

## STUDIES ON THE FLORA OF YEMEN:

### Flora of Yabraq valley and villages of Al-Mihwery, , Alwadeea District , Abyan Governorate-Yemen

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#### Abstract:

The present study deals with the flora of Wadi Yabraq and Al-Mahory villages in Al-wadie District, Abyan Governorate, the study was conducted during the period from August 2020 to December 2022, a number of field works were completed. About 295 taxa including species and sub-species, belonging to 175 genera and 59 families have been recorded. Among them two species belonging to Pteridophytes, The dicots are represented by 257 species, these represent 87% of the total plant species of the study area, while the monocots are represented by 36 species represented 12%.

The most dominant families in the term of species richness were Asteraceae (28 species ; 14 genera ) followed by Poaceae (23 species ; 19 genera), Apocynaceae ( 19 species ; 10 genera). The floristic analysis revealed the most abundant plant in the study area are Herbs This study also recorded new species as additions to the flora Abyan Governorate and recorded new specie as additions to the flora yemen *Cleome glaucescens*.

**Keywords:** flora, Yabraq Valley, Abyan Governorate.

#### الخلاصة

#### فلورا وادي يبرق وقرى المحوري في منطقة الوضيع محافظة ابين- اليمن

أجريت دراسة الحياة النباتية لمنطقة وادي يبرق وقرى المحوري ، مديرية الوضيع ، محافظة أبين خلال الفترة من أغسطس 2020 م إلى ديسمبر 2022م. اظهرت نتائج الدراسة تسجيل 295 وحدة تصنيفية (شملت النوع ووحدات تحت النوع) تنتمي لـ 175 جنساً في 60 فصيلة نباتية تم تسجيل نوعين نباتيين ينتميان الى النباتات الازهرية ، باقي الانواع مثلت كالتالي : نباتات نوات الفلقتين 257 نوعا نباتيا شكلت ما نسبته

87% من اجمالي الانواع التي سجلت في منطقة الدراسة يليها نباتات ذوات الفلقة الواحدة 36 نوعاً 12%. اظهرت النتائج ان الفصائل النباتية الاكثر تنوعاً وتمثيلاً الفصيلة المركبة Asteraceae (28 نوعاً، 15 جنساً) Poaceae النجيلية (23 نوعاً، 19 جنساً) الابوسينية Apocynaceae (19 نوعاً، 10 أجناس) اظهر التحليل الزهري ان اكثر النباتات وفرة في منطقة الدراسة هي الأعشاب كما تم تسجيل عدد من النباتات كإضافة الى فلورا محافظة أبين وتسجيل نوع نباتي جديد في فلورا اليمن وهو النوع النباتي *Cleome glaucescens*.

الكلمات المفتاحية: فلورا، وادي ببرق، محافظة أبين.

### Introduction:

Understanding the relationship between the prevailing environmental condition and the responses of the existed plants are important for most investigations of plant habitats. Multivariate analysis including classification and ordination techniques has been used widely to indicate the ecological relationships between vegetation and the environment. Moreover, floristic studies are not only important in order to know the variety of plants that are present in an area, but also are socioeconomically significant they provide shelter, food, medicine and every-thing for the human being (50). Surveys on biodiversity including the floras are important for determining the species distribution data required for analyses and for modeling the plants responses to global climatic changes (33).

Generally, the floristic composition of a region and the biological spectrum, which is representation of the number of species, is influenced by the climate and nature of the substrate material (29) and their distribution is closely associated with the topography of the region (10). Many previous studies showed that topography of the area and the climatic factors are the main factors affecting the degree of speciation ((1; 24; 40; 41). The under study area is typically unfamiliar and there are no work of the flora of it, so we aim to appearance the plant biodiversity of this area.

### Materials and Methods:

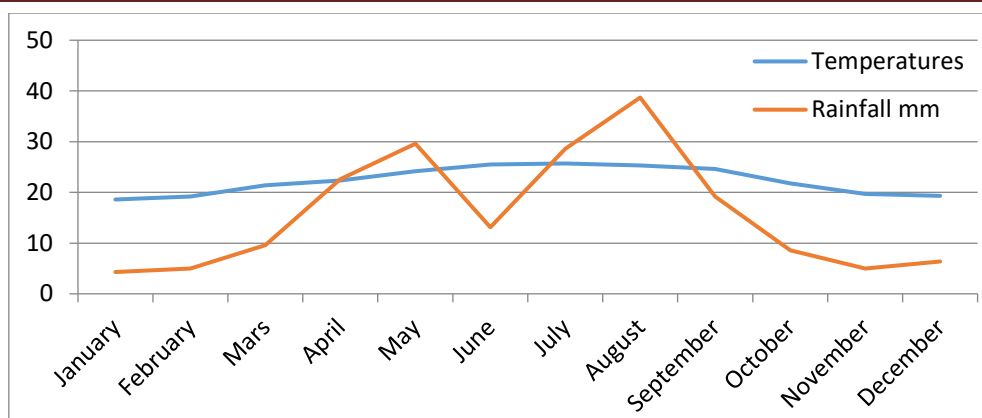
#### Study area and its features:

The study area is located in the villages of Al-Mihwery adjacent to Wadi Yabraq in the district of Al-Wade'e, Abyan Governorate, Yemen and cover about 2785 square Km (Fig. 1), at latitude between 13.920573 and 13.517228 and longitude between 46.047728 and 46.684208, the altitude rage between 70 - 1250 meters above sea level, the southern mountain ranges in the region overlook the Gulf of Aden(Fig. 1).



**Fig 1: The location of the investigated area.**

The climate features of study area are high temperature in the summer, the mean temperature was 25.5°C in June, July and August to moderate temperature in the winter (the mean was 18°C) January. Rainy season mostly in the late summer (July- Aug- Sept.) with rainfall around 38.7 mm / year (Fig. 2).



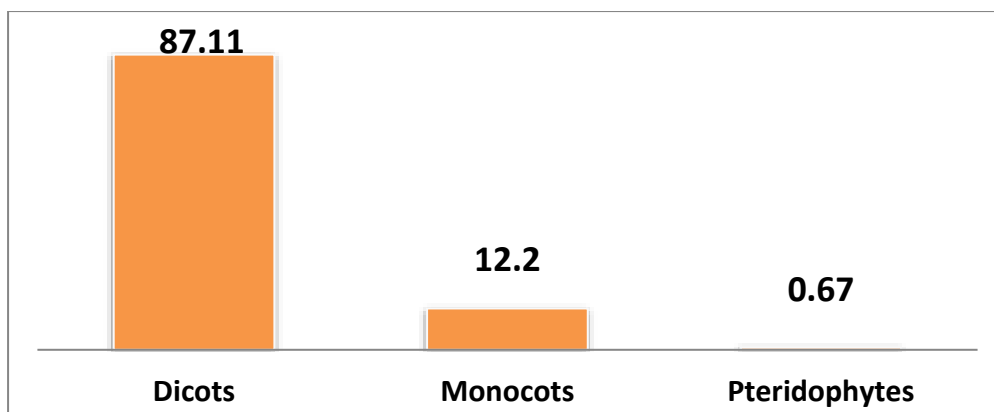
**Figure 2: The average rainfall and temperatures of study area.**

The most important factors affecting the distribution of vegetation in the study area and Yemen in general are topography, the resulting presence of flat land and inclined slopes, altitude from the sea level ( 11,13, 26).

Field survey was carried out through several trips during 2020 to 2022. In each trip, plant samples were collected. The plants were identified through the morphological the specimens were identified by Al-Khulaidi ; Al-Gifri and the helps of ‘description various floras (2,4,5,7,8,10,15,16,17,18,19,20,21,22,24,25,30,31,32,34,38,40, 42, 43,45,46,44,49, 50).

### **Results and discussion:**

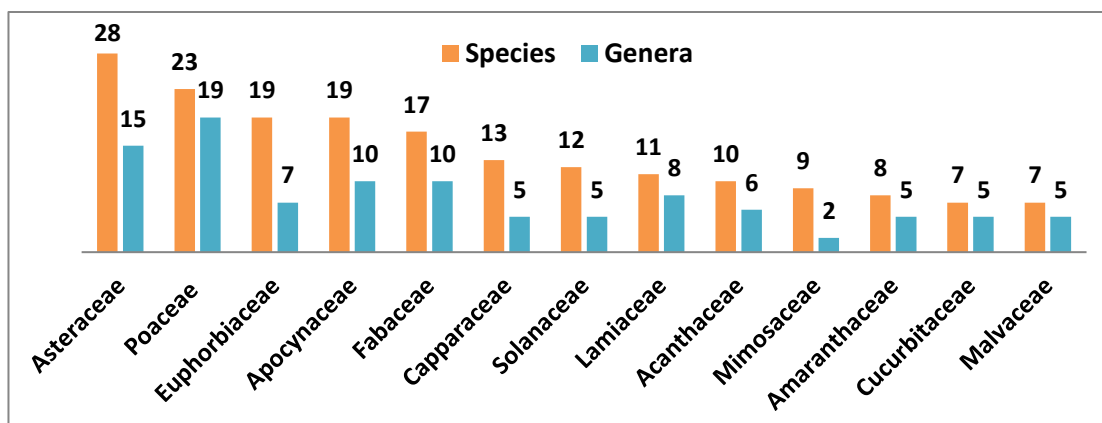
The investigated area characterized by its high diverse in flora ranged from trees to shrubs, perennials and annual plants. The identification of the Floristic composition in investigated region, showed that there are 295 species belong to 175 genera and 60 families have been recorded (**Table 1**). The dicots are represented by 257 species (87.11%), 145 genera and 52 families. While the monocots are represented by 36 species (12.2%) 28 genera and 6 families while Pteridophytes represented by 2 species (0.67%), 2 genera and 2 families of the total flora of the study area (Fig.3).



**Fig.3.** Show the percentage of floristic richness in the main plants groups in the study area.

Floristic composition of study area showed that Asteraceae had the highest contributions ( 28 species ; genera 15 ) followed by poaceae (23 species ; 19 genera), Apocynaceae ( 19 species ;10 genera) , Euphorbiaceae (19 species ; 7 genera), Fabaceae (17 species ; 10 genera), Capparaceae (13 species ; 5 genera) , Solanaceae( 12 species ; 5 genera), Lamiaceae (11 species ; 8 genera), Acanthaceae (10species ; 6 genera), Mimosaceae (9 species ; 2 genera), Amaranthaceae (8 species ; 5 genera) , Cucurbitaceae (7 species ; 5 genera) , Malvaceae (7 species ; 5 genera) (Fig.4).

A comparison of families in terms of the number of species found in this study agree with studies of nearby regions with similar habitats,( 3,6,7,8,9,12,13,14, 35,36, 28,26,25,48)Asteraceae was the largest families in Yabraq agree with the study (13,23,49)) Poaceae was the second family disagree with the studies (8,7,27) Poaceae was the largest families.



**Fig.4.** The largest families according to the number of genera and species in the study area.

With regard to the growth type, the most frequent of the recorded species were, herbs plants represented by 59.67%, The second growth type was the shrubs represented by 27% and trees represented by 10%. while liana and parasites represented only by 2 % and 2.37% respectively. The floristic analysis revealed the most abundant plant in the study area are Herbs. These findings agree with those of (7,27)(Fig.5). The abundance of the Annual might be due to water availability, including annual precipitation and soil properties (50).

Asteraceae, Poaceae and Euphorbiaceae were representing the largest families. Asteraceae and Poaceae not only represent the largest families in Yemen and whole Arabian Peninsula, but also among the largest and most widespread families of flowering plants in the world (37,40,45). Wide ecological range of Asteraceae and Poaceae can be attributed to their adaptation to harsh conditions as well as effective dispersal of their diaspores by wind(47, 50).

The most species rich genera in the study area were *Euphobia* had 11 species followed by *Acacia* 7 species and *Heliotropium*, *Solanum*, *Pulicaria*, had 6 species *Caralluma*, *Cleome*, *Indigofera* 5 species and *Aloe* had 4 species each.

Results also revealed that 19 taxa were endemic and near endemic belonged to 12 families, a percentage of 6.3% out of the total species recorded in the study area.

This study also recorded new species as additions to the flora Abyan Governorate viz;

*Fagonia hadramautica*, *Tetraena alba*, *Physalis angulata*, *Physalis minima*, *Launaea hafunensis*, *Euphorbia hadramautica*, *Heliotropium bacciferum*, *Euphorbia larica*, *Barleria prionitis subsp. appressa*, *Cistamche rosea*, *Corbichonia decumbens*, *Pulicaria arabica*, *Pentas lanceolate*, *Striga asiatica*, *Striga angustifolia*, *Boerhavia erecta*, *Dracaena ombet*, *Seetzenia lanata*, *Glossoniema varians*, *Maerua angolemsis*, *Kissenia arabica*, *Stipagrostis hirtigluma*, *Pulicaria somalensis*, *Actiniopteris radiata*, *Adiantum incisum*, *Cynomorium coccineum*.

The remarkable features survey of flora of study area, that there were : a new taxa seems to be unlike any other previously known in Yemen flora after it was recorded in Oman and Saudi Arabia viz; *Cleome glaucescens* and *Louts garcinii* was recorded as the second records in Yemen after being recorded as the first geographical record in Socotra Island.

It is concluded that the study area is botanically virgin and not explored extensively and intensively, so we recommend further detailed study.

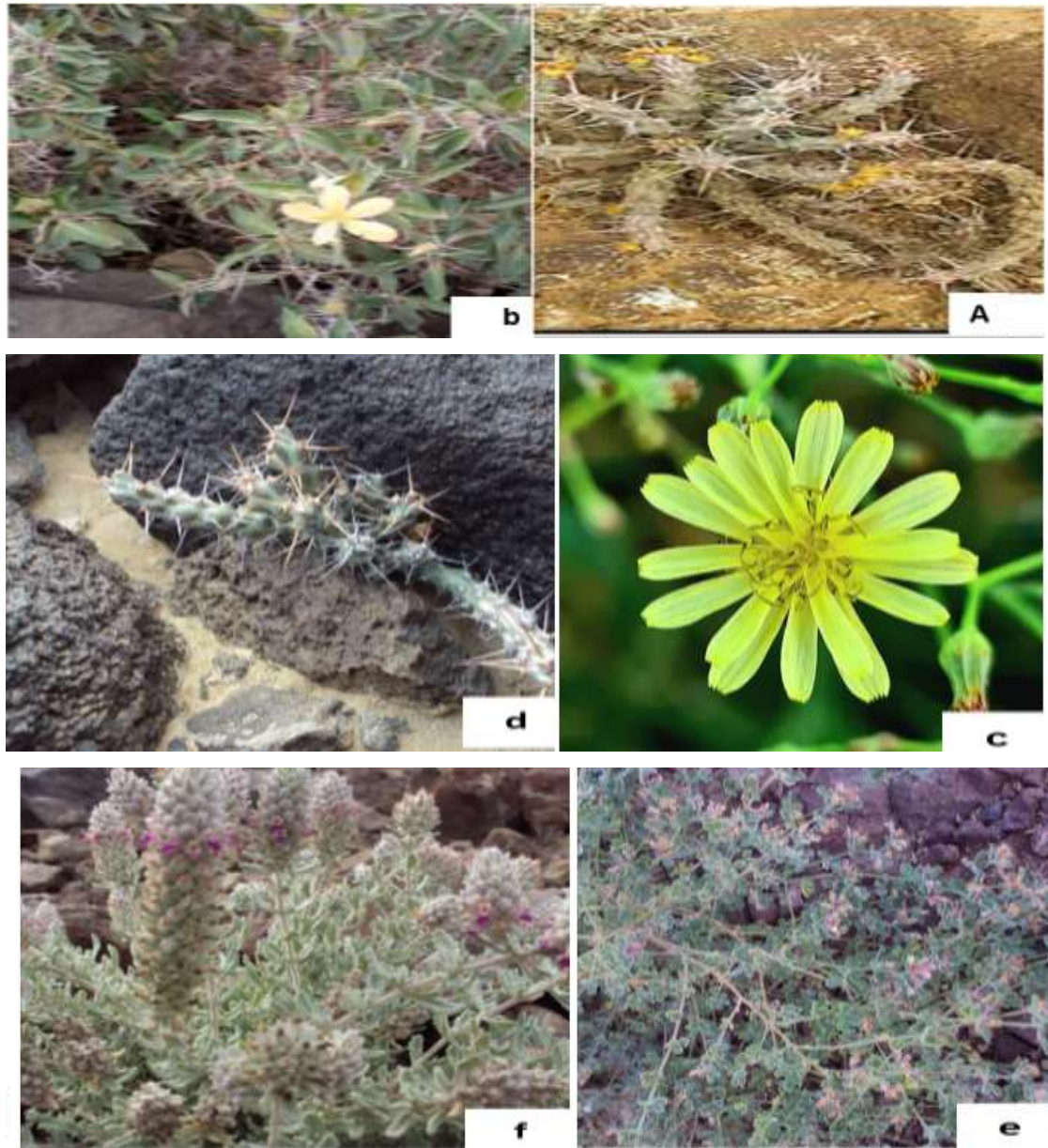
To the best of our knowledge the current investigation is the first floristic diversity study in Al-Wadhaea district and it has showed the importance of this region. Further studies are needed for more comprehensive analysis on the fluctuation of plant species composition, diversity and vegetation in the study area. .

**Conclusion:**

The present study is the first floristic study of Yabraq Valley and showing the importance of the region in term of plant diversity, this mainly due to the presence of various habitats each with particular features as regard the soil characteristics, rock type, water resources.

Dominance percentage of Asteraceae and Poaceae may due to anemochorous dispersal and high adaptability in its habitats. High percentage of Herbs followed by shrubs in the study area indicated to climate with enough rainfall and topographical variation with many microhabitats as well as anthropogenic factors. Further studies are needed for more comprehensive analysis on the fluctuation of plant species composition, diversity and vegetatio .





**Fig.5 plants of study area.**

<i>Launaea hafunensis</i> CHIOV	c	<i>Euphorbia greuteri</i> with flower	la
<i>Euphorbia greuteri</i>	d	<i>Barleria Prionitis. Subsp. Appressa</i>	b-
<i>Teucrium yemense</i> Defl	f	<i>Louts garcinii</i> DC	e



Table 1. List of plant species which recorded from Yabraq valley. n in the study area.

Family	Scientific names
Acanthaceae	<i>Anisotes trisulcus</i> (Forssk). Neas
	<i>Blepharis edulis</i> Forssk.
	<i>Barleria proxima</i> Lindau.
	<i>Barleria trispinosa</i> (Forssk.) Vahl.
	<i>Barleria prionitis</i> L. subsp. <i>appressa</i> (Forssk.) Brummitt & J. R. I. Wood
	<i>Ecbolium viride</i> (Forssk.) Alston.
	<i>Justicia flava</i> (Vahl.)Vah.
	<i>Justicia odora</i> (Forssk.) Vah.
	<i>Ruellia discifolia</i> Oliv.
	<i>Ruellia patula</i> Jacq.
Actiniopteridaceae	<i>Actiniopteris radiata</i> (Swartz) Link
Adiantaceae	<i>Adiantum incisum</i> Forssk.
Aizoaceae	<i>Aizoon canariense</i> L.
	<i>Trianthema crystallina</i> (Forssk.) Vahl
	<i>Trianthema portulacastrum</i> L
Aloeaceae	<i>Aloe splendens</i> lavranos
	<i>Aloe inermis</i> Forssk
	<i>Aloe vacillans</i> Forssk
	<i>Aloe lanata</i> T.A.McCoy & Lavranos.
Amaranthaceae	<i>Achyranthes aspera</i> L.
	<i>Aerva lanata</i> (L.) Juss
	<i>Aerva javanica</i> (Burn.f.) juss.
	<i>Amaranthus graecizan</i> L.
	<i>Amaranthus spinosus</i> L.
	<i>Amaranthus viridis</i> L.
	<i>Digera muricata</i> (L.) Mart.
Apiaceae (Umbelliferae)	<i>Conium maculatum</i> L
Areaceae (Palmae)	<i>Hyphaene thebaica</i> (L.) Mart

	<i>Phoenix dactylifera</i> L.
	<i>Wissmania carinensis</i> Chiov.
<b>Aristolochiaceae</b>	<i>Aristolochia bracteolata</i> Lam.
<b>Apocynaceae</b> ( <b>Asclepiadaceae</b> )	<i>Adenium obesum</i> (Forssk.) Roem. & Schult
	<i>Calotropis procera</i> Aiton.
	<i>Caralluma adenensis</i> (Defl.) Schum.
	<i>Caralluma awdaliana</i> (Defl.) A. Berger
	<i>Caralluma deflersiana</i> (Defl.) Bergor.
	<i>Caralluma edulis</i> (Edgw.) Benth
	<i>Caralluma hexogona</i> Lavranos
	<i>Caralluma penicillata</i> (Defl.) N. E. Brown
	<i>Caralluma quadrangula</i> (Forssk.) N. E. Brown
	<i>Ceropegia subaphylla</i> K. Schumann.
	<i>Ceropegia variegata</i> (Forssk.) Decne.
	<i>Glossoniema varians</i> (Stocks) Benth. ex Hook. f.
	<i>Leptadenia arborea</i> (Forssk.) Schweinf
	<i>Leptadnia pyrotechnica</i> (Forssk.) Decne
	<i>Pergularia tomentosa</i> L.
	<i>Pentatropis nivalis</i> (Gmel.) Field & Wood
	<i>Rhytidocaulon macrolobum</i> Lavranos
	<i>Sarcostemma forskalianum</i> Schultes
<i>Sarcostemma viminalis</i> (L.) R. Brown	
<b>Asteraceae</b>	<i>Eclipta prostrata</i> (L.) L.
	<i>Echinops erinaceus</i> Kit Tan
	<i>Helichrysum pumilum</i> (Klatt.) Moes.
	<i>Flaveria trinervia</i> (Spreng.) Mohr
	<i>Kleinia odora</i> (Forssk.) A. Berger.
	<i>Kleinia semperviva</i> (Forssk.) DC.
	<i>Kleinia pendula</i> (Forssk.) DC.
	<i>Launaea hafunensis</i> Chiov.
	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajgopal.
	<i>Launaea nudicaulis</i> (L.) Hook. f.

	<i>Lactuca serriola</i> L.
	<i>Iphionia scabra</i> DC.
	<i>Pluchea dioscoridis</i> (L.) DC
	<i>Pluchea indica</i> (L.) Less. subsp. <i>indica</i>
	<i>Psiadia arabica</i> Jaub. Et. Spach
	<i>Pulicaria jauberti</i> Gamal-Eldin
	<i>Pulicaria arabica</i> (L.)Cass.
	<i>Pulicaria schimperii</i> DC
	<i>Pulicaria somalensis</i> O. Hoffm. subsp. <i>schweinfurthii</i> Gamal-Eldin
	<i>Pulicaria undulata</i> (L.) C. A. Mey.
	<i>Pulicaria petiolaris</i> Jaub. & Spach
	<i>Sonchus oleraceus</i> L.
	<i>Vernonia cinerea</i> (L.) Less.
	<i>Vernonia arabica</i> F. G. Davies
	<i>Vernonia spatulata</i> (Forssk.) Sch-Bip ex Asch.
	<i>Xanthium brasiliicum</i> Vell.
	<i>Xanthium spinosum</i> L.
	<i>Xanthium strumarium</i> L.
<b>Balanitaceae</b>	<i>Balanites aegyptiaca</i> (L.) Delile var. <i>aegyptiaca</i>
<b>Boraginaceae</b>	<i>Heliotropium aegyptiacum</i> Lehm.
	<i>Heliotropium bacciferum</i> Forssk.
	<i>Heliotropium curassavicum</i> L
	<i>Heliotropium eurapaeum</i> L
	<i>Heliotropium longiflorum</i> A. DC.) Jaub. & Spach var. <i>longiflorum</i>
	<i>Heliotropium pterocarpum</i> (D.C.) 98 Steud. Hochst. ex. Bunge.
	<i>Heliotropium rariflorum</i> Stocks
<b>Brassicaceae</b>	<i>Eruca sativa</i> Miller
	<i>Farsetia longisiliqua</i> L.
	<i>Farsetia linearis</i> Dene ex Boiss

	<i>Farsetia stylosa</i> R.Br.
	<i>Schouwia purpurea</i> (Forssk.) Schweinf.
<b>Buraceraceae</b>	<i>Commiphora africana</i> (A.Rich.) Engl.
	<i>Commiphora kataf</i> (Forssk.) Engl.
	<i>Commiphora myrrha</i> (Nees) Engl.
	<i>Commiphora schimperi</i> (O. Berg) Engl
<b>Cactaceae</b>	<i>Opuntia ficus-indica</i> (L.) Mill
<b>Caesalpinaceae</b>	<i>Delonix elata</i> (L.) Gamble
	<i>Parkinsonia aculeata</i> L.
	<i>Senna alexandrina</i> Mill
	<i>Senna italica</i> Mill.
	<i>Senna occidentalis</i> (L.) Link
<b>Capparaceae</b>	<i>Capparis cartilaginea</i> Forssk.
	<i>Capparis spinosa</i> L.
	<i>Codaba hetirotricha</i> Stocks.
	<i>Cadab glandulosa</i> Forssk.
	<i>Cadab rotundifolia</i> Forssk.
	<i>Cleome brachycarpa</i> (Forssk.)Vahl. ex Dc.
	<i>Cleome glaucescens</i> DC.
	<i>Cleome gynandra</i> L.
	<i>Cleome scaposa</i> DC.
	<i>Cleome viscosa</i> L.
	<i>Dipterygium glaucum</i> Decne.
	<i>Maerua crassifolia</i> Forssk.
	<i>Maerua angolemsis</i> DC.
<b>Caryophyllaceae</b>	<i>Cometes abyssinica</i> R. Br.
	<i>Polycarpaea spicata</i> Wt. et Arn.
<b>Chenopodiaceae</b>	<i>Salsola forskali</i> Forssk.
	<i>Salsola spinescens</i> Mog.
	<i>Suaeda aegyptiaca</i> (Hasselq.) Zohary
	<i>Suaeda monoica</i> Forssk. ex J.F. Gmel
	<i>Suaeda vermiculata</i> Forssk. ex J.F. Gmel

	<i>Halothamnus bottae</i> jaub & spack subsp <i>niger</i> kathe-Heinrich
Commelinaceae	<i>Aneilema forskolii</i> Kunth.
	<i>Commelina bengalensis</i> L.
Convolvulaceae	<i>Convolvulis arvensis</i> L
	<i>Convolvulis fatmensis</i> kunze
	<i>Convolvulus glomeratus</i> Choisy
	<i>Ipomoea pes-caprae</i> (L.) R.Br.
Crassulaceae	<i>Kalanchoe bentii</i> Hook. f. subsp. <i>bentii</i>
Cucurbitaceae	<i>Citrullus colocynthis</i> (L.) Schrad.
	<i>Corallocarpus glomeruliflorus</i> (Defl.) Cogn.
	<i>Coccinia grandis</i> (L) voigt.
	<i>Cucumis prophetarum</i> L. subsp. <i>prophetarum</i>
	<i>Momordica balsamina</i> L.
	<i>Cucumis melo</i> var <i>agvestis</i> . (Naud.) Grebense
	<i>Luffa forsskalii</i> Schweif.
Cyperaceae	<i>Cyperus rotundus</i> L.
Cynomoraceae	<i>Cynomorium coccineum</i> L.
Dracaenaceae	<i>Dracaena ombet</i> Kotschy & Peyr.
	<i>Sansevieria ehrenbergii</i> Schweinf. ex Baker
	<i>Sansevieria forskaoliana</i> (Schult. f.) Hepper & J. R. I. Wood
Euphorbiaceae	<i>Acalypha fruticosa</i> Forssk.
	<i>Chrozophora oblongifolia</i> (Del.) Juss.
	<i>Euphorbia inarticulata</i> Schweinf.
	<i>Euphorbia balsamifera</i> Ait. subsp. <i>adenensis</i> (Defl.) Bally
	<i>Euphorbia cuneata</i> Vahl subsp. <i>cuneata</i>
	<i>Euphorbia granulata</i> Forssk. var. <i>granulata</i>
	<i>Euphorbia greuteri</i> N. Kilian, Kürschner & P. Hein
	<i>Euphorbia hirta</i> L.
	<i>Euphorbia hadramautica</i> E.G.Baker

	<i>Euphorbia indica</i> Lamk.
	<i>Euphorbia larica</i> Boiss.
	<i>Euphorbia schimperi</i> Presl.
	<i>Euphorbia serpens</i> Kunth.
	<i>Jatropha glauca</i> Vahl.
	<i>Jatropha pelargonifolia</i> Courb.
	<i>Jatropha spinosa</i> Vahl.
	<i>Phylanthus fraternus</i> Webter
<b>Fabaceae</b>	<i>Cadia purpurea</i> (Picc.) Aiton
	<i>Crotalaria incana</i> L.
	<i>Crotalaria persica</i> (Burm.f.) Merr.
	<i>Crotalaria saltiana</i> Andr.
	<i>Indigofera articulata</i> Gouan
	<i>Indigofera arabica</i> Jaub& Spach
	<i>Indigofera coerulea</i> Roxb. var. <i>coerulea</i>
	<i>Indigofera oblongifolia</i> Forssk.
	<i>Indigofera spinosa</i> Forssk.
	<i>Alhagi graecorum</i> Boiss.
	<i>Rhynchosia minima</i> (L.) DC. var. <i>prostrata</i> (Harv.) Meikle
	<i>Rhynchosia memnonia</i> (Delile.)Dc.
	<i>Melilotus officinalis</i> (L.) pall
	<i>Ormacarpu yemenense</i> Gillett
	<i>Louts garcinii</i> DC.
	<i>Sesbania pachicarpa</i> DC.
	<i>Tephrosia purpurea</i> (L.) Pers. subsp. <i>apollinea</i> (Delile) Hosni & El- Karemy
<b>Geraniaacea</b>	<i>Monsonia heliotropioides</i> (Cav.) Boiss.
	<i>Geranium ocellatum</i> jacq ex.Cam
<b>Hydnoraceae</b>	<i>Hydnora johannis</i> Becc.
<b>Lamiaceae</b>	<i>Endostemon tenuiflorus</i> (Benth.) M. Ashby
	<i>Plectranthus montanus</i> Benth.



	<i>Lavandula pubescens</i> Decne.
	<i>Leucas alba</i> (Forssk.) Sebald
	<i>Leucas urticifolia</i> (Vahl) R.Br.. var. <i>urticifolia</i>
	<i>Marrubium vulgare</i> L.
	<i>Micromera imbricata</i> (Forssk.) Christen.
	<i>Ocimum basilicum</i> L.var. <i>purpurascens</i> Benth.
	<i>Ocimum filamentosum</i> Forssk.
	<i>Ocimum forsskaolii</i> Benth.
	<i>Otostegia fruticosa</i> (forssk.)Schweinf. ex penzig.
	<i>Teucrium yemense</i> Defl.
<b>Loranthaceae</b>	<i>Plicosepalus acacia</i> (Zucc.) Wiens ex Polhil.
	<i>Oncocalyx doberae</i> (Schweinf.) G.R.L. Wood.
<b>Loasaceae</b>	<i>Kissenia arabica</i> R.Br.ex Chiov.
<b>Lythraceae</b>	<i>Lawsonia inermis</i> L.
<b>Malvaceae</b>	<i>Abutilon fruticosum</i> Guill. & Perr
	<i>Abutilon pannosum</i> (Forst. F..) Schlegl.
	<i>Hibiscus vitifolius</i> L.
	<i>Senra incana</i> (Cav.) DC.
	<i>Sida alba</i> L.
	<i>Sida cardifolia</i> L
<b>Meliaceae</b>	<i>Azadirachta indica</i> A. Juss.
<b>Mimosaceae</b>	<i>Acacia asak</i> (Forssk.) Willd.
	<i>Acacia ehrenbergiana</i> Hayne.
	<i>Acacia etbaica</i> Schweinf. subsp. <i>uncinata</i> Brenan
	<i>Acacia hamulosa</i> Benth.
	<i>Acacia mellifera</i> (Vahl.) Benth.
	<i>Acacia nilotica</i> (L.) Willd. ex Delile subsp. <i>indica</i> (Benth.) Brenan
	<i>Acacia tortilis</i> (Forssk.) Hayne subsp. <i>tortilis</i>
	<i>Prosopis cineraria</i> (L.) Druce
	<i>Prosopis juliflora</i> (Sw.) DC.
<b>Molluginaceae</b>	<i>Corbichonia decumbens</i> (Forssk.) Exel

	<i>Glinus lotoides</i> L.
Moraceae	<i>Ficus cordata</i> Thunb.
	<i>Ficus sycomorus</i> L.
	<i>Ficus vasta</i> (Forssk.)Thunb.
Nyctaginaceae	<i>Boerhavia diffusa</i> L.
	<i>Boerhavia elegans</i> Choisy
	<i>Boerhavia erecta</i> L.
Orobanchaceae	<i>Cistanche phelypaea</i> (L.) Cout.
	<i>Cistanche rosea</i> E.G.Baker
Oxalidaceae	<i>Oxalis corniculata</i> L.
Papaveraceae	<i>Argemone mexicana</i> L.
Plantaginaceae	<i>Campylanthus pungens</i> (O.Schwart)
	<i>Plantago major</i> L.
	<i>Plantago lanceolata</i> L.
Poaceae	<i>Aeluropus lagopoides</i> (L) Trin. Et. Tw
	<i>Aristida adscensionis</i> L.
	<i>Aristida ferrilateris</i> S. M. Phillips
	<i>Brachiaria reptans</i>
	<i>Chloris barbata</i> Sw.
	<i>Cenchrus ciliaris</i> L.
	<i>Conchrus setigerus</i> vahl.
	<i>Cymbopogon schoenanthus</i> (L.) Spreng.
	<i>Cynodon dactylon</i> (L.) Pers.
	<i>Dactyloctenium aegyptiacum</i> (L.) Willd.
	<i>Dactyloctenium scindicum</i> Boiss.
	<i>Echinochloa colona</i> (L.) Link.
	<i>Eragrostis ciliaris</i> (L.) R. Br.
	<i>Eragrostis papposa</i> (Roem. et Schult.) Steud.
	<i>Panicum turgidum</i> Forssk.
	<i>Phealaris minor</i> Retz.
	<i>Odysea mucronata</i> (Forssk.) Stapf.
<i>Setaria barbata</i> (Lam.) Kunth.	

	<i>Sporobolus spicatus</i> (Vahl) Kunth
	<i>Stipagrostis hirtigluma</i> (Steud. ex Trin. & Rupr.) De Winter
	<i>Tetrapogon villosus</i> Desf.
	<i>Tragus berteronianus</i> Schult
	<i>Tragus racemosus</i> (L.) all.
<b>Polygonaceae</b>	<i>Calligonum comosum</i> Herit.
	<i>Rumex vesicarius</i> L.
<b>Portulacaceae</b>	<i>Portulaca oleracea</i> L. subsp. <i>oleracea</i>
	<i>Portulaca qundrifida</i> L.
<b>Resedaceae</b>	<i>Reseda sphenocleoides</i> Defl.
<b>Rhamnaceae</b>	<i>Zizaphus spina-Christi</i> (L.) Desf.
<b>Rubiaceae</b>	<i>Breonadia salicina</i> (Vahl) Hepper & J. R. I. Wood
	<i>Pavetta longiflora</i> Vahl subsp. <i>longiflora</i>
	<i>Pentas lanceolata</i> (Forssk) Benth & Hook.
	<i>Tarenna graveolens</i> (S.Moore) Bremek. subsp. <i>arabica</i> (Cuf.) Bridson
<b>Salvadoraceae</b>	<i>Dobera glabra</i> (Forssk.) Poir
	<i>Salvadora persica</i> L.
<b>Scrophulariaceae</b>	<i>Aptosimum pumilum</i> (Hochst.) Benth.
	<i>Scrophularia arguta</i> Sol.
	<i>Striga asiatica</i> (L) Kuntze.
	<i>Striga angustifolia</i> (D. Don.) C. J. Saldanha
	<i>Striga hermonthica</i> (Del.)Benth.
<b>Solanaceae</b>	<i>Datura innoxia</i> Mill.
	<i>Datura stramonium</i> L.
	<i>Lycium shawii</i> Roem. et Schult.
	<i>Physalis minima</i> L.
	<i>Physalis angulata</i> L.
	<i>Solanum cordatum</i> Forssk.
	<i>Solanum coagulans</i> Forssk.
	<i>Solanum glabratum</i> Dunal.

	<i>Solanum incanum</i> L
	<i>Solanum nigrum</i> L.
	<i>Solanum villosum</i> Mill.
	<i>Withania somnifera</i> (L.) Dunal.
<b>Sterculiaceae</b>	<i>Sterculia africana</i> (Lour.)Fiori
<b>Tamaricaceae</b>	<i>Tamarix aphylla</i> (L.) Karst
<b>Tiliaceae</b>	<i>Corchorus depressus</i> (L.) Stocks
	<i>Corchorus olitorius</i> L.
	<i>Corchorus trilocularis</i> L.
	<i>Grewia erythraeae</i> Schweinf.
	<i>Grewia velutina</i> (Forssk.)Vahl.
	<i>Grewia tenax</i> (Forssk.) Fiori.
<b>Urticaceae</b>	<i>Forsskaolea tenacissima</i> L.
<b>Vitaceae</b>	<i>Cissus quadrangularis</i> L.
	<i>Cissus rotundifolia</i> (Forssk.)Vahl.
<b>Zygophyllaceae</b>	<i>Fagonia hadramautica</i> Beier & Thulin
	<i>Fagonia indica</i> Burm. f. var. <i>indica</i>
	<i>Seetzenia lanata</i> (willd) bull.
	<i>Tribulus terrestris</i> L
	<i>Tetraena alba</i> (L.F)Beier & Thulin
	<i>Tetraena simplex</i> (L.) Beier & Thulin

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