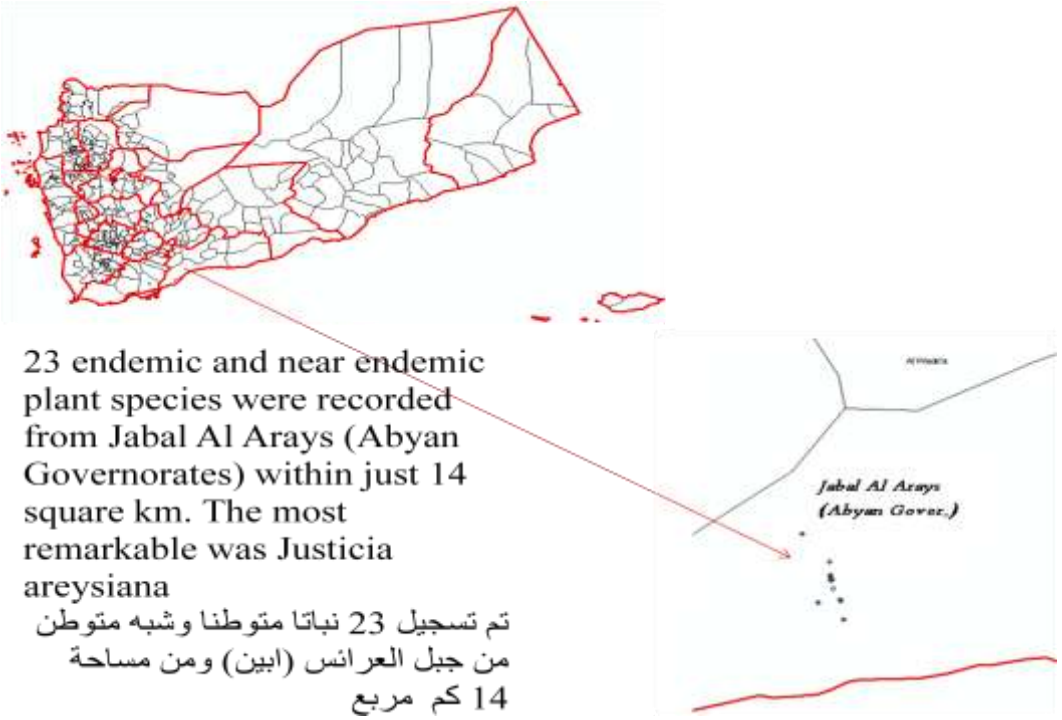
4- Al Hujeriyah region (South of Taiz) منطقة الحجرية (جنوب تعز)



46 endemic and near endemic plant species were recorded within 220 square km. In Al Hujeriyah region south of Taiz, most important are:
Euphorbia inarticulata, Jatropha variegata, Aloe niebuhriana, Pavetta longiflora, Zygocarpum yemenense, Rhus flexicaulis and Euphorbia ammak.

تم تسجيل 46 نباتات متوطنا وشبه متوطن من مساحة تقدر بحوالي 220 كم مربع من منطقة الحجرية

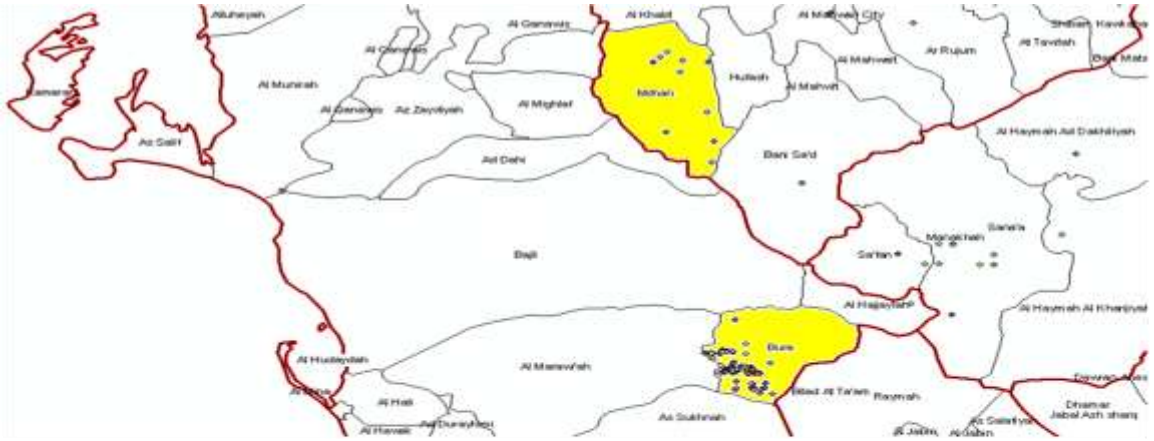
5- Jabal Al Arays (Abyan Governorate) جبل العرائس (محافظة ابين)



23 endemic and near endemic plant species were recorded from Jabal Al Arays (Abyan Governorates) within just 14 square km. The most remarkable was Justicia areysiana

تم تسجيل 23 نباتا متوطنا وشبه متوطن من جبل العرائس (ابين) ومن مساحة 14 كم مربع

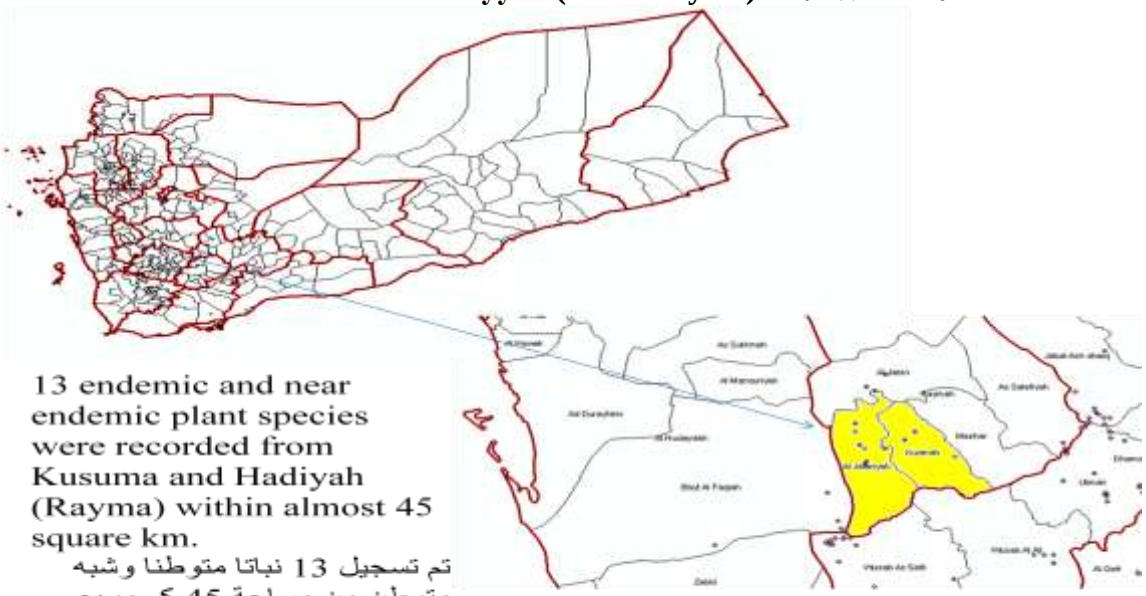
6- Jabal Milhan and Jabal Bura' محمية جبل برع وجبل ملحان



Another tow Important plant areas with notable endemic and near endemic plant species are: Jabal Milhan (Al Mahwit governorate) and Jabal Bura' protected area (Al Hudeydah governorate). In the former area 17 endemic and near endemic plant species were recorded within about 40 square km., while in the second area 24 plants were recorded within almost the same area.

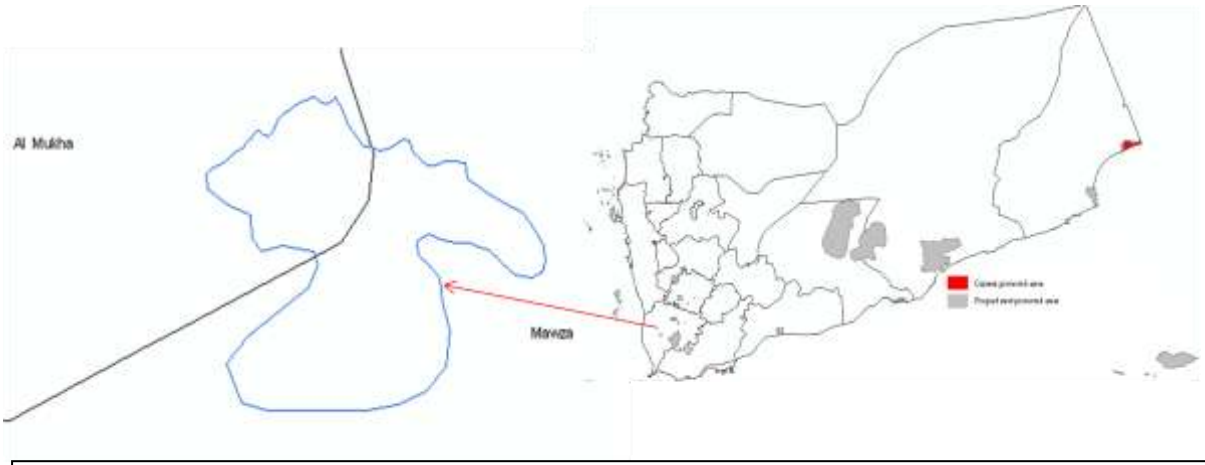
من المناطق الهامة جبل ملحان (المحويت) حيث تم فيها تسجيل 17 نباتا متوطنا وشبه متوطن من مساحة حوالي 40 كم مربع ومحمية برع حيث تم تسجيل 24 نباتا متوطنا وشبه متوطن من نفس المساحة تقريبا.

7- Kusuma and Al H'adiyyah (Jabal Rayma) كسمة وهادية، جبل ريمة



13 endemic and near endemic plant species were recorded from Kusuma and Hadiyah (Rayma) within almost 45 square km.

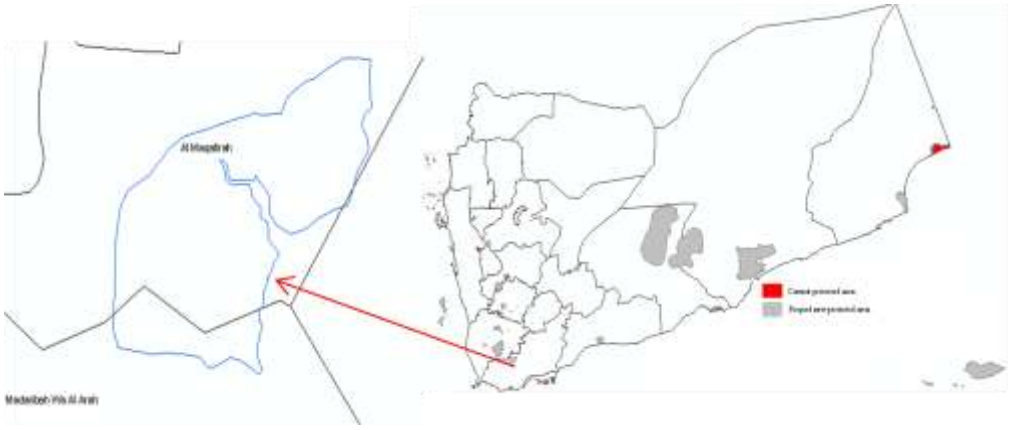
تم تسجيل 13 نباتا متوطنا وشبه متوطن من مساحة 45 كم مربع تقريبا في منطقة كسمة والحدية (ريمة)



8- Al Mafraq junction مفرق المخا

proposed protected area. it is an important *Acacia tortilis* woodland, The area is characterised by rich vegetation with few endemic and near endemic plants such as *Caralluma arabica, Campylanthus yemenensis, Saltia papposa* and economic plants such as *Aloe vera, Commiphora gileadensis, Commiphora myrrha*, the area is considered also by few botanists of high concentration of endemism stapeliads such as Caralluma quadrangula, C. cicatricosa, C. sinaica, C. subulata, C. hexagona, Orbea deflersiana Duvalia sulcata, and Rhytidocaulon macrolobum

من المناطق الهامة نباتيا وغنية بالنباتات المتوطنة وشبه المتوطنة والاقتصادية



9- Jabal Eraf in Al Maqatira distirict, Lahj جبل ارف، المقاطرة محافظة لحج

is proposed protected area , it is an important *Juniperus procera* woodland, The area is characterised by relict ecosystems and communities with few endemic and near endemic plants such as Aloe irafensis, A. niebuhriana, Aloe rivierei, Aloe sabaea, and Teucrium yemense.

جبل ارف: احدى المناطق النباتية الهامة والواقعة في المقاطرة (لحج)، وتتميز بغابات العرعر (الفروش) الفريدة من نوعها

The floristic vegetation types of Yemen **الطرز (الأنماط) النباتية في اليمن**
(Al Khulaidi, A.A. & El-Ghouri,M. (1996).

1- Costal plains السهول الساحلية
A number of vegetation types occur in the coastal plains, among them the following:
اهم الانماط النباتية

1.1- *Avicennia marina* type

It is a mangrove swamp occurs along the Red sea coastal fringe, mainly north of the wadi Siham outlet, in particular around al Khokaha isolated swamps are also seen south al Mukha, north Yakhtol (southern Tihama) and around Bir Ali (west of al Mukalla). Occasionally other plants such as *Aeluropes lagopoides, Suaeda spp.* and others can occur with this type and can be also considered as a transition to the vegetation types found further inland.

1.2- *Suaeda vermiculata* shrubland

This habitat is found along the coast on flat, often bare mud known locally as Sabakha and covers from shore line to about 5 km. inland. *Suaeda vermiculataand Aeluropus lagopoides* are the most common species in this habitat. The following vegetation types have been found:

1.2.1- *Halopyrum mucronatum-Suaeda vermiculata*type is dwarf shrubland and grassland
1.2.2- *Aeluropus lagopoides- Suaeda vermiculata*type is grassland
1.2.3- *Suaeda fruticosa-Odyssea mucronata* type is dwarf shrubland
Associated species of these types are *Acacia tortilis, Cadaba rotundifolia* and *Panicum turgidum.*

1.3- Sandy plain covered by shrubland or bushland

This plain covers an area from 5-20 to 20-40 km. inland. Soil predominantly sandy and it is almost flat to slightly undulating. The plain consists of fine gravel, sand , silt and clay. Recent Aeolian deposits are frequent at the surface. Many sandy hummocks which covered by vegetation are found in many locations. The following vegetation types are found in this habitat:

1.3.1. *Cadaba rotundifolia - Panicum turgidum* Type:

It is open shrubland to sparse dwarf shrubland. Associated species are *Acacia tortilis, Maerua crassifolia, Dipterygium glaucum* and *Indigofera oblongifolia.*

1.3.2. *Odyssea mucronata - Panicum turgidum* type*:*

It is shrubland. Associated species are *Dipterygium glaucum* and *Cadaba rotundifolia.*

13.3. *Salsola spinescens - Suaeda vermiculata* type:

It is dwarf shrubland. Associated species are *Salvadora persica.*

1.3.4. *Capparis decidua - Odyssea mucronata* type:

It is sparse shrubland. Associated species is *Suaeda fruticosa*

1.3.5. Tephrosia purpurea - *Panicum turgidum* type

It is shrubland to grassland found on waste and cultivated fields and also on sandy plain. Associated species are *Odyssea mucronata*. *Aerva javanica, Blepharis ciliaris, Senna alexandrina , Corchorus depressus* and others.

1.4. Sand dunes area:

This unit is a degradation form of the previous unit. The vegetation cover is very low (less than 5%). The following vegetation types can be found:

1.4.1. *Leptadenia pyrotechnica - Odyssea mucronata* type:

It is sparse grassland. Associated species is *Dipterygium glaucum,* occasionally *Acacia tortilis, Senna alexandrina* and *Senna italica* can be seen.

1.4.2. *Dipterygium glaucum -Panicum turgidum* type:

It is grassland. Associated species is *Odyssea mucronata.*

1.5. Gravelly plain areas:

It is slightly undulating and intersected by wide and shallow wadis or depressions and numerous drainage lines, where the vegetation is densely found. Most of these plains are concentrated southern Tihama (south wadi Zabid). The main vegetation types here are:

1.5.1. *Blepharis ciliaris - Lasiurus scindicus* type:

Is open woodland. Associated species are *Indigofera spp., Rhigozum somaliense , Acacia tortilis, Acacia hamulosa, Commiphora myrrha, Fagonia indica, Anisotes trisulcus, Euphorbia cuneata* and others.

1.5.2. *Acacia ehrenbergiana - Lasiurus scindicus* type:

Is woodland to grassland. Associated species are *Acacia tortilis, Indigofera oblongifolia, Euphorbia cuneata, Aloe vera, Fagonia indica, Tephrosia purpurea, Cissus quadrangularis* and many others.

1.5.3. *Euphorbia triaculeata - Sarcostemma sp.* type:

is shrubland. Associated species are *Lasiurus scindicus, Calligonum sp., Acacia hamulosa, Commiphora myrrha, Maerua crassifolia, Indigofera spinosa* and others.

1.5.4. *Cadaba rotundifolia - Panicum turgidum* type:

Is sparse dwarf shrubland to sparse grassland. Associated species are *Lasiurus scindicus, Acacia tortilis, Indigofera oblongifolia, Acacia hamulosa, Euphorbia cuneata,* and others.

1.5.5. *Commiphora gileadensis - Acacia hamulosa* Type:

Is open woodland. Associated species are *Acacia mellifera, Acacia hamulosa, Acacia tortilis, Commiphora myrrha, Rhigozum somalense, Indigofera spinosa* and many others.

1.5.6. *Acacia hamulosa - Commiphora myrrha* type:

Is open woodland. Associated species are *Calligonum crinitum, Cadaba glandulosa, Euphorbia triaculeata, Panicum turgidum, Cymbopogon schoenanthus* and *Pennisetum divisum.*

1.6- *Acacia ehrenbergiana* woodland

This woodland are common in many parts of coastal plains such as wadis, depressions and alluvial plains. Associated species are *Ziziphus spina-christi, Panicum turgidum, Acacia tortilis* and others.

1.7- *Ziziphus spina-christi - Dobera glabra* cultivated lands

These lands are located on plains near the Tihama foothills. Scattered trees of *Dobera glabra and Ziziphus spina-christi* are found. On the fallow lands of this unit *Dactyloctenium scindicum* some time in dense cover is found, also in waste and fallow land

1.7.1- Tephrosia purpurea -Panicum turgidum type is found . Associated species here are *Cenchrus ciliaris, Chloris barbata, Brachiaria ramosa, Indigofera spinosa and Blepharis ciliaris.*

Plate **1.1.** *Avicennia marina* type south Al Mukha

Plate 1.3.2. . *Odyssea mucronata - Panicum turgidum* type south al Mukha

Plate **1.5.** A community on Gravelly plain areas between Hays and Al Mafraq, dominated by Acacia tortilis with *Lasiurus scindicus, Panicum turgidum, Rhigozum somaliense, Acacia hamulosa, Acacia ehrenbergiana, Commiphora myrrha, Fagonia indica, Anisotes trisulcus.*

2- Low altitude mountains

The following vegetation types can be found:

2.1- *Dactyloctenium scindicum-Anisotes trisulcus* type

Is a sparse shrubland found on rocky slopes. Associated species are *Zygocarpum yemenense , Grewia tenax, Indigofera oblongifolia, I. spinosa, Euphorbia inarticulata, E. cuneata, Adenium obesum , Aloe vera, Acacia tortilis, A. hamulosa, Commiphora myrrha* and many others.

2.2- *Dactyloctenium scindicum-Senna italica* type

Is sparse shrubland found on gravelly wadi terraces and on the bed of narrow wadis

2.3- *Adenium obesum- Anisotes trisulcus* type

Is dwarf shrubland found on dry slopes. Associated species are *Acacia tortilis, Commiphora myrrha and Dobera glabra.*

2.4- *Dobera glabra-Acacia mellifera* type

Is shrubland found on the foothills and rock outcrops of Tihama (e.g. east suq Abs, Jabel Attur, near Jabel Bura'). Associated species are *Anisotes trisulcus, Cadaba glandulosa Euphorbia inarticulata, Acacia asak and Adenium obesum.*

2.5- *Acacia tortilis-Euphorbia cuneata* type

Is open woodland found on the southern mountains and on some isolated mountains on the coastal plains (e.g. west al Rahida, south west al Barh and near Addimna and Warazan). Associated species are *Anisotes trisulcus, Sarcostemma viminale, Acalypha fruticosa, Aloe sp, Indigofera spinosa, Kleinia odora, Cissus quadrangularis, Cissus rotundifolia, Euphorbia inarticulata, Aristida sp., Dobera glabra, Hibiscus deflersii, Jatropha spinosa, Aerva javanica* and others.

2.6. Campylanthus yemenensis - *Acacia tortilis type*

Is shrubland to open shrubland found on rocky lands near the foothills, drainage lines and wadis between 300 and 400 west of Al Barah. Associated species are:
Rhigozum somaliense, Saltia papposa, Acacia hamulosa, Euphorbia cuneata, Aristida sp., Acacia mellifera, Acacia laeta, Commiphora myrrha, Commiphora gileadensis, Blepharis ciliaris, Jatropha pelargoniifolia, Seddera arabica, Indigofera spinosa, Grewia tenax, Prosopis juliflora, Indigofera spiniflora, and *Anisotes trisulcus.*

2.7- *Acacia johnwoodii -Trichilia emetica* type

Is a forest area found on steep rocky slopes and Wadi of Jabel Bura' and Jabel Milhan and other valleys. Association species are *Combretum molle, Berchemia discolor, Celtis africana, Carissa spinarum, Cissus quadrangularis, C .rotundifolia, Anisotes trisulcus* and many others.

2.8- *Combretum molle -Ficus spp.* type

Is evergreen forest on valleys (e.g. Jabel Bura' and Jabel Milhan). Associated species are *Ficus vasta, F. cordata L.* subsp. *salicifolia, Tamarindus indica, Trichilia emetica, Mimusops laurifolia* and many others. On undisturbed valley slopes *Acacia asak* is become dominant associated species here are *Grewia schweinfurthii, Anisotes trisulcus, Carissa spinarum , Barbeya oleoides* and others.

2.9- *Arundo donax – phoenix caespitasa* type

Is shrubland, open woodland and woodland found on Wadi bed at low altitude, (between 370 - 500m.) such as wadi Rijaf (J. Bura'),

Associated species are*: Eragrostis pilosa, Ficus sycomorus, Phoenix caespitosa, Trichilia emetica , Breonadia salicina, Acacia asak, Acalypha fruticosa, Tridax procumbens, Combretum molle, Cassytha filiformis, Senna occidentalis, Cissus rotundifolia, Kanahia laniflora, Ricinus communis, Leptadenia arborea, Amaranthus spinosus, Euphorbia hirta* and many others.

2.10- *Cadaba farinose – Anisotes trisulcus type*

Is shrubland, dense shrubland and open woodland, found on rocky, north and south west facing mountain slopes of the lower altitude, such above Suq Assabt (between 350-500m.). The dominant species is *Anisotes trisulcus* with association of the following species*: Acacia mellifera, Blepharis edulis, Selaginella imbricata , Adenium obesum, Grewia schweinfurthii, Acacia asak, Cissus rotundifolia, Coptosperma graveolens, Acalypha fruticosa, Ruellia patula, Cissus quadrangularis, Commelina forskalei, Becium filamentosum, Opuntia dillenii, Digitaria nodosa, Blepharis edulis, Dactyloctenium scindicum, Barleria bispinosa, Endostemon tenuiflorus, Aerva javanica, Ocimum forskolei, Portulaca quadrifida, Indigofera spinosa, Pupalia grandiflora, Sarcostemma arabicum, Hibiscus deflersii, Aristida adscensionis, Grewia trichocarpa, Evolvulus alsinoides, Grewia tembensis, Maytenus parvifolia, Terminalia brownii* and others.

2.11- *Acacia ehrenbergiana – Acacia mellifera type*

Is shrubland, and dense shrubland found at the bottom of mountain slopes and near road sides at the entrance of Wadi al Hudhayn and Rijaf, mainly before Suq Assabt (between 300-460m.). The dominant species is *Acacia mellifera* with association of the following species*: Selaginella imbricate, Anisotes trisulcus, Blepharis edulis, Dactyloctenium scindicum, Barleria bispinosa, Endostemon tenuiflorus, Aerva javanica, Ocimum forskolei, Portulaca quadrifida, Indigofera spinosa, Pupalia grandiflora, Indigofera spiniflora, Acacia ehrenbergiana, Grewia tenax, Tribulus terrestris, Seddera arabica, Zygocarpum yemenense , Acacia asak, Cissus rotundifolia, Coptosperma graveolens , Acalypha fruticosa, Ruellia patula, Cissus quadrangularis, Commelina forskalei, Becium filamentosum, Opuntia dillenii, Digitaria nodosa* and others.

2.12- Olea europaea – Phoenix caespitosa type

Is dense shrubland, open woodland and woodland, found on rocky mountain slopes, drainage lines .old terraces of moderate area,(between 700-800m.) around Wadi Zuheir and She'b Mathab (J. **Bura')**. The terrain is moderately steep slope (*20-35%)*. This type shows relatively high cover of vegetation, represents. Average vegetation is 78% (trees 12%, shrub 55%, grass 3% and herbs 8%).

The dominant species of this type is *Phoenix caespitosa,* co-dominant species are:

Carissa spinarum , Oncopa spinosa, Hypoestes forskalei, Selaginella yemensis, Segeretia thea, Rhoicissus revoilii and *Maytenus parvifolia.*

2.13- *Pterolobium stellatum - Phoenix caespitosa* type

Is shrubland, dense shrubland and open woodland, found on very rocky mountain slopes, drainage lines, old terraces and adjacent to Wadis of J. Bura', (between 700-1000m.). The terrain is slightly to steep slope (5-60%), with rocks range between 60-90%. Average vegetation cover is 92% (trees 11%, shrub 55%, grass 1% and herbs 12%). This type shows relatively high cover of vegetation. The vegetation cover in some locations exceeds 100%. The dominant species of this type is *Phoenix caespitosa,* other co-dominant species are*: Carissa spinarum , Oncopa spinosa, Hypoestes forskalei, Pterolobium stellatum* is aggressive unwanted species by farmer in this type, the most common species *Acacia asak* and the undesirable species *(Opuntia dillenii)* not seen here.

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2.14- *Acacia mellifera-Commiphora spp.* type

Is sparse to open woodlands found on the Tihama foothills. Associated species are *Commiphora myrrha, C. habessinica, C. gileadensis, Indigofera spinosa*

2.15- *Anogeissus dhofarica* woodland

Is a dense woodland found on the escarpment of an altitude of 700m. near Hawf and Ras Fartak (al Mahara gover.) Associated species are *Croton confertus, Dodonaea viscosa, Cadia purpurea, Jatropha dhofarica, Tamarindus indica, Commiphora spp., Acacia spp. Hybanthus durus, Maytenus dhofarica, Euphorbia smithii,* and many others.

***2.16- Salvadora persica - Tamarix sp.* woodland**

Is found on wadis and drainage lines on dry areas (between 710 and 980m), such as Tihama, W of Taiz, J. Habashi, Bani Omar. Associated species are:
Ziziphus spina-christi, Tamarix arabica, Flueggea virosa, Ficus populifolia, Acacia tortilis, Calotropis procera, Cissus quadrangularis, Cissus rotundifolia, Trichilia emetica. Rarely the following are found: Acacia ehrenbergiana, Acokanthera schimperi, Indigofera oblongifolia.

Plate 2.11- Olea europaea – Phoenix caespitosa type, Jabal Bura'

Plate 2.12- Pterolobium stellatum - Phoenix caespitosa type, Jabal Bura'

Plate 2.15- Salvadora persica - Tamarix sp. Wadi Bani Omar

Plate **2.6.** *Campylanthus yemenensis - Acacia tortilis* type between 300 and 400 west of Al Barah

3- Medium altitude mountains الجبال منوسطة الارتفاع

The following vegetation types can be found: اهم الانماط النباتية

3.1- *Acacia asak-Indigofera spinosa* type

Is a woodland found on large parts of steep to moderate steep slope mountains. Associated species are *Ruellia patula, Aerva javanica, Barleria trispinosa, B. bispinosa, Acalypha fruticosa, Anisotes trisulcus, Zygocarpum yemenense , Blepharis ciliaris, Grewia erythraea , G. tenax, Eragrostis sp., Kleinia odora, Caralluma quadrangula* and many others.

3.2- *Euphorbia spp.* shrubland

A large number of vegetation types occur here for example:

3.2.1- *Pergularia tomentosa-Euphorbia cactus* type
3.2.2- *Euphorbia schimperi -Euphorbia inarticulata* type
3.2.3- *Psiadia punctulata- Euphorbia schimperi* type
3.2.4- *Euphorbia cactus-Euphorbia parciramulosa* type
3.2.5- *Euphorbia cuneata -Andropogon greenwayi* type
3.2.6- *Jatropha spinosa - Acacia nilotica - Euphorbia inarticulata* type
3.2.7- Anisotes trisulcus- Cissus rotundifolia - Euphorbia inarticulate type
3.2.8- Psiadia punctulata-Acacia gerrardii- Euphorbia inarticulata type

These types found on the slopes of mountains around Taiz, east Madinat Ashsharq, near Hammam Ali, Adhale', and south Hajjah . Associated species are many, such as *Acacia mellifera, A. asak, A. gerrardii, Hypoestes forskalei, Ruellia patula, Aerva javanica, Hibiscus deflersii, Grewia tembensis, Commicarpus helenae, Barleria spp., Zygocarpum*

yemenense , Grewia spp., Cissus rotundifolia, C. quadrangularis, Kleinia odora, Indigofera spinosa, I. arabica, Anisotes trisulcus, Caralluma quadrangula, Blepharis ciliaris, Sarcostemma viminale,, Sansevieria spp., Lantana rugosa, Justicia flava, J. odora, Heliotropium spp., Euphorbia cuneata, Seddera arabica, Hypoestes forskalei , Cadia purpurea, Aloe lanata, Lavandula pubescens, Aristida adscensionis, and many others.

3.3- *Aloe vera-Acalypha fruticosa* type

Is a sparse shrubland found on steep to moderate steep slope near Madinat Ashsharq. Associated species are *Anisotes trisulcus, Zygocarpum yemenense , Cissus quadrangularis, Indigofera spinosa, Acacia asak, A. etbaica, Kleinia odora, Barleria bispinosa, Adenium obesum, Acalypha fruticosa, Euphorbia cactus and others.*

3.4- *Grewia villosa-Andropogon greenwayi* type

Is sparse shrubland to grassland found on steep to moderate steep slope mountains south Hajjah ,(between 1240-1550m.). Associated species are *Psiadia punctulata, Pupalia lappacea, Salvia sp., Ruellia patula, Commicarpus helenae, Leucas glabrata, Grewia spp., Ocimum hadiens, Adenium obesum, Seddera arabica, Acalypha fruticosa, Blepharis ciliaris* and others

3.5- *Cenchrus ciliaris-Commicarpus glandiflorus* type

Is open woodland to dwarf shrubland found on almost flat to steep slope stony mountains and road sides (between 1600-1800m.). Associated species are *Andropogon distachyus, Aerva javanica, Indigofera spinosa, Anisotes trisulcus, Eragrostis sp., Forsskaolea tenacissima, Commicarpus grandiflorus, Acalypha fruticosa, Withania somnifera, Alternanthera pungens, Kleinia odora* and others.

3.6- *Aerva javanica-Hibiscus vitifolius* type

Is shrubland found on stony steep slope mountains near wadi Sharis (south Hajjah), between 1300-1400m. Associated species are *Forsskaolea tenacissima, Indigofera spinosa, Heliotropium longiflorum, Cissus quadrangularis, Boerhavia repens, Solanum incanum, Adenium obesum* and others.

3.7-*Acacia mellifera* woodlands

These woodlands cover a large parts of medium altitude mountains such as north and North east of Taiz, Jabel al Arays, west Huth, around Madinat Ashsharq. For example:

3.7.1- *Acacia mellifera-Euphorbia cactus &*
3.7.2- *Acacia mellifera-Euphorbia inarticulata* types

are Shrubland to dense woodland found on slopes north and north east Taiz (between 1200-1500m.). Associated species are *Ruellia patula, Grewia erythraea , Cissus rotundifolia, Kleinia odora, Indigofera spinosa, I. arabica, Anisotes trisulcus, Boerhavia repens, Lantana rugosa, Senna italica, Seddera arabica, Euphorbia schimperi, Heliotropium sp., Hypoestes forskalei , Cadia purpurea* and many others.

3.7.3- *Acacia mellifera-Ocimum forskolei* type

Is a woodland found on moderate steep slope mountains and hills east Madinat Ashsharq (between 1400-1610m.). Associated species are *Kleinia odora, Grewia tenax, Zygocarpum yemenense , Indigofera spinosa, Seddera arabica, Commicarpus helenae , Acacia asak, Ruellia patula* and others.

3.7.4- *Acacia mellifera-Euphorbia cuneata* type

Is a woodland occurs on moderate to steep slope mountains and hills east Madinat Ashsharq (between 1380-1440m.). Associated species are the same of type 3.7.3 plus the following :
Sarcostemma sp. Blepharis ciliaris and Aloe sp.

3.8- *Tridax procumbens -Indigofera spinosa* type

Is a shrubland to grassland found on wadi beds and degraded slopes east of Madinat Ashsharq and east Hammam Ali (between 1590-1650m.). Associated species are *Solanum incanum, Bidens bitata, Ocimum hadiens, Indigofera spinosa, Eragrostis papposa, Aristida adscensionis, Acalypha fruticosa, Commicarpus boissieri, Boerhavia repens, Lavandula pubescens, Rumex nervosus* and others.

3.9- *Mentha longifolia-Conyza incana* type

Is a shrubland found on wadi beds where the water is flowing almost all the year, (e.g. wadi Rimaa, between 1200-1300m.). Associated species are *Ricinus communis, Polygala sp., Flaveria trinervia, Trichilia emetica, Acanthus arboreus, Cordia africana, Pandanus odoriferus* and others.

3.10- *Breonadia salicina-Tridax procumbens* type

Is a sparse shrubland found on wadi beds of Sharis (south Hajjah), between 1100-1380m. Associated species are *Aristida adscensionis, Solanum incanum, Indigofera spinosa, Boerhavia repens,* Ziziphus spina-christi, Tagetes minuta and others.

3.11- *Acacia asak - Cadia purpurea* type

Is an open woodland found on the western escarpment mountains at elevation of 1200-1600m. Associated species are *Acacia mellifera, A. etbaica, Commiphora kataf, Boscia angustifolia, Adenium obesum, Psiadia punctulata, Kleinia odora, Commicarpus helenae, Becium filamentosum, Themeda triandra, Elionurus muticus , Eragrostis papposa, Hypoestes forskalei* and many others.

3.12- Grewia trichocarpa - Boscia angustifolia – Acacia asak type

Is an open woodland to shrubland found on the western mountain slopes and hills such as al U'deyn (between 1000 and 1400). Associated species are *Adenium obesum, Aloe vacillans, Cissus quadrangularis, Cissus rotundifolia, Grewia schweinforthi, Grewia tembensis, Jatropha variegate, Justicia odora, Zygocarpum yemenense , Acacia mellifera, Acalypha fruticosa, Actiniopteris radiata , Adenia venenata, Annona squamosa, Boscia angustifolia, Caralluma cicatricose, Combretum molle , Commicarpus sp., Crinum album, Crossandra johanninae, Ecbolium viride, Ehretia obtusifolia, Endostemon sp., Euphorbia inarticulate, Grewia trichocarpa, Huernia yemenensis, Indigofera articulata, Lantana rugosa, Plectranthus sp., Portulaca quadrifida, and Sansevieria ehrenbergii*.

3.13- *Acacia etbaica* woodlands

These woodlands are found on plains, plateaus, at the bottom of mountains and on moderate steep slope mountains (between 1400-1800m.). A number of vegetation types can be found:

3.13.1- *Acacia etbaica-Gnidia somalensis* type

Is an open woodland found on plateau of Jabel Eraf (about 1350m.). Associated species are *Euphorbia schimperi , Ruellia patula, Aerva javanica, Aloe inermis,*

Commicarpus helenae , Lantana sp., Zygocarpum yemenense , Tetrapogon villosus , Solanum incanum, Fagonia incanum, Euphorbia cuneata , and others.

3.13.2- *Acacia etbaica-Euphorbia cactus* type

Is a woodland found on moderate steep slope mountains and hills south Taiz (between 1400-1600m.). Associated species are *Euphorbia inarticulata, E. schimperi , E. ammak, Acacia mellifera, Cissus quadrangularis, C. rotundifolia, Blepharis ciliaris, Fagonia indica, Justicia flava, Solanum incanum, Polygala senensis, Cyanotis sp., Boerhavia repens, Psiadia punctulata, Heliotropium sp., Dodonaea viscosa,* and others.

3.14- *Juniperus procera - Psiadia punctulata* type

Is a forest found on moderate steep slope of Jabel Eraf (al Maqatirah,) and Jabel Thogan (al Qabetah) and Hayfan, between 1350-1450m. Associated species are *Acacia etbaica, Cadia purpurea, Teucrium yemense, Tetrapogon villosus , Barleria sp., Rhus spp., Carissa spinarum , Aristida sp., Seddera arabica, Tarchonanthus camphoranthus, Commicarpus helenae* and many others, some of the species not unidentified yet and could be new or endemic to Yemen or to Arabian peninsula.

3.15- Mirabilis jalapa - Jatropha curcus type

Is a shrubland found on wadi beds and near wadi terraces such as wadi Addur (between 1030 and 1488m). Associated species are Achyranthus aspera, *Alternanthera pungens , Amaranthus spinosus, Argemone mexicana , Asystacia gangetica, Chenopodium ambrosioides, Cordia Africana, Cyperus rotundus, Datura stramonium, Euphorbia hirta, Leucaena leucocephala, Oxalis corniculata, Pandanus odoriferous, Pithecellobium dulce, Rumex nervosus, Senna obtosifolia, Solanum schimperianum, Solanum sp., Tagetes minuta, Senna obtosifolia, Tridax procumbens, Acanthus arboreus, Xanthium strumarium*

3.16- Acacia yemenensis - Tarchonanthus camphorates - Jatropha variegate type

Is found on rocky slopes west and south al U'deyn and Jabel Bahri (between 1300 and 1700m). Associated species are *Bonatea steudneri, Ceropegia varigata, Crassula alba, Dodonaea viscose, Echinops spinosissimus, Evolvulus alsinoides, Ficus ingens, Gomphocarpus fruticosus, Merendera abysssinica, Myrsine Africana, Pennisetum setaceum, Rhus retinorrhoea, Rhynchosia variegate, Tarchonanthus camphorates, Tephrosia purpurea and Vernonia spathulata*

3.17- Kanahia laniflora - Arundo donax type

Is a shrubland found on wadi beds such as wadi Adhaba, wadi Addur, wadi Annah (between 1000 and 1200m). Associated species are *Abrus precatorius, Adiantum capillus-veneris, Colocasia esculenta, Kanahia laniflora, Maesa lanceolata, Phoenix caespitose, Polygonum avicular, Colocasia esculenta, Jatropha curcus, Ficus vasta, Ficus sycomorus* and *Trichilia emetica*

3.18- Combretum molle - Ficus sycomorus type

Is a woodland found on most of river beds and near wadi terraces (between 1000 and 1500m). Associated species are *Ziziphus spina-christi, Jatropha curcus, Terminalia brownii, Trichilia emetica, Ficus vasta, Ehretia cymosa, Carissa spinarum . Breonadia salicina, Tamarindus indica, Phoenix dactylifera, Ziziphus mucronata* and *Acacia asak*

3.19- Acacia gerrardii type

Is Agro-forestry type with annual crops and Qat fields found between al Qae'dah and al Sayani, Dhisufal, Mutheikhira, East of Ibb, al Makhader (between 1300 and 2000) and can be seen also until 2600m. Associated species are: *Agave sisalana, Opuntia ficus-indica, Euphorbia ammak, Ehretia cymosa , Carissa spinarum Senecio hadiensis, Commicarpus plumbagineus, Ricinus communis.*

3.20- Acacia asak - Zygocarpum yemenense (*Ormocarpum yemenense)* ***type***

Dense woodland to grassland grows south and south east of J. Saber and some areas north and North West Taiz, between 1150 to 1490 m. The terrain is steep to moderate steep slope mountains, hills and drainage lines. Average tree cover is 9%, shrub cover is 17 and herbaceous cover is 12%, the vegetation cover ranges between 13% and 75%. Associated species are: Indigofera spinosa, Ruellia patula, Aerva javanica, Barleria trispinosa, B. bispinosa, Acalypha fruticosa, Anisotes trisulcus, Blepharis ciliaris, Grewia erythraea, G. tenax, Eragrostis sp., Kleinia odora, Caralluma quadrangula.

3.21- Cymbopogon schoenanthus - Aerva javanica **type**

Dense grassland to dense shrubland grows west of Taiz, between 1000 to 1200 m.
The terrain is steep, hilly to almost flat slope mountains and hills, with very shallow, brown to pale brown colour and sandy loam loamy textured soil. Average tree cover is .4%, shrub cover is 4% and herbaceous cover is 37%. The vegetation cover ranges between 10% to 71%. Associated species are: *Indigofera spinosa, Caralluma quadrangula, Ruellia patula, Fagonia indica , Aristida sp.*

3.22- Aloe inermis - Indigofera spinosa **type**

Dense grassland to dense shrubland, grows north east Taiz, between 1010 to 1360 m. The terrain is very steep to moderately steep mountains and hills and almost flat gravely plain. Average tree cover is 1% , shrub cover is 25% and herbaceous cover is 14% , the vegetation cover ranges between 14-76%. Associated species are: *Indigofera spinosa, Euphorbia inarticulata, Grewia erythraea, Cissus rotundifolia, Kleinia odora, Alo inermis,* Zygocarpum yemenense , *Eragrostis papposa , Aristida sp*. and others.

3.23- Acacia gerrardii - Eragrostis papposa **type**

Grassland, shrubland, dense shrubland and woodland, grows north and north eat Taiz, between 1400 to 1500m. The terrain is undulating to almost flat plain. Average tree cover is 7%, shrub cover is 10% and herbaceous cover is 13%, the vegetation cover ranges between 26% and 37%. *Acacia etbaica, Fagonia indica, Euphorbia inarticulata, Blepharis ciliaris, Lycium shawii, Solanum incanum, Commicarpus helenae . Kleinia odora, Caralluma quadrangula, C. penicillata, C. hexagona, Echidnopsis squamulata, Ceropegia arabica, C. rupicola, C. variegata, Sarcostemma viminale, Blepharis ciliaris, Grewia tembensis, Indigofera spinosa, Ruellia patula, Asparagus africana.*

3.24- Acacia yemenensis - Euphorbia schimperi **type**

Sparse shrubland to dense shrubland and woodland to dense woodland, grows south & south east Taiz and west and north west al Qaadah, between 1450 and 1800m. The terrain is moderately to very steep slope mountains. Average tree cover is 8%, shrub cover is 35% and herbaceous cover is 6%., the vegetation cover ranges between 14% and 76%. Associated species are: *Euphorbia parciramulosa, E. inarticulata, E. cactus, E. schimperi, Hypoestes forskalei, Psiadia arabica, Aristida sp., Kleinia odora.*

3.25- Polygala abyssinica - Cadia purpurea type

Grassland to open woodland grows south Taiz and on Jabal Saber and Jabal Habashi, between 1390 and 1650m. The terrain is very steep to moderately steep slope mountains, very steep drainage lines and rolling hills. Average tree cover is 1%, shrub cover is 29% and herbaceous cover is 15%, the vegetation cover ranges between 25% and 86%.
associated species are: *Hypoestes forskalei, Tagetes minuta, Barleria trispinosa, Andropogon greenwayi, Aristida sp., Arthraxon prionodes & Cheilanthes sp.*

3.26- Sporobolus spicatus - Suaeda aegyptiaca type

Is dense grassland, grows on saline plains called locally (Khazaga) between 970-1380m. The vegetation cover ranges between 75% - 80%. (18% trees, 60% herbs). Associated species are: *Tamarix sp., Flaveria trinervia.*

3.27- Acacia nilotica subsp *kraussiana – Cymbopogon jwarancusa type*

Is a woodland found on rocky mountain slopes between 1000 and 1210m, such as Al Rubeie', al Birayn and Yafrus (J. Habashi) S of Taiz. Associated species are:
Acacia asak, Acalypha fruticosa, Cissus quadrangularis, Euphorbia inarticulata, Euphorbia cactus, Kleinia odora, Acacia mellifera, Sarcostemma viminale, Anisotes trisulcus, Indigofera spinosa, Aloe niebuhriana, Pergularia tomentosa, Commiphora abyssinica, Commiphora schimperi, Heliotropium aegyptiacum , Actiniopteris radiata, Flueggea virosa, Coptosperma graveolens, Aerva javanica , Caralluma cicatricose, C. penicillata Barleria proxima, Ziziphus spina-christi, Indigofera arabica, Grewia tembensis, Euphorbia schimperi, Acacia nilotica ssp. Indica, Indigofera articulate, Chrozophora oblongifolia, Aristolochia bracteolate, Dobera glabra, Ceropegia rupicola and *Aloe inermis*

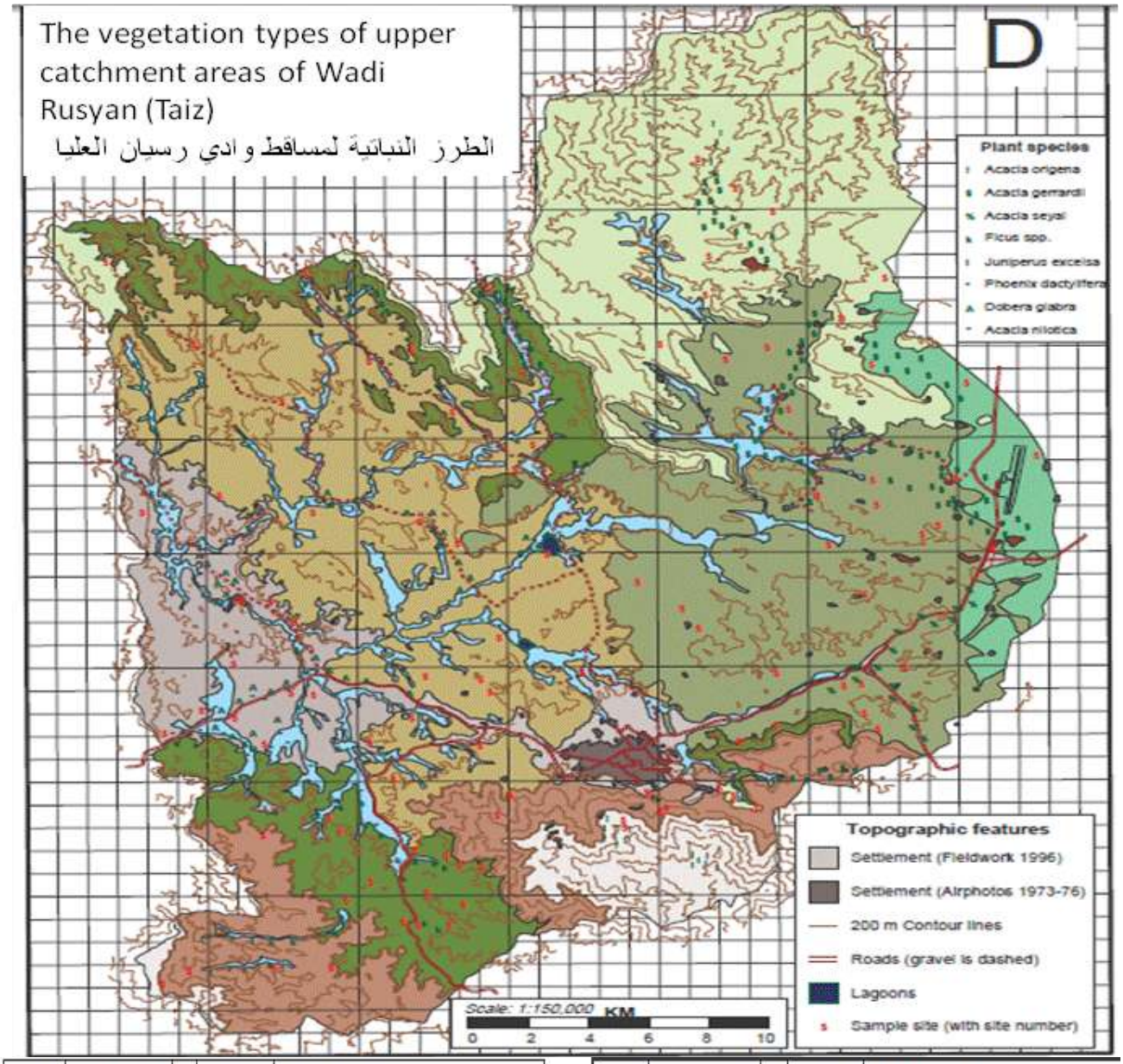
3.28- Acacia yemenensis - Senecio hadiensis type

Is found on mountain slopes between 1380 and 1700 m, such as J. Saber, J. Habashi, Qadas, Al Misrakh (Taiz). Associated species are:
Tagetes minuta, Echinops spinosissimus, Euphorbia schimperi, Acacia etbaica, Cadia purpurea, Barleria trispinosa, Rhus retinorrhoea, Jasminum grandiflorum, Micromeria imbricata, Gomphocarpus fruticosus, Barleria bispinosa, Dodonaea viscosa. Rarely the following are found:
Ficus cordata, Ficus palmata, Scilla hyacinthina, Pancratium maximum, Phoenix caespitosa, Wendlandia arabica, Aloe rivierei, Aloe vacillans,

*Plate **3.27.** Acacia nilotica* subsp *kraussiana – Cymbopogon jwarancusa* west of Taiz

***Plate 3.23. Acacia gerrardii - Eragrostis papposa* type NE Taiz (Al Ganad)**

Plate *3.12. Grewia trichocarpa - Boscia angustifolia – Acacia asak type, Al U'deyn*



SYMBOL	VEGETATION TYPE	%	STRUCTURE	MAIN PLANT SPECIES
	Acacia asak, Ormocarpum yemenese	38	6, 5, 1, 2, 7, 3, 4, 9	Acacia asak, Ormocarpum yemenensis, Indigofera spinosa, Acalypha fruticosa, Cyanotis nyctitropa (1), Ruellia patula, Ocinum hadiense
	Cymbopogon schoenanthus (2), Aerva javanica	46	9, 8, 7, 6, 4	Aerva javanica, Cymbopogon schoenanthus, Aristida sp., Indigofera spinosa, Caralluma quadrangula, Ruellia patula, Fagonia indica (2)
	Aloe inermis (2), Indigofera spinosa	41	5, 6, 7, 4, 8	Indigofera spinosa, Euphorbia inarticulata, Aristida sp., Grewia erythrea, Cissus rotundifolius, Kleinia adora, Eragrostes papposa, Aloe inermis, Ormocarpum yemenensis
	Acacia mellifera, Euphorbia cactus	62	4, 5, 2, 3, 1	Euphorbia cactus, Acacia mellifera, Cissus rotundifolius, Euphorbia inarticulata, Kleinia adora, Eragrostes papposa, Anisotes trisulcus, Grewia Erythrea, Indigofera spinosa, Ruellia patula, Euphorbia schimperi, Cadia purpurea, Cissus quadrangularis

(1) Moisture Indicator
(2) Drought Indicator
(3) High salinity Indicator

Key for structural vegetation type:
1- Dense Woodland
2- Woodland
3- Open Woodland
4- Dense Shrubland
5- Shrubland
6- Sparce Shrubland
7- Shrub/Grassland
8- Dense Grassland
9- Grassland

SYMBOL	VEGETATION TYPE	%	STRUCTURE	MAIN PLANT SPECIES
	Acacia gerrardii, Eragrostes papposa	31	2, 3, 5, 9	Eragrostes papposa, Acacia etbaica, Fagonia indica (2), Euphorbia inarticulata, Blepharis ciliaris
	Acacia yemenensis (1) Euphorbia schimperi	49	4, 5, 6, 2 1	Euphorbia schimperi, Euphorbia inarticulata, Aristida sp., Euphorbia cactus, Hypoestes forskalei, Psiadia arabica
	Polygala abyssinica, Cadia purpurea	45	4, 9, 7, 6, 5, 3	Cadia purpurea, Hypoestes forskalei, Andropogon greenwayii, Cheilanthes sp. (1), Aristida sp., Arthraxon prionodes, Tagetes minuta, Barleria trisponosa
	Scabosia columbaria (1), Acanthus arboreus	39	6, 9	Acanthus arboreus, Andropogon greenwayii, Scabiosa columbaria, Satureja biflora (1), Cheilanthes sp. (1), Rosa abyssinica, Gomphocarpus fruticosus
	Sporobolus spicatus (3), Suaeda sp. (3)	78	8, 2	Sporobolus spicatus, Suaeda sp., Tamarix sp. (3), Flaveria trinervia

Plate 3.19. Acacia gerrardii type Assayani (South of Ibb)

Plate 3.27. Acacia nilotica subsp kraussiana – Cymbopogon jwarancusa type Yafrus

Plate 3.28. Acacia yemenensis - Senecio hadiensis type, Bir Al Arabah (Qadas)

4- High altitude mountains الجبال عالية الارتفاع

Main vegetation types of the region are: اهم الانماط (الطرز) النباتية

4.1- Rosa abyssinica - Scabiosa columbaria type

Is a grassland or dwarf shrubland occur on the steep slope mountains of Jabel Saber (south Taiz), between 2000-2800m. Associated species are *Echinops spinosissimus, Cheilanthes sp., Acanthus arboreus, Micromeria imbricata, Gomphocarpus fruticosus, Rumex nervosus, Maesa lanceolata, Hypericum revolutum, Nuxia congesta, Scabiosa columbaria,, Iris albicans, Echinops spinosissimus, Gomphocarpus fruticosus,, Tagetes minuta, Rumex nervosus, Aloe tomentosa, Clematis hirsute, Juniperus procera, Andropogon greenwayii Centaurothamnus maximus* and others.

4.2- Themeda triandra - Barleria proxima type

Is shrubland to grassland found on moderate steep slope mountains and hills, between 1900-2200m. such as east and south east wadi Mauna (between Maaber and Madinat Ashsharq) and south east Hajjah . Associated species are *Psiadia punctulata, Andropogon greenwayi, Cadia purpurea, Ruellia patula, Cyphostemma digitata, Lantana viburnoides, Leucas glabrata, Aristida sp. Eragrostis papposa, Acacia etbaica and others.*

4.3- Micromeria imbricata -Pennisetum setaceum type

Is a woodland to sparse grassland found on steep slope mountains and terraces (between 1950-2250m.). Associated specioes are *Richardia tingitata, Andropogon sp., Anisotes trisulcus, Eragrostis papposa, Acacia origena, Themeda triandra, Acanthus arboreus, Teucrium yemense, Felica abyssinica, Hypoestes forskalei, Solanum incanum, Leucas glabrata* and many others.

4.4- Kniphofia somarea - Acanthus arboreus type

Is a dense shrubland occurs on steep slope mountain of Sumara (between 2600-2700m.). Associated species are *Pterocephalus pulverulentus, Micromeria imbricata, Ammi majus, Ferula communis, Anagallis arvences , Echinops spinosissimus, Campanula edulis* and others.

4.5- Thymus laevigatus - Themeda triandra - Acanthus arboreus type

Is a shrubland occurs on moderate to almost flat rocky mountains and hills at elevation above 2600m. Associated species are *Euphorbia schemperiana, Andropogon sp., Hypoestes forskalei, Aloe vacillans, Acacia yemenensis, Teucrium yemens, Vermitrox abyssinica, Plectranthus spp., Osteospermum vaillantii, Jasminum grandiflorum, Echinops spinosissimus, Dianthus uniflorus, Rumex nervosus, Polygala senensis* and others.

4.6- Acacia origena type

Is open woodland found near or on cultivated fields in wadis, terraces, plains and plateus or mountain slopes (e.g. Ibb, NE At Turba, Jabel Saber, Jabel Sumara, Utuma), (between 1600 and 2800m). this woodland can be as Agro-forestry system. Associated species are *Ziziphus spina-christi, Euphorbia ammak, Opuntia ficus-indica, Agave sisalana, Cordia africana, Ficus vasta, Ehretia cymosa, Carissa spinarum* and others.

4.7- Plectranthus hyemali shrubland

Is a shrubland found on mountain slopes around Adhale, Dimt, Juban, Ashueib, Qa'tabah (between 1600 and 2200m). A large number of vegetation types occur here for example:

1- *Acacia asak - Acalypha fruticosa- Plectranthus hyemalis type*
2- *Acacia mellifera - Cissus rotundifolia - Plectranthus hyemalis type*
3- *Indigofera spinosa- Andropogon distachyos-Plectranthus hyemalis type*
4- *Acacia gerrardii-Euphorbia inarticulata- Plectranthus hyemalis type*

Associated species are *Andropogon distachyos, Grewia tembensis, Kleinia odora, Farsetia longisiliqua, Indigofera spinosa, Blepharis ciliaris, Tetrapogon villosus, Hypoestes forskalei, Psiadia punctulata, Cissus rotundifolia, Cissus quadrangularis , Acacia mellifera, Grewia tembensis, Euphorbia cuneata, Cissus quadrangularis, Farsetia longisiliqua,*and *Commiphora kataf.*

*Plate **4.5.** Thymus laevigatus -Themeda triandra - Acanthus arboreus,* type Ibb area

*Plate **4.6.** Acacia origena type,* Annagd al Ahmer (South Ibb)

***Plate 4.7.** Indigofera spinosa- Andropogon distachyos - Plectranthus hyemalis type,* Ashue'ib (Adhale' governorate)

5- Highland plains سهول المرتفعات العالية

Main vegetation types are: اهم الأنماط (الطرز) النباتية

5.1. Elionurus muticus - Euriops arabica type:

is a grassland to dwarf shrubland found on rocky slopes of mountain plain. Associated species are *Andropogon sp., Becium capitatom, Felicia abyssinica, Pennisetum setaceum, Kleinia semperviva, Dianthus uniflorus.*

5.2. *Peganum harmala - Blepharis ciliaris* type:

is a shrubland found on flat, rocky areas or old fallow lands. (Such as around Ma'ber and Sana'a). Associated species are *Enneapogon desvauxii, Lycium shawii, Pulicaria undulata, Sonchus oleraceus.*

5.3. *Tetrapogon villosus - Cynodon dactylon:*

is a grassland occur on rocky fallow land. Associated species are *Cenchrus ciliaris, Indigofera arabica, Pulicaria undulata, Sonchus oleraceus, Pennisetum villosum, Brachiaria erucidiformis.*

5.4. *Acacia etabaica - Euphorbia inarticulata* type:

Is open woodland found on plains below 1500 m (e.g. Qa al Qaeda, Al Hoban and Al Ganad). Associated species are *Withania somnifera, Ziziphus spina-christi, Solanum incanum, Fagonia indica, Eragrostes sp., Aerva javanica, Lycium shawii, Euphorbia cactus, Cissus rotondifolia, Commicarpus helenae, Hypostes forskalei, Indigofera spinosa, Kleina odora, Caralluma quadrangula, C. cicatricosa, C. penicillata, C. hexagona, Echidnopsis squamulata, Ceropegia arabica, C. rupicola, C. variegata, Sarcostemma viminale, Huernia sp.*

5.5. Acacia origena open woodland:

The common type here

Acacia origena - Pennisetum setaceum type is a woodland found on mountain slopes and terraces (between 1950 - 2250 m). Associated species are *Micromeria biflora, Andropogon sp., Reichardia tingitana , Themeda triandra, Rumex nervosus, Acanthus arboreus* and others.

5.6. Felicia abyssinica - Andropogon sp. type:

is grassland occurs on moderate steep slope mountains and hills (between 2300 - 2370m). Associated species are *Teucrium yemense, Echinops spinosissimus, Tetrapogon villosus, Indigofera arabica, Salvia aegyptiaca, Eragrostis papposa, Blepharis* ciliaris, *Helichrysum pumilum, Gomphocarpus fruticosus, Euphorbia granulata, Hypoestes forskalei , Thymus laevigatus* and others

6. Eastern and northern east mountain:

Main vegetation types of this region are:

6.1. Chrysopogon plumulosus - Lavandula pubescens Type:

is dwarf shrub occurs on dry rocky slope mountain east Dhamar plains. Associated species are *Andropogon sp., Becium obovatum, Felicia abyssinica , Pennisetum setaceum* and other.

6.2. Chrysopogon plumulosus - Helichrysum pumilum type:

is grassland to dwarf shrubland occurs on flat to moderately slope areas. Associated species are *Tetrapogon villosus , Blepharis ciliaris, Enneapogon desvauxii , Lycium shawii, Eragrostis papposa , Aristida adscensionis* and others.

6.3. Lavandula pubescens - Chrysopogon plumulosus type:

is a dwarf shrubland occurs o the plains and hills between 1800 - 2600 m (east highland plains). Associated species are *Acacia origena , Gnidia somaliense, Seddera arabica, Fagonia indica, Peganum harmala, Tetrapogon villosus* and others.

6.4. Euphorbia balsamifera - Kleinia odora type:

is a dwarf shrubland occurs on limestone plateau. Associated species are *Euphorbia fruticosa, Aristida adscensionis, Lycium shawii, Barleria proxima* and others.

6.5. Andropogon crossotos type:

is open grassland found on plains, hills and mountains around Rada' at elevation up to 2600 m. Associated species are *Helichrysum pumilum, Andrachne aspera, Aloe vacillans, Caralluma quadrangula , Kleinia odora, Chrysopogon plumulosus, Cenchrus ciliaris, Tetrapogon villosus* and others.

6.6. Euphorbia inarticulata - Psiadia punctulata type:

is a shrubland occurs south west of al Baydha governorate and along the road Rada'-al Baydah at elevation lower than 2200 m. Associated species are *Solanum glabratum* var. *sepicula, Lavandula pubescens, Blepharis ciliaris, Tetrapogon villosus, Chrysopogon plumulosus, Euphorbia cactus* and others.

6.7. Acacia nilotica - Barleria parvifolia type:

Is open woodland occurs on Wadis and plains or depressions at elevation about 1800 to 2000 m. Associated species are *Solanum spp., Lycium shawii, Cynodon dactylon, Peganum harmala, Acacia gerrardii, Ziziphus spina-christi* and others.

6.8. Acacia oerfota - Commiphora myrrha type:

is open bush land occurs on mountains and Wadis and hills adjacent to the desert and north east al Baydha governorate. Associated species are *Acacia tortilis, Salvadora persica, Tamarix aphylla, Desmostachya bipinnata , Pennisetum divisum, Stipagrostis hirtigluma* and others.

6.9. Acacia asak - Cadia purpurea type:

is open woodland occurs southern part of al Baydha governorate. The elevation is less than

1600 m. Associated species *Acacia mellifera, Commiphora myrrha, "Adenium obesum, Euphorbia sp.* The Wadis in this unit are characterized by large trees such as *Breonadia salicina , Trichilia emetica, Tamarix indica, Ficus spp.* and *Ziziphus spina-christi*.

6.10. Acacia etbaica - Ziziphus spina-christi type:

is open woodland found east of Sa'dah on Wadis and depressions.

6.11- Acacia mellifera - Euphorbia rubriseminalis type

It is a woodland and shrubland. The topography is plateau and limestone mountain and slopes. The altitude ranges between 1050 and 1385 m asl such as Shabwa and Hadhramaut. The vegetation here is found on the mountain slopes, on stone flat pavement and channels that cut the plateau. Associated species are: *Zygophyllum decumbenus, Fagonia indica, Sarcostemma viminale, Indigofera spinosa, Anisotes trisulcus, Senna italic, Ochradenus arabicus, Helichrysum pumilum, Cymbopogon schoenanthus, Acacia etbaica, Chrysopogon sp., Aloe sp., Heliotropium ramosissimum, Gnidia somalensis, Pulicaria undulata, Limonium cylindrifolium, Calotropis procera, Barleria proxima, Commicarpus sp., Plicosepalus acaciae, Iphiona scabra, Turraea parvifolia, Crotalaria persica, Acacia hamulosa, Grewia tenax* and *Grewia erythraea.*

7. Eastern desert: الصحراء الشرقية

The following vegetation types can be found:اهم الانماط (الطرز) النباتية

7.1- Acacia tortilis-Aerva javanica type

Is a grassland to woodland occurs on wadis, drainage lines, along the edges of the wadi and sand dunes. Associated species are *Panicum turgidum, Fagonia indica, Indigofera spinosa, Dipterygium glaucum, Rhazya stricta, Jatropha spinosa, Pennisetum setaceum, Pergularia tomentosa, Aristida adscensionis, Acacia oerfota* and others.

7.2- Dipterygium glaucum-Panicum turgidum type

Is sparse shrubland occurs on undulating sand dune plain or almost gravely plain near Marib. Associated species are *Aerva javanica, Fagonia indica, Salsola imbricata, Stipagrostis spp.* and others.

7.3- Suaeda aegyptiaca-Salsola imbricata type

Is sparse shrub-woodland found on undulating to almost flat, slightly saline soil areas (northern west Marib). Associated species are *Aerva javanica, Panicum turgidum, Rhazya stricta, Dipterygium glaucum, Leptadenia pyrotechnica, Acacia tortilis, Fagonia indica, Salvia merjamie, Tamarix sp., Desmostachya bipinnata* and others.

7.4- Calotropis procera-Dipterygium glaucum type

Is sparse grassland and accopies most of the eastern desert plain. Associated species are *Aerva javanica, Panicum turgidum and Acacia tortilis.*

7.5- Ziziphus spina-christi cultivated lands

Is found on many cultivated lands as a traditional Agroforestry system

7.6- Rhazya stricta - Fagonia indica types

It is a grassland found on the sand dune areas between 728 and 909 m north Ataq (Shabwa). The vegetation cover is very poor. Associated species are *Dipterygium glaucum, Heliotropium strigosum, Aerva javanica, Pulicaria undulata, Acacia ehrenbergiana, Crotalaria persica Calotropis procera,* and *Tephrosia apollinea.*

7.7- Acacia campoptila - Cymbopogon schoenanthus type

It is an open woodland found on rocky flood plain cut by numerous channels and depressions such as Shabwa and Hadhramaut. The altitude ranges between 790 and 1007 Associated species *are: Acacia hamulosa, Fagonia indica, Tephrosia apollinea, Ziziphus leucodermis, Blepharis ciliaris* and *Barleria sp.*

7.8- Rhazya stricta – Panicum turgidum - Calotropis procera type

It is a grassland found on rocky flood plain cut by numerous channels and depressions such as Shabwa Associated species are: *Acacia campoptila, Fagonia indica, Tephrosia apollinea, Ziziphus leucodermis, Dipterygium glaucum, Heliotropium ramosissimum, Crotalaria persica, Senna italic, Citrullus colocynthis, Aerva javanica, Pulicaria jaubertii, Pulicaria undulata* and *Tribulus arabicus*.

7.9- Rhazya stricta - Anogeissus bentii – Anisotes trisulcus type

It is a grassland and shrubland found on flood plain cut by numerous channels and near cultivated fields such as Shabwa. Associated species are: *Acacia campoptila, Fagonia indica, Tephrosia apollinea, Panicum turgidum, Indigofera spinosa* and *Ochradenus arabicus,*

7.10- Acacia campoptila - Rhazya stricta type

It is a woodland and shrub land. The topography is wadi terraces and river valley (active channels) covered by small rocks and subjected to severe flooding such as Shabwa, Hadhramaut and Marib. The altitude ranges between 970 and 1369 m asl. The vegetation here is concentrate mostly at the edge of the wadi bed (river bed) where water that flows from adjacent mountain and hills is accumulated. The most common plant species are:

Fagonia indica and *Tephrosia apollinea, Barleria sp, Fagonia indica, Ziziphus leucodermis* (Shabwa and Hadhramaut only), *Senna italica, Tephrosia apollinea, Indigofera arabica, Kohautia retrorsa* and *Dipterygium glaucum.*

7.11- Pulicaria cylindrica - Aloe dhufarensis type

The community is rare and found on depressions at the foothills and on the plateau south Hat district al Mahara (between 860 and 960m). The vegetation is rich and important in term of plant diversity, endemic and near endemic species. Associated species are: *Acacia tortilis, Acacia hamulosa, Tephrosia apollinea, Heliotropium fartakense, Pulicaria cylindrica, Pulicaria undulata, Aristida sp., Chrysopogon plumulosus, Senna holosericea, Blepharis ciliaris, Pluchea arabica, Crotalaria sp., Kickxia sp., Kohautia sp., Zygophyllum decumbenus, Euphorbia rubriseminalis, Commicarpus sp., Vernonia arabica and Fagonia arabica.*

Plate 7.11. Pulicaria cylindrica - Aloe dhufarensis type south Hat district al Mahara

8- Soqotra Archipelago ارخبيل سقطرى

Main vegetation types are:اهم الانماط (الطرز) النباتية

1. ***Limonium axillare – Atriplex griffithii type*** . Main association: *Chenopodium sp, Pulicaria stephanocarpa, Zygophyllum album* .
2. **. *Croton socotranus – Cissus subaphylla type.*** A shrubland found on the coastal plain almost from 0 to 100 masl. Main association: *Pulicaria stephanocarpa, Jatropha unicostata,* Maerua angolensis var. Socotrana, *Euphorbia arbuscula, Dendrosicyos socotrana Commiphora ornifolia*
3. ***Aizoon canariensis – Salsola sp type***. Main association: *Dactyloctenium sp, Pulicaria stephanocarpa, Blepharis ciliaris* .
4. ***Salvadora persica - Cissus subaphylla type***. Main association: *Tephrosia apollinea, Indigofera nephrocarpoides.*
5. ***Indigofera nephrocarpoides – Panicum rigidum type***. Main association: *Tephrosia apollinea, Indigofera pseudointricata , Lycium sokotranum, Heliotropium balfourii.*
6. ***Dracaena cinnabari – Buxus hildebrandtii type***. Main association: *Indigofera nephrocarpoides, Trichocalyx obovatus, Croton socotranus, Adenium obesum ssp sokotranum, Helichrysum balfourii.*
7. ***Aloe perryi – Euphorbia arbuscula type***. Main association: *Polycarpaea kuriensis , Atriplex griffithii, Lycium sokotranum , Zygophyllum album , Asparagus africanus* .

8. ***Aristida adscensionis – Euphorbia schimperi type***. Main association: *Atriplex griffithii, Zygophyllum album , Asparagus africanus , Sevada schimperi, Polycarpaea kuriensis, Lycium sokotranum ,*
9. ***Euphorbia abdelkuri – Euphorbia balsamifera type***. Main association: *Lycium sokotranum , Zygophyllum album , Asparagus africanus , Euphorbia schimperi.*
10. ***Seddera spinosa – Urochondra setulisa ty***pe. Main association: *Atriplex griffithii, Lycium sokotranum , Zygophyllum album , Indigofera nephrocarpa, Seddera spinosa.*
11. ***Avicennia marina – Suaeda monoica type***. Main association: *Atriplex griffithii, Limonium paulayanum, Urochondra setulosa, Heliotropium sp, Arthrocnemum macrostachyum.*
12. ***Pulicaria lanata – Rhus thysiflora type***. Main association: *Hypericum socotranum, Pteridium aquilinum, Micromeria remota , Thamnosma socotrana, Helichrysum balfourii, Trichodesma microcalyx and Euphorbia socotrana*.
13. ***Cocculus balfourii – Heteropogon contortus type***. Main association: *Rhus thysiflora , Themeda quadrivalvis, Dichanthium foveolatum, Juncus soqotranus , Heliotropium balfourii, Ballochia atro-virgata, Aloe perryi and Commiphora socotrana.,*
14. ***Adiantum balfourii – Dracaena cinnabari type***. Main association: *Buxanthus pedicellatus, Croton socotranus, Trichocalyx orbiculatus , Ballochia atro-virgata, Aloe perryi, Cissus hamaderohensis , Euphorbia arbuscula , Jatropha unicostata and Aerva lanata*
15. ***Leucas virgata – Croton socotranus type***. Main association: *Trichocalyx orbiculatus , , Heliotropium odorum, Ballochia atro-virgata, Heteropogon contortus, Euryops arabicus, Dracaena cinnabari and Seddera glomerata.*

Plate 8.6. ***Dracaena cinnabari – Buxus hildebrandtii type***

Table (1). Plant species of Yemen

Families	Species	Genera	Naturalize	Cultivated	Introduced	Endemic to:	Endemic to:
						Yemen *	Arabia **
1. ACANTHACEAE	100	28	98		2	28(24)	7
2. ACTINIOPTERIDACEAE	2	1	2	-	-	-	-
3. ADIANTACEAE	17	7	17	-	-	-	-
4. AGAVACEAE	1	1			1		
5. AIZOACEAE	20	12	20	-	-	-	2
6. ALOEACEAE	33	1	33	-	-	17(3)	13
7. AMARANTHACEAE	32	10	30		2	4(3)	1
8. AMARYLIDACEAE	9	5	8		1	1(1)	1
9. ANACARDIACEAE	16	7	13	2	1	2(2)	1
10. ANNONACEAE	1	1	1				
11. ANTHERICACAEA	4	2	4			1(1)	
12. APIACEAE (UMBELLIFERAE)	35	26	30	5	-	8(4)	2
13. APOCYNACEAE	131	51	127	-	4	45(18)	14
14. ARACEAE	5	4	5	-	-	-	-
15. ARALIACEAE	1	1	1	-	-	-	-
16. ARECACEAE (PALMAE)	11	9	7	3	1	-	-
17. ARISTOLOCHIACEAE	2	2	2	-	-	-	-
18. ASPARAGACEAE	5	1	4		1		
19. ASPHODELACEAE	1	1	1				
20. ASPLENIACEAE	11	2	11	-	-	1(1)	-
21. ASTERACEAE (COMPOSITAE)	216	86	193	13	10	45(25)	21
22. AVICENNIACEAE	1	1	1	-	-	-	-
23. BAISAMINACEAE	1	1	1	-	-	-	-
24. BARBEYACEAE	1	1	1	-	-	-	-
25. BALANITACEAE	2	1	2	-	-	-	-
26. BASELLACEAE	2	2	1	1	-	-	-
27. BEGONIACEAE	2	1	2	-	-	2(2)	-
28. BERBERIDACEAE	1	1	1	-	-	-	-
29. BIGNONIACEAE	6	6	2	-	4	-	-
30. BOMBACEAE	2	2	1	-	1	-	-
31. BORAGINACEAE	82	17	82	-	-	23(16)	6
32. BRASSICACEAE	56	29	49	7		9(4)	3
33. BURSERACEAE	23	2	23			11(11)	
34. BUXACEAE	1	1	1				
35. CACTACEAE	2	1	2				
36. CAMPANULACEA	6	2	6			1(1)	
37. CANNABACEAE	1	1		1			
38. CANNACEAE	1	1		1			
39. CAESALPINIACEAE	33	12	27		6	1(1)	
40. CAPPARACEAE	21	6	21			1(1)	2
41. CARYOPHYLLACEAE	61	23	60	1		14(9)	7
42. CASUARINACEAE	3	1			3		
43. CELASTRACEAE	7	2	6	1		1	1
44. CERATOPHYLLACEAE	1	1	1				
45. CHENOPODIACEAE	37	16	35	1	1		1

46. CISTACEAE	3	1	3				2
47. CLEOMACEAE	19	1	19			2(1)	4
48. C OLCHICACEAE	3	2	3			1(1)	
49. COMBRETACEAE	7	4	6		1	1	1
50. COMMELINACEAE	18	3	18			1	1
51. CONVOLVULACEAE	50	12	46	1	3	11(8)	
52. CRASSULACEAE	18	6	18			5(2)	1
53. CUCURBITACEAE	33	15	26	7		3(2)	
54. CUPRESSACEAE	4	3	1		3		
55. CUSCUTACEAE	3	1	3				
56. CYCLOCHEILACEAE	2	2	2				
57. CYMODOCEACEAE	5	4	5				
58. CYPERACEAE	74	17	74			2	
59. DENNSTAEDTIACEAE	1	1	1				
60. DIOSCOREACEAE	1	1	1			1(1)	
61. DIPSACACEAE	3	2	3				
62. DIRACHMACEAE	1	1	1			1(1)	
63. DRACAENACEAE	5	3	4	1		1(1)	
64. DRYOPTERIDACEAE	5	4	5				
65. EBENACEAE	3	2	3				
66. ELAEAGNACEAE	1	1			1		
67. EPHEDRACEAE	4	1	4				1
68. EQUISETACEAE	1	1	1				
69. ERICACEAE	1	1	1				
70. ERYTHROXYLACEAE	1	1	1			1(1)	
71. EUPHORBIACEAE	106	17	103		3	30(19)	10
72. FABACEAE (PAPILIONACEAE)	205	62	181	16	8	24(11)	3
73. FLACOURTIACEAE	2	2	2				
74. FRANKENIACEAE	1	1	1				
75. FUMARIACEAE	2	1	2				
76. GENTIANACEAE	11	5	11			3(2)	2
77. GERANIACEAE	14	4	13		1	1(1)	
78. GLOBULARIACEAE	1	1	1			1	
79. GOODENIACEAE	1	1	1				
80. HALORAGACEAE	1	1	1				
81. HYACINTHACEAE	10	3	10			6(6)	1
82. HYDNORACEAE	1	1	1				
83. HYDROCHARITACEAE	5	4	5				
84. HYPERICACEAE	7	1	7			5(5)	
85. HYPOXIDACEAE	2	1	2				
86. IRIDACEAE	5	4	5			1(1)	
87. JUGLANDACEAE	1	1		1			
88. JUNCACEAE	9	1	9				1
89. LAMIACEAE (LABIATAE)	89	23	85	3	1	23(13)	13
90. LAURAICEAE	1	1	1				
91. LEMNACEAE	3	1	3				
92. LENTIBULARIACEAE	2	1	2				
93. LILIACEAE	13	10	9	4		1	
94. LINACEAE	4	1	3	1			
95. LOASACEAE	1	1	1				

96. LOGANIACEAE	4	3	4				
97. LORANTHACEAE	7	5	7			1	1
98. LYTHRACEAE	7	5	7				
99. MAGNOLIACEAE	1	1			1		
100. MALPIGHIACEAE	2	2	2			1(1)	
101. MALVACEAE	69	14	60	4	5	12(9)	
102. MARSILEACEAE	2	1	2				
103. MELIACEAE	6	4	4		2	1(1)	
104. MELIANTHACEAE	1	1	1				
105. MENISPERMACEAE	5	3	5				1
106. MIMOSACEA	39	7	27		12	5(2)	3
107. MORACEAE	17	4	14	2	1	2(2)	
108. MORINGACEAE	2	1	1		1		
109. MUSACEAE	1	1		1			
110. MYRICACEAE	1	1	1				
111. MYRSINACEAE	2	2	2				
112. MYRTACEAE	12	4	1	2	9		
113. NAJADACEAE	2	1	2				
114. NEURADACAEAE	1	1	1				
115. NYCTAGINACEAE	20	5	19		1	4(2)	1
116. NYMPHAEACEAE	1	1	1				
117. OCHNACEAE	1	1	1				
118. OLEACEAE	6	2	5	1			
119. OLEANDRACEAE	2	2	2				
120. ONAGRACEAE	3	2	3				
121. OPHIOGLOSSACEAE	3	1	3				
122. ORCHIDACEAE	25	9	25			1(1)	
123. OROBANCHACEAE	6	2	6				
124. OXALIDACEAE	3	1	2		1		
125. PANDANACEAE	1	1	1				
126. PAPAVERACEAE	4	2	3	1			
127. PARKERIACEAE	1	1	1				
128. PASSIFLORACEAE	2	2	2				
129. PEDALIACEAE	2	2	1	1			
130. PIPERACEAE	5	2	4	1			
131. PITTOSPORACEAE	1	1	1			1	
132. PLANTAGINACEAE	7	1	7				
133. PLUMBAGINACEAE	12	4	11		1	5(4)	
134. POACEAE (GRAMINEA)	322	153	306	13	3	15(9)	1
135. POLYGALACEAE	11	1	11			1(1)	
136. POLYGONACEAE	22	7	20		2		1
137. POLYPODIACEAE	3	2	3				
138. PORTULACACEAE	10	2	10			3(3)	1
139. POTAMOGETONACEAE	6	1	6				
140. PRIMULACEAE	8	5	8				
141. PROTEACEAE	1	1			1		
142. PSILOTACEAE	1	1	1				
143. PTERIDACEAE	4	1	4				
144. PUNICACEAE	2	1	1	1		1(1)	
145. RANUNCULACEAE	8	5	7	1			
146. RESEDACEAE	13	4	13			3(2)	2

147. RHAMNACEAE	11	5	9		2		1
148. RHIZOPHORACEAE	1	1	1				
149. ROSACEAE	17	9	9	7	1	2	
150. RUBIACEAE	46	21	44	2		17(15)	3
151. RUPPIACEAE	1	1	1				
152. RUTACEAE	13	5	6	7		1	
153. SALICACEAE	3	1	2		1		
154. SALVADORACEAE	3	3	3				
155. SANTALACEAE	4	2	4				1
156. SAPINDACEAE	6	5	5	1			
157. SAPOTACEAE	6	4	5	1		2(2)	
158. SCROPHULARIACEAE	76	28	75		1	16(4)	6
159. SELAGINELLACEAE	4	2	4				
160. SIMAROUBACEAE	1	1	1				
161. SOLANACEAE	38	10	31	7		4(3)	2
162. STERCULIACEAE	15	7	13	1	1	1(1)	
163. TAMARICACEAE	3	1	3				
164. THELYPTERIDACEAE	1	1	1				
165. THYMELIACEAE	2	1	2			1(1)	
166. TILIACEAE	25	3	24	1		5(4)	
167. TYPHACEAE	2	1	2				
168. ULMACEAE	3	2	3				
169. URTICACEAE	18	9	18			1	1
170. VALERIANACEAE	1	1	1			1(1)	
171. VELLOZIACEAE	1	1	1				1
172. VERBENACEAE	22	9	20	1	1	6(5)	
173. VIOLACEAE	4	2	3		1		
174. VISCACEAE	2	2	2				
175. VITACEAE (VITIDACEAE)	11	5	10	1		3(3)	
176. WOODSIACEAE	1	1	1				
177. ZANNICHELLIACEAE	1	1	1				
178. ZINGIBERACEAE	2	2		2			
179. ZYGOPHYLLACEAE	28	6	28			1	3
Total	2838	1068	2602	129	107	457	151

Note. In addition there are 4 endemic varieties, 3 near endemic varieties, 3 endemic sub species and 1 near endemic sub species

The number between bracts is endemic to Soqotra

الارقام بين القوسين تدل على عدد النباتات المتوطنة في سقطرى