



Plant Archives

Journal homepage: <http://www.plantarchives.org>
doi link : <https://doi.org/10.51470/PLANTARCHIVES.2021.v21.S1.259>

ECOLOGY AND GEOGRAPHICAL DISTRIBUTION OF *Ononis* L. SPP. (Fabaceae) IN IRAQ

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ABSTRACT

The study included the ecology and geographical distribution of the *Ononis* L. species, which are grown wildly in Iraq. The species of this genus varied in their ecological growth and distribution on Iraqi phytogeography districts. *Ononis sicula* Guss. has wide distribution, which was distributed in thirteen districts: (Amadiya (MAM), Rowanduz (MRO), Sulaimania (MSU), Jabal Sinjar (MJS), Nineveh District (FNI), Upper jazira (FUJ), Arabil (FAR), Kirkuk (FKI), Persian foothills (FPF), Eastern Alluvial plain (LEA), Lower Jazira (DLJ), Western Desert (DWD) and Southern Desert (DSD)). *Ononis reclinata* L. was found in twelve districts, Nineveh (FNI), Kirkuk (FKI), Upper jazira (FUJ), Persian foothills (FPF), Eastern Alluvial plain (LEA), Arbil (FAR), Sulaimania (MSU), Jabal Sinjar (MJS), Rowanduz (MRO), Lower Jazira (DLJ), Eastern Alluvial plain (LEA) and in Desert plateau region, Southern Desert (DSD). As it was recorded a new distributed of this species in two geographical districts (LEA, DSD), but *Ononis serrata* FORSSK., It grows in eight districts, (FUJ, FKI, FPF, DLJ, DGA, LCA, LEA, DSD), in the environments of the upper plains and foothills region, desert plateau and in the lower mesopotamian region, but *O. viscosa* L. subsp. *breviflora* (DC.) Nym., dispersal in six districts (MAM, FNI, FKI, FPF, DSD and DWD), as it was recorded a new distributed of this species in three geographical districts, (FPF, DWD, DSD.) *Ononis mitissima* L. founded in four districts (MAM, MRO, MSU and FNI), *Ononis spinosa* L. subsp. *leiosperma* (BOISS.), distributed in five districts (MAM, MRO, MSU, FAR and FNI), *Ononis hirta* POTR. and *Ononis pusilla* L. distributed in two districts (MRO, FAR) and (MAM, MSU) respectively, as *Ononis pusilla* L. was recorded a new distributed of this species in (MSU) district whereas *Ononis hirta* was recorded a new distributed in (FAR) district, other species (*Ononis adenotricha* BOISS., *Ononis pubescens* L., *Ononis natrix* L. sub sp. *stenophylla*, *Ononis biflora* Desf. that are rare distribution which dispersal does not exceed one geographical district. The study showed the variations in ecology and geographical distribution with taxonomic value in isolation of species.

Keywords: Ecology, Geographical distribution, *Ononis* L., Fabaceae.

Introduction

Ononis L., is a large genus from the subfamily Faboideae - Tribe Ononideae family Fabaceae, this genus (restharrow), It was first recognized by Linnaeus (1753, 1754) described 17 species. And now, it is as about 86 species in the world (Turini *et al.*, 2010). The members of this genus species are grow as weeds on arable lands whose tough stems would stop the harrow. In herbalism *Ononis* (restharrow) is used to treat bladder and kidney problems and water retention. The active ingredients in this genus are essential oils, flavonoid-glycosides, and tannins, and are used as food plants by the larvae of some Lepidoptera species including the grey pug and *Coleophora ononidella* (which feeds exclusively on *O. arvensis*). The name of *Ononis* was given from Greek word Onos meaning donkey and is a favorite food of this animal. *Ononis spinosa* considered plantis growing on plains and heights; geographically it grows in Mediterranean region, Europe to Central Asia (Barrero *et al.*, 1989). A subspecies from *Ononis spinosa* L.

is called *leiosperma* (BOISS.) grows in many of Iraqi districts including MAM, MRO, MSU, FAR and FNI in Iraq. The aerial part of this species decoction is used as diuretic, mild laxative. Roots are used as diuretic, blood purative, expectorant. *Ononis spinosa* was traditionally used as antitussive, aperient, diuretic and lithontripic. *Ononis spinosa* infusion was used in the treatment of dropsy, urinary tract infections, inflammations and rheumatism, while, it externally, used for the healing of wounds, eczema and the other skin disorders because contained secondary products such as flavonoids, phenolic acids, volatile oil, spinonin glycoside, sterols, lectins, tannins and minerals, it possessed diuretic, antimicrobial, anti-inflammatory, analgesic, antioxidant, dermatological, anticancer and hepatoprotective effects, (Al-Snafi, 2020). *Ononis hirta* Desf. is used anti-proliferative activity; the methanol aerial parts extract of *Ononis hirta* inhibited the proliferation of different cancer cell lines and showed selective toxicity (Kirana *et al.*, 2003). Phenetic studies of geomorphological characters was

estimated of their relationships between the taxa (El-Hadidy *et al.*, 2018). The first scientists have been used to illustrate the geographical distribution of plants in the world (Majeed, 2016). Environmental factors are important in the geographical distribution of taxa (AL-Dalawi, 2011). Ecology and geographical distribution of plants are more important to plant taxonomy and put each taxon in a certain pattern of distribution, which can aspect of identification of taxa (AL-Dosky, 2014). Geographical distribution of Iraqi plants has important because of its variation in the environment as a result of its geographical locations (Townsend and Guest, 1980), The geographical distribution of Iraqi plants has an important because of its geographic location between the desert region and the mountainous regions. Iraqis divided into 4 main physical regions which has been subdivided according to their physiography features as given in table 1 (AL-Rawi, 1964). There are 12 species belonging to *Ononis* in flora of Iraq (Townsend and Guest, 1974) Willd. *O. pusilla* L. syn.(*O. columnae* Ail.), *O. spinosa* L., *O. serrata* Forssk., *O. hirta* Desf., *O. mitissima* L., *O. adenotricha* Boiss. Say that not yet found in Iraq, though not far across the border in Tukey. *O. natrix* L., *O. biflora* Desf., *O. sicula* Guss., *O. viscosa* L., *O. pubeseens* L., *O. reclinata* L. The study has been conducted on some environmental aspects and geographical distribution of the *Ononis* taxa which growing wild in Iraq and there is no previous study of the genus in this field only some lists that mentioned their distribution including (Handel-Mazzetti, 1910; Nabelek, 1922; AL- Rawi 1964; Rechinger, 1964;

Zohary, 1964; Ridda and Daoud, 1982). The aims of this study is to inspect the geographic distribution and ecological relationships between *Ononis* taxa in Iraq's natural geographical districts, to assess the diversity of distribution which depend from ecological factors for these taxa and determine its taxonomic significance from this genus which studied.

Table 1 : Regions and phytodistricts of Iraq (Guest, 1966).

M	Mountain region
MAM	Amadiya District
MRO	Rowanduz District
MSU	Sulaimanyia District
MJS	Jabal Sinjar District
F	Upper plains and foothills region
FUJ	Upper jazira District
FNI	Nineveh District
FAR	Arbil District
FKI	Kirkuk District
FPF	Persian foothills District
D	Desert plateau region
DLJ	Lower Jazira District
DGA	Ghurfa-Adhaim District
DWD	Western Desert District
DSD	Southern Desert District
L	Lower mesopotamian region
LEA	Eastern Alluvial plain District
LCA	Central Alluvial plain District
LSM	Southern Marsh District

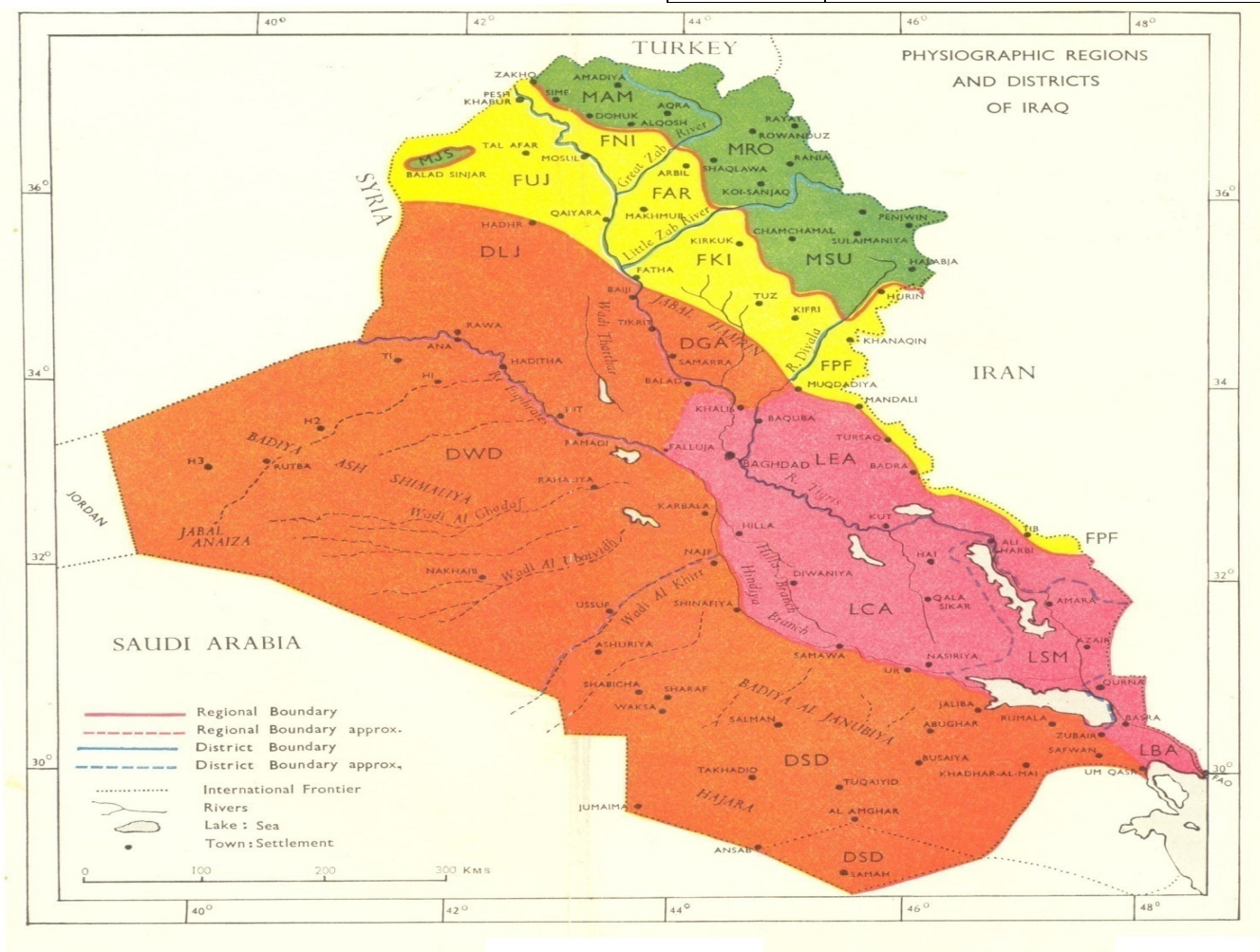


Fig.1: Map of regions and phytodistricts of Iraq (Guest, 1966).

Materials and Methods

This study was carried out in the period of 2019-2020 and covered different areas of Iraqi districts (Table, 1, Fig., 1) and the herbaria specimens in (Baghdad University Herbarium (BUH), National Herbarium of Iraq (BAG), College of Agriculture Herbarium (BUA), National History Research Center & Museum (BUNH). Taking into account what was mentioned regarding the studied species that grow in Iraq in floras of the neighboring countries, especially Turkey and Iran. Data recorded on label included scientific name, locality, collector, altitude, date, type of soil, habitat, abundance. The list of Iraqi plants published by (Handle-Mazzetti (1910), Nabelek (1922), Al-Rawi & Chakravarty (1964), Al-Rawi, (1964), Flora Lowland of Iraq, (Rechinger, 1964), Zohary (1946), Flora of Turkey, (Davis, 1972) and Flora Iranica, (Rechinger, 1984). Ridda & Daoud (1982) were used. This study based on Iraqi districts in Guest (1966) and Iraqi natural districts of in flora of Iraq (Townsend and Guest, 1974). The scientific names of the studied species were confirmed according to the most recent scientific sources in this regard. The current study included mentioning the type of soil in which the studied species grows.

Results and Discussion

Ecology study

Depending on the previous survey and according to the field trips, it was observed that variation appeared in limiting distribution of typical species. plants of all species dispersal grown in valley in ground hills, limestone rocks, sandy stone soil, abound in cliffs, sand stone soil, mountain aria, gypsum rocks, on road, slope limestone mountain., sand and sand stone soil, valley and valley shoulders, sand soil, flat stone ground, in field which the soil was sand, sandy gravely, clayish. Species of genus *Ononis* was distributed in fifteen separated geographical districts of Iraq (Table 2 & 3), they were found in (50 - 2500) m., they varying in their distribution by different species and the environments in which they grows. Accordingly, the species grows in environments with different heights and different soils, they grows on the clay between the rocks, appears in different zones in mountain, rocky slopes, beside the roads, forest fields and near or beside the stream, desert areas and in upper plain and foothills regions, the species which distributed in districts of mountain region only are, *Ononis adenotricha* BOISS. founded in MAM district in sandy and gravelly sandy soils, at an altitude of more than 800m., *O. hirta* DESF., founded in mountain plain of the lower forest zone in FAR and MRO districts, at an altitude (600-650)m., *O. pusilla* L. grows on dry hills slope, in light oak forest at an altitude (900-1300) m. in MAM and MSU districts, (Table,2 & 3). Species of the genus distributed in the mountain region and in nineveh district in upper plain and foothills, deserts and other regions of Iraq such as, *O. sicula* GUSS. which distributed in thirteen districts in different areas, stony mountain slopes , sandy silt in valley, dry banks and hillsides, in deserts wades, and desert limestone plateau, on altitude up to 1300m., *O. reclinata* L. distributed in different twelve districts, in rocky mountain region, dry stony hillsides, sandy and sandy gravely and clayish soils at an altitude (100-900)m., *O. serrate* FORSSK., was dispersal in eight districts which soils are, sandstones in conglomerate hills, on rocky slope with sand pocket, sandy and sandy gravely soil at an altitude up to 150m., *O. viscosa* L. subsp.

breviflora (DC.) Nym. was found in six districts in different soils, mountain slopes, grassy slopes under oak ,sandy and sandy gravely soils at an altitude (500-1100)m., *O. spinosa* L. Subsp. *leiosperma* (BOISS.) founded in five districts, species founded at different altitudes ranged between 650-2500 m above sea level,distributed in different soils, limestone and metamorphic rocks , mountain slopes, in oak forest , destroyed forest, *O. mitissima* L. distributed in four districts in waste land, roadsides, by cornfield at an altitude (400-1200)m.in sandy and sandy clayish soils, While there are species spread in one district only, *O. natrix* L. subsp. *Stenophylla* (BOISS.) was found in FPF district in sandy and sandy gravely soils, at 150m. altitude. *O. biflora* DESF.in FUJ district in moist steppes at an altitude (300-400) m. and *O. pubescens* L. in LCA, in sandy soil in field at 50m. altitude. (Table 2 & 3).

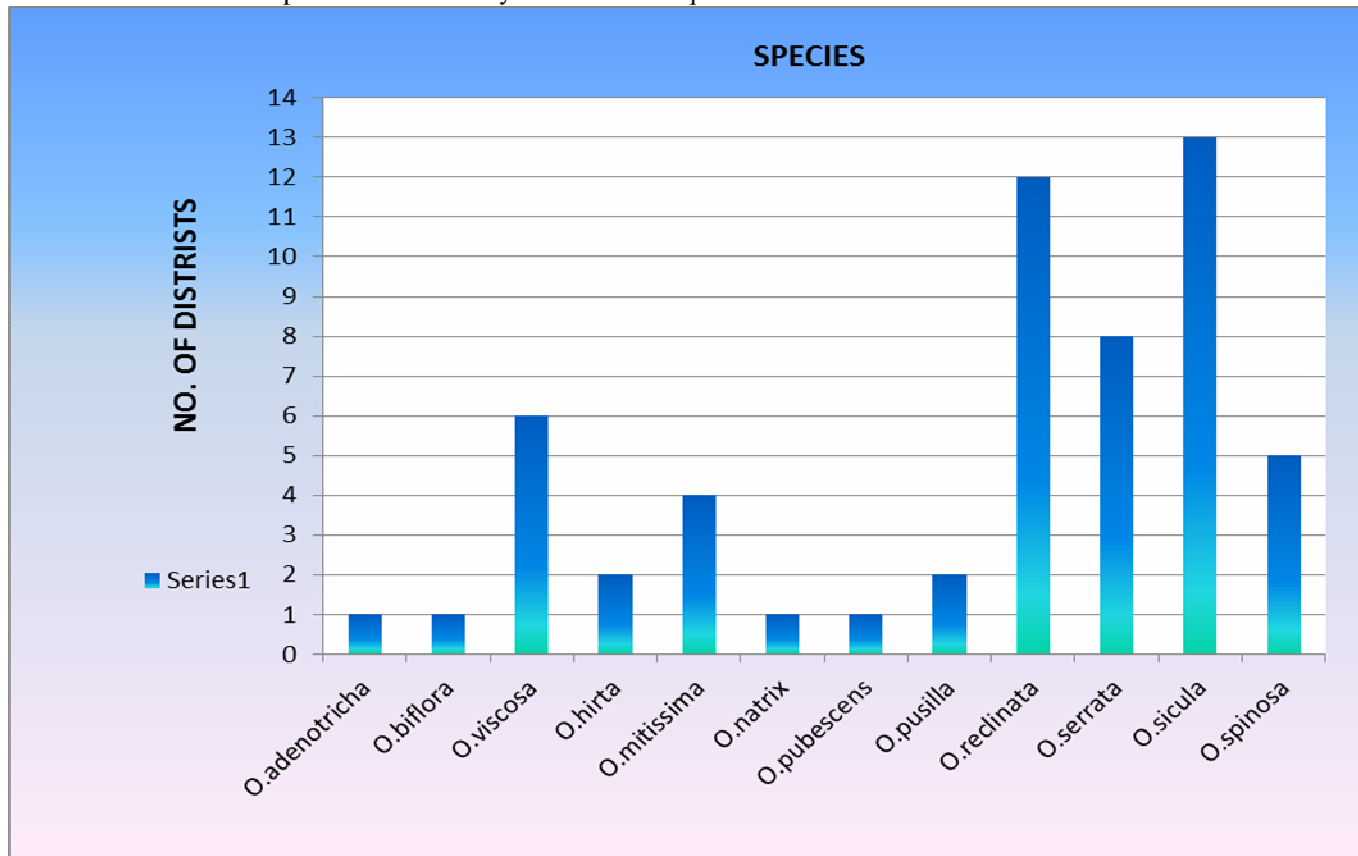
Geographical study

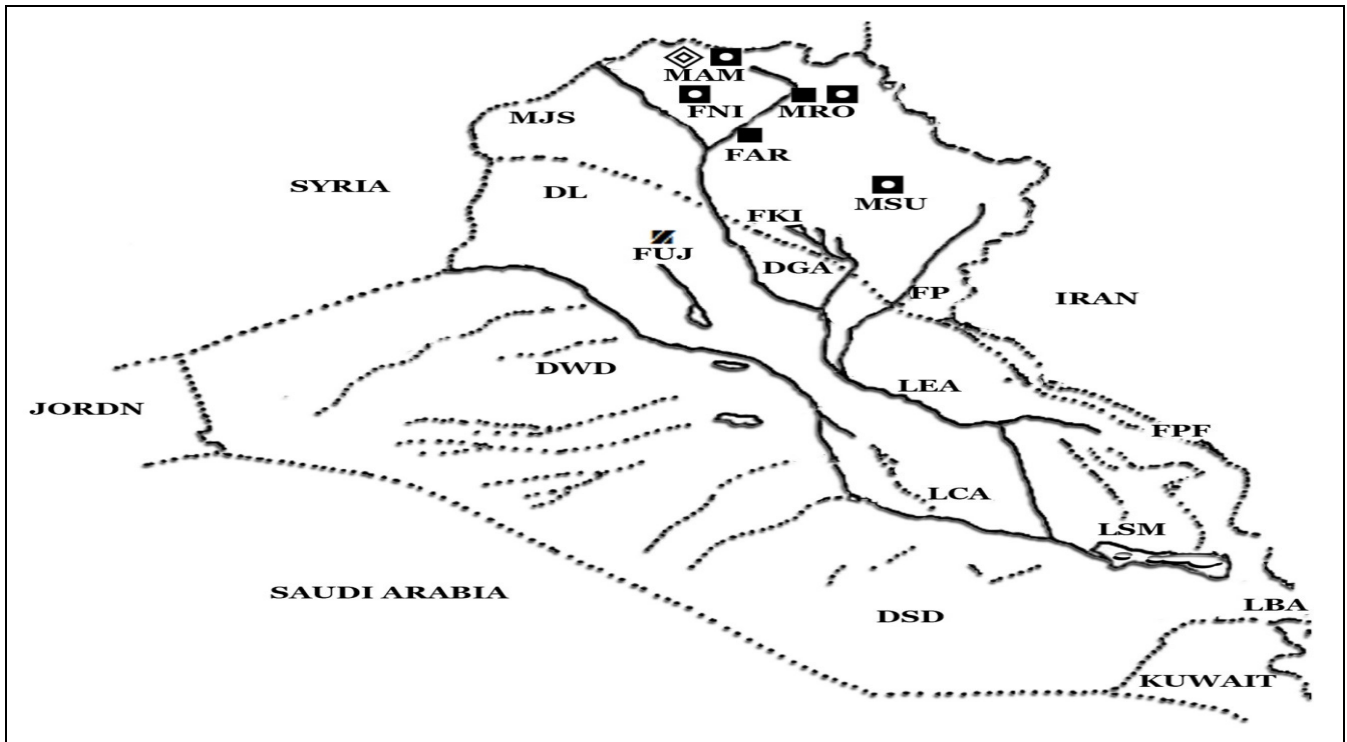
The results showed the taxa of the genus was distributed in almost all over the geographical districts of Iraq including the Iraqi Kurdistan Region that extended from south Hawraman (MSU) district to north Zakho (MAM) , As most of them spread in the geographical districts (MAM, MRO, MSU, FAR, FPF and FKI) and found in (southern, central and western of Iraq the results showed some of the species from genus *Ononis* were distribution capacity varied among *Ononis* species, they found and distributed in more than one Iraqi districts From the following, (LCA, LEA, DSD, DWD, DLJ, DGA, FPF, FKI, FUJ, FAR, FNI, MJS, MSU, MRO and MAM), (Table 2 & 3)and (Figure 2, 3, 4).While other species distributed in one geographical district, the species *O. sicula* GUSS. and *O. reclinata* L. distributed in high elevation regions in small population or as individuals, The first is distributed in thirteen districts (MAM, MRO, MSU, MJS, FAR, FKI, FNI, FPF, FUJ, LEA, DLJ, DWD and DSD) which was the wide dispersal and the second in twelve districts (FAR, FNI, FKI, FUJ, FPF,LEA, MSU, MJS, MRO, DLJ, LEA and DSD), a new distributed of this species was recorded in the two districts in (LEA, in Kut and Amara, in east of salman and North Ansab,Shaiba in DSD),*O. serrata* FORSSK.was distinguished for its distributed in eight districts such as foothills, deserts and steppe environments in (FKI, FPF,FUJ,LCA, LEA, DSD,DLJ and DGA). *O. viscosa* L. subsp. *breviflora* (DC.) Nym. dispersal in six districts (FKI, FNI, MAM, FPF, DWD and DSD) in mountain, foothills and desert regions as it was recorded a new distributed of this species in three geographical districts, (FPF, DWD, DSD.). Whereas *O. spinosa* L. Subsp. *leiosperma* (BOISS.) distributed in five districts, (MAM, MRO, MSU, FAR and FNI) as it was recorded a new distributed of this species in two geographical districts (FAR in Arbil and FNI in Hinnis north Ain Sifin), *O. mitissima* L. distributed in four districts (FNI, MAM, MRO and MSU), *Ononis hirta* POTR. and *Ononis pusilla* L. distributed in two districts (MRO, FAR) and (MAM, MSU) respectively, as *Ononis hirta* was recorded a new distributed of this species in (FAR) district, whereas *Ononis pusilla* was recorded a new distributed of this species in (MSU) district, other species (*Ononis adenotricha* BOISS., *Ononis pubescens* L., *Ononis natrix* L. sub sp. *stenophylla*, *Ononis biflora* Desf. that are distribution which dispersal does not exceed one geographical district ,they distributed in (MAM, LCA, FPF, FUJ) respectively.

Table 2: Distribution of the studied species in Iraqi districts.

Species	Districts														
	MAM	MRO	MSU	MJS	FNI	FAR	FUJ	FKI	FPF	DGA	DLJ	DWD	DSD	LEA	LCA
<i>O. pubescens</i> L.															
<i>O. adenotricha</i> BOISS.															
<i>O. mitissima</i> L.															
<i>O. serrata</i> FORSSK.															
<i>O. pusilla</i> L.															
<i>O. reclinata</i> L.															
<i>O. sicula</i> GUSS.															
<i>O. spinosa</i> L. Subsp. <i>leiosperma</i> (BOISS.)															
<i>O. viscosa</i> L. subsp. <i>breviflora</i> (DC.) Nym.															
<i>O. hirta</i> DESF.															
<i>O. biflora</i> DESF.															
<i>O. natrix</i> L. subsp. <i>Stenophylla</i> (BOISS.)															

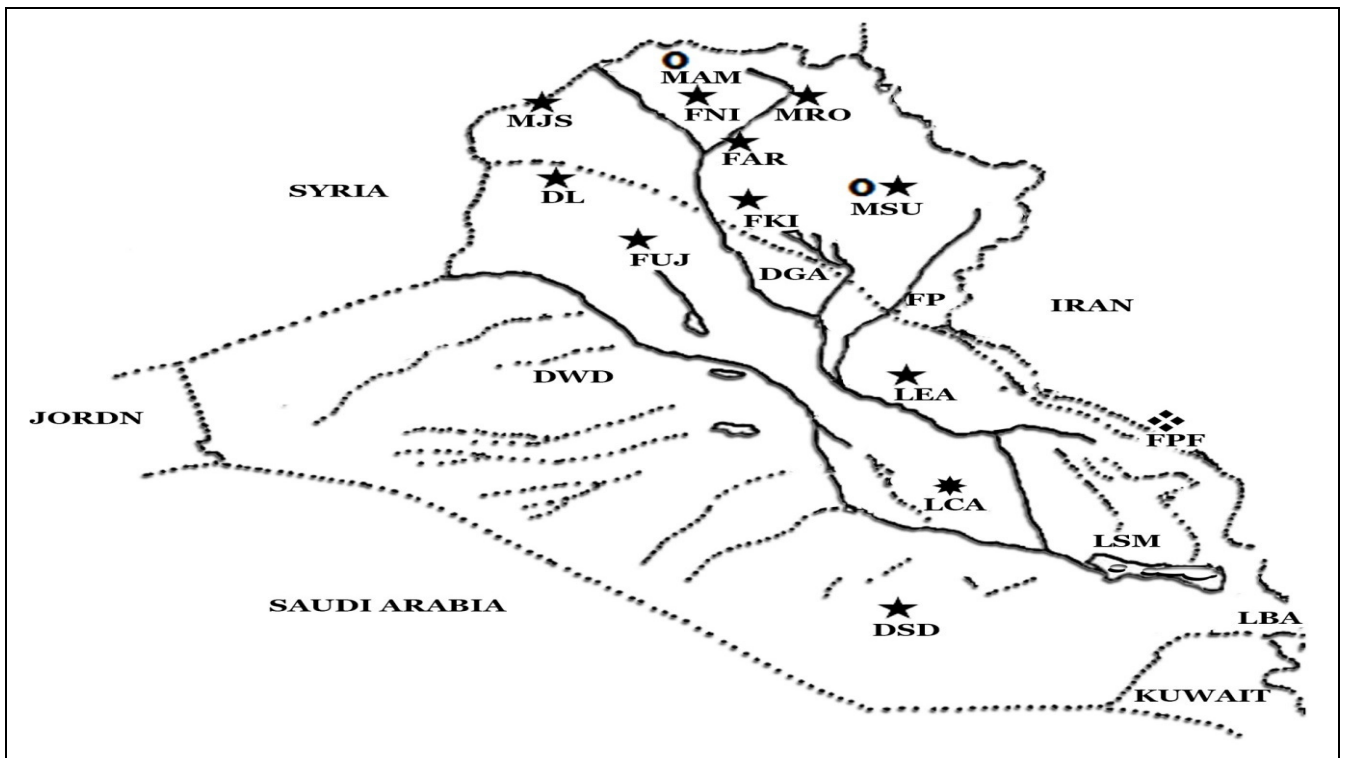
Table 3: Distribution of species on natural Phytodistricts of Iraqi.





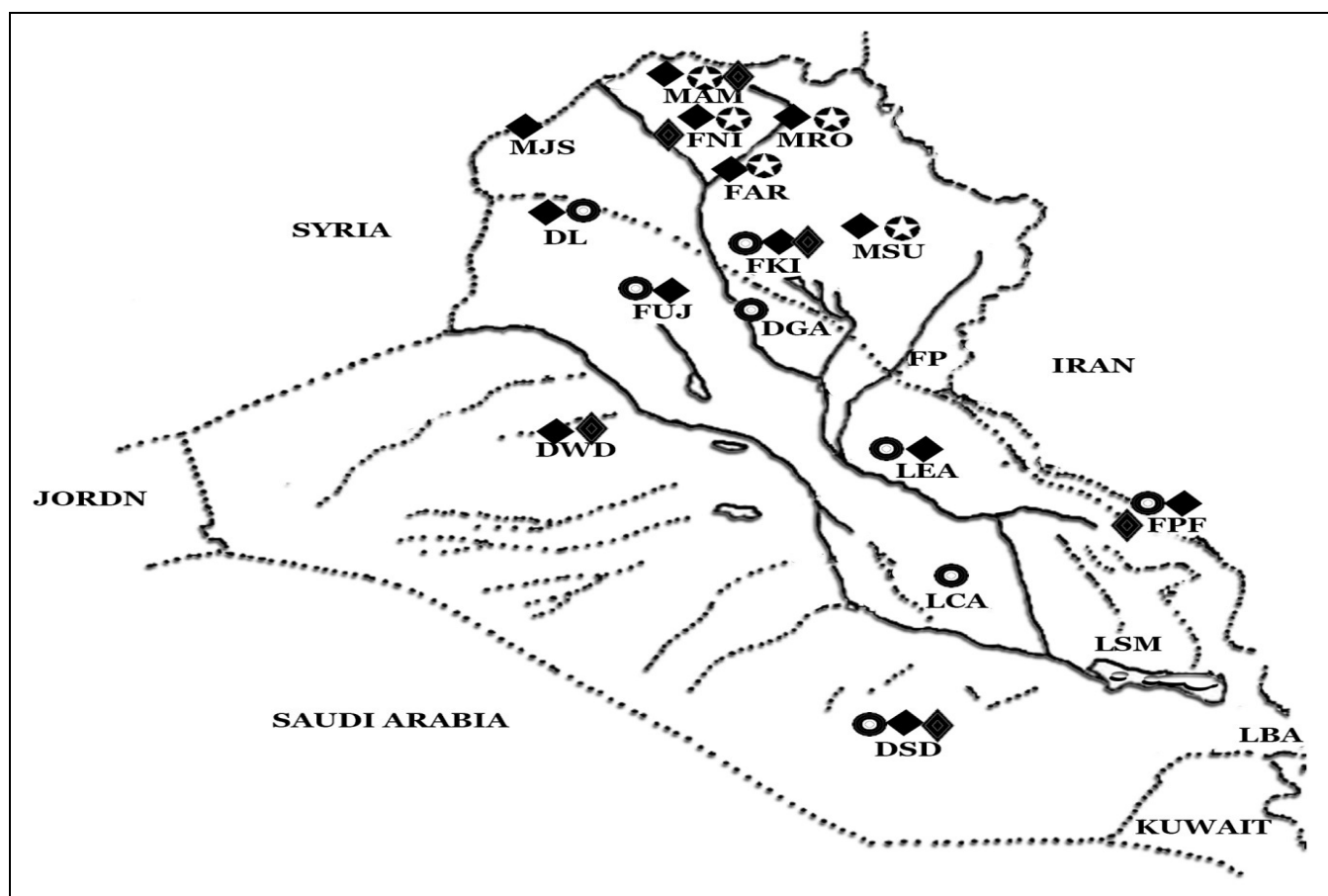
- ▣ *O. mitissima* L.
- *O. hirta* DESF.
- ⌘ *O. biflora* DESF.
- ◊ *O. adenotricha* BOISS.

Fig. 2: Distribution map of *O. mitissima* L., *O. hirta* DESF., *O. biflora* DESF., *O. adenotricha* BOISS. .



- ★ *O. reclinata* L.
- *O. pusilla* L.
- ✱ *O. pubescens* L.
- ❖ *O. natrix* L. subsp. *Stenophylla* (BOISS.)

Fig. 3: Distribution map of *O. reclinata* L., *O. pusilla*, *O. pubescens* L., *O. natrix* L. subsp. *Stenophylla* (BOISS.).



- ◆ *O. sicula* GUSS.
- ◆ *O. viscosa* L. subsp. *breviflora* (DC.) Nym.
- ★ *O. spinosa* L. Subsp. *leiosperma* (BOISS.)
- *O. serrata* FORSSK.

Fig. 4: Distribution map of *O. sicula* GUSS., *O. viscosa* L. subsp. *breviflora* (DC.) Nym., *O. spinosa* L. Subsp. *leiosperma* (BOISS.), *O. serrata* FORSSK.

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