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A contribution to the grass flora of Iraq

J. CHRTEK and E. HADAČ

RÉSUMÉ.

Dans cette contribution nous publions des remarques sur la distribution et, dans quelques cas, sur la taxonomie et l'écologie de quelques graminées d'Iraq. En tout, nous énumérons 72 espèces, de différentes parties du pays, dont les suivantes sont nouvelles pour l'Iraq: *Arrhenatherum bulbosum* (Willd.) Presl, *A. palaestinum* Boiss., *Phleum bertolonii* Bornm. Une nouvelle section et une nouvelle combinaison sont proposées. Quelques collections sont nouvelles pour leur district. Les auteurs continuent la révision des graminées iraqiennes des herbiers de Prague (PR).

SUMMARY.

In this paper we are publishing notes on distribution and, in some cases, also on the taxonomy and ecology of some Iraqi grasses. In all, it covers 72 species from different districts of Iraq. New for Iraq are: *Arrhenatherum bulbosum* (Willd.) Presl., *A. palaestinum* Boiss., *Phleum bertolonii* Bornm. Further, a new section and a new combination are created. Some of the collections are new for their district. The authors are continuing their revision of the Iraqi grasses in the Prague (PR) herbaria.

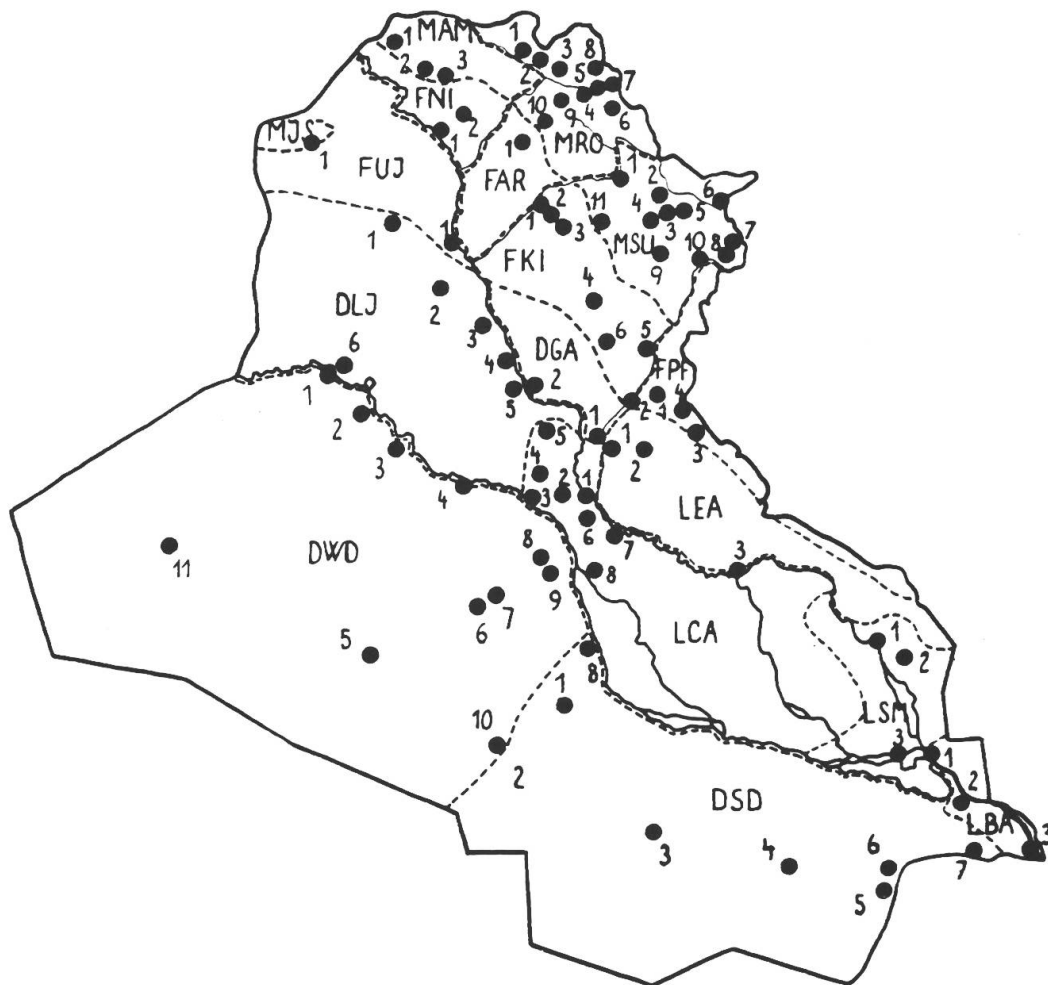
ZUSAMMENFASSUNG.

In diesem Beitrag veröffentlichen wir Bemerkungen über die Verbreitung und in einigen Fällen über die Taxonomie und Ökologie einiger irakischer Gräser. Im ganzen sind es 72 Arten aus verschiedenen Teilen des Landes. Neu für Irak sind: *Arrhenatherum bulbosum* (Willd.) Presl, *A. palaestinum* Boiss., *Phleum bertolonii* Bornm. Ferner wurden eine neue Sektion und eine neue Kombination veröffentlicht. Einige Angaben sind neu für den betreffenden Distrikt. Die Verfasser setzen die Revision der irakischen Gräser aus den Herbarien in Prag (PR) fort.

During the years 1959-1961 E. Hadač had the opportunity of working in Iraq. Thanks to the excellent help of his friends and colleagues from the staff of Baghdad University, Prof. Dr. A. D. Q. Agnew, Dr. R. Wheeler-Haines, Prof. Dr. Abbás ar-Rushdi, assistant Waleed al Hashimi and others, he was able to collect material in practically all parts of Iraq, from Jebel Sinjar and the highest Kurdish mountains in the north to Fao and Jebel Sanam in the south. Only a part of his collections of plants, numbering about 6.500 sheets, has been worked out. In those years no complete flora of Iraq was at hand, except the "Flora orientalis" of Boissier, and it was difficult to identify groups as grasses with the scanty material for comparison available. Now the situation is much better: there is Rechinger's "Flora of lowland Iraq", three parts of the "Flora of Iraq", including grasses by Bor, and a part of Rechinger's "Flora Iranica". The second author, J. Chrtek, collected and studied some material in Egypt and the Sinai peninsula; as the Iraqi flora is related to the flora of the region studied by him, we thought that it would be preferable to study the Iraqi collection of grasses together.

The main localities where our material was collected may be seen in map 1. We grouped them according to the districts used in the "Flora of Iraq" (vol. 1: fig. 1. 1966) to facilitate the comparison.

- MAM: 1, Zakho; 2, Dohuk; 3, Dohuk galli.
MRO: 1, Potine mountain group (Kani Mâm Shirin, village Zeyta etc.); 2, Shirwan Mazin; 3, Mergazor; 4, Rowanduz; 5, Derbend (including village Naprdan and Sheikhan); 6, village Sakri-Sakran and valley Hassar-i-Sakran; 7, Haji Omran; 8, Helgurd mountain group (Nowanda village, place called Sarcial, the highest peak of Helgurd, 3660 m alt., etc.); 9, Galli Ali beg (incl. Hopkins bridge); 10, Shaqlawa.
MSU: 1, Dokkan dam; 2, Pira Magrun (or Pir Omar Gudrun) mountain group (incl. village Zawiya, place Shakhra khao and the police post of Girbador); 3, Sulaimaniya (incl. Sarchinar); 4, village Tasluja; 5, Azmir dagh; 6, Penjwin; 7, Khormal; 8, Halabja; 9, Kopi Qaradagh; 10, Derbendi khan; 11, Chamchamal.
MJS: 1, Balad Sinjar.
FNI: 1, Ninive; 2, Ba'shiqa.
FAR: 1, Arbil.
FKI: 1, Altun Köprü; 2, Doraman; 3, Kirkuk; 4, Tuz Khormatu; 5, Jalaula; 6, Injana and Adheim.
FPF: 1, Jebel Hamrin between Baquba and Khanaquin, and Table mountain Mansuriya; 2, Saduur; 3, Mandali; 4, Koma Sank.
FUJ: 1, Qalat Sharqat.
DLJ: 1, Hadhar; 2, Bagga; 3, Baiji; 4, Tekrit; 5, Ashiq; 6, Rawa.
DSD: 1, Rahba; 2, Shubaicha; 3, As Salman; 4, Busaiya; 5, Khidr al Mai; 6, Shatt ar Ramal; 7, Jebel Sanam; 8, Najaf.
DWD: 1, Ana; 2, K3; 3, Khan Baghdadi; 4, Romadi; 5, Nukhaib; 6, Ukhaidir; 7, Shithatha; 8, Hur; 9, Kerbela; 10, Lussuf; 11, Rutba.
DGA: 1, Deltawa; 2, Samarra.
LEA: 1, Baquba; 2, Balad Ruz; 3, Kut.
LCA: 1, Baghdad; 2, Abu Ghuraib; 3, Falluja; 4, Sichar; 5, Wadi Tharthar; 6, Mahmudiya; 7, Suwaira; 8, Bab Êl (Babylon).
LSM: 1, Amara; 2, M'saida; 3, Medeina.
LBA: 1, Gurna; 2, Basra; 3, Fao.



Map 1. - Physiographic regions and districts of Iraq, with places, where collections were made (see p. 160).

These are only the main places from where our material was collected. As may be seen, the collections were made in all districts of Iraq. The excursions were made mainly with professors Dr. A. D. Q. Agnew and Dr. R. Wheeler-Haines, assistant Waleed al Hashimi; an excursion to the Southern Desert was made with Dr. Ali Rawi from the State Herbarium in Abu Ghuraib; in the Kurdish mountains we were accompanied by Faisal Abd el Kader, a Kurdish student, and several colleagues from Baghdad University. Most of the material is deposited in PR, a considerable collection was left in the herbarium of the Baghdad University; as Dr. Agnew and Dr. Haines as well as Dr. Ali Rawi collected their own material simultaneously, some of their collections may be practically identical to ours.

LIST OF SPECIES

***Achnatherum longearistatum* (Boiss. et Hausskn.) Nevski**

MRO: at the N foot of Potine, 20.6.1961, *Hadač* 6065.

Bor (1968) places this species in the genus *Stipa* as *S. kurdistanica* Bor, whereas Cvelev (1968) is of the opinion that it belongs to *Achnatherum* sect. *Trikeraiia* (Bor) Cvelev. The genus (or section) *Trikeraiia* Bor may be distinguished in the first place by the shape of the lemmas: they are bifid with the lobes produced into two stout scabrid bristles (cf. Bor 1960). In *A. longearistatum* the lemmas are bifid, but the bristles are not clearly developed. Also there are considerable differences in venation of lemmas in both taxa. Thus we hold for certain that *A. longearistatum* has very little or nothing in common with *Trikeraiia* Bor; on the other hand it occupies a distinct position in the genus *Achnatherum*. For this reason we think it preferable to erect a new section *Paratrikeraiia*, with one species *A. longearistatum* (Boiss. et Hausskn.) Nevski.

***Achnatherum* sect. *Paratrikeraiia* Chrtek et Hadač, sect. nova:** Plantae caespitosae, rhizomata brevia squamis coriaceis oblecta; lemmata longe aristata, bifida, lobis apice penicillatis. Typus sectionis: *Achnatherum longearistatum* (Boiss. et Hausskn.) Nevski.

***Agropyron caespitosum* C. Koch**

MRO: Nowanda valley near Sarcál, on both sides of the brook, 2100-2230 m alt., in the ass. Prangeto-Astragaletum tragacanthae (cf. Hadač et Agnew 1963), 10. and 13.6.1960, *Hadač* 2390, 2713; Hassar-i-Sakran, 2400-2800 m alt., in the same type of vegetation, 7.6.1961, *Hadač* 5625.

According to Bor (1968) "very rare, only found once in the thorn-cushion zone (Chia-i-Mandau)"; probably the same mountain group, where the Hassar-i-Sakran valley is situated. This species differs from *A. intermedium* (Host) Pal. Beauv., with which it might be confused, by its dense tufts and the absence of long creeping rhizomes.

***Agropyron elongatiforme* Drobov**

MRO: Potine, at the Kani Mâm Shirin, 20.6.1961, *Hadač* 5984.

Agropyron panormitanum Parl.

MRO: Potine, at the Kani Mâm Shirin spring, 20.6.1961, *Hadač* 5970.

Bor (1968) cites from MRO one collection only, but "without location". Melderis (1959) discusses its taxonomic relations with *A. brachyphyllum* Boiss. et Hausskn., which differs from *A. panormitanum* by a low number of flowers in the spikelet (2-3), by glabrous lower lemmas, shorter anthers and more convolute leaves. He classifies this taxon as *A. panormitanum* var. *heterophyllum* Bornm. ex Melderis, but this variety, it would seem, does not occur in Iraq.

Agropyron podperae Náb.

MSU: Kopi Qaradagh, northern slope, and at Waziara, 29.5.1961, *Hadač* 5143, 6304.

Both collections belong to the var. *podperae*, with the upper lemmas densely ciliate on the margins and with glabrous leaf-sheaths.

Agropyron repens (L.) Pal. Beauv.

MRO: northern slope of the hill, 2450 m (above Sarcal), at 2250 m alt., 5.6.1960, *Hadač* 2228.

Bor (1968) cites from MRO only one record "without location". It is interesting to find this species, belonging in Europe to the most troublesome weeds, in a natural vegetation of the thorn-cushion zone, together with *Alyssum singarense*, *Ficaria kochii*, *Galium coronatum*, *Holoschoenus vulgaris*, *Scutellaria pinnatifida*, etc.

Agropyron trichophorum (Link) Richt.

MRO: between the villages Zeita and Hupa, 23.6.1961, *Hadač* 6184; near the village Naprdan, 5.6.1961, *Hadač* 5370.

Agrostis gigantea Roth

MRO: hill slopes at Mergazor, 1070 m alt., 18.6.1961, *Hadač* 6217.

According to Bor (1968) "very rare in Iraq, only found once (Kopi Qaradagh)"; our collection is the second in Iraq, and first in the MRO district.

Agrostis stolonifera L. sl.

MSU: wet places on the E slope of Pira Magrun, 1900 m alt., 23.10.1960, *Hadač*.

Alopecurus arundinaceus Poir.

MSU: slopes above Penjwin, 26.5.1961, *Hadač* 4883; Kopi Qaradagh, Waziara, 29.5.1961, *Hadač* 6265.

MRO: Sarcal, by the brook, 2190-2230 m alt., 5.6.1960, *Hadač* 2137, 2285, 2327.

In all the above collections the awns exceed the spikelets by about 1-2 mm. Very interesting plants were collected at MSU: Pira Magrun, Guirdabor, 25.5.1961, *Hadač* 4720, where awns exceed the spikelets by 3-4 mm. By this they recall *A. apiatus* Ovcz., known also from Iraq, but they have higher growth and their spikelets are blackening when mature. The whole complex of *A. arundinaceus* needs a thorough study; it appears to contain several distinct taxa.

Alopecurus myosuroides Huds.

LCA: Zafraniya near Baghdad, 15.1.1960, *Hadač* 154.

Alopecurus textilis Boiss.

MRO: mt. Helgurd, at the top, 3660 m alt., 7.6.1960 *Hadač*.

Ammochloa palaestina Boiss.

DLJ: sandy places between Tekrit and Baiji, 21.2.1961, *Hadač* 3128; between Baiji and Bagga, 17.3.1961, *Hadač* 3531.

DWD: steppe 65 km E of Rutba, 27.4.1961, *Hadač* 4460; desert on the right bank of the Euphrates SW of Falluja, 10.2.1961, *Hadač* 3081.

DSD: As Salman, 10.3.1961, *Hadač* 3492; Rahba, between Shubaicha and Najaf, 11.3.1961, *Hadač* 3412; between Najaf and Rahba, 2.4.1961, *Hadač* 3958.

LEA: sandy places at Beini Gani near Sharaban, 16.2.1961, *Hadač* 3095.

LCA: sandy places between Kufa and Najaf, 8.2.1961, *Hadač* 3085; Sichar, 1.3.1960, *Hadač* 516.



Map 2. — ● *Ammochloa palaestina*; ○ *Brachypodium sylvaticum*.
Ammochloa palaestina, according to Zohary (1950), belongs to the West Saharo-Sindian element, but as it occurs (cf. Bor 1968) from Spain through Morocco, Algeria, Tunisia, Libya, Egypt, Sinai, Palestine to Kuwait, Iran and Caucasus, it may be classified also as a Mediterranean element. In Iraq it grows in sandy places in the district of eocene and miocene rocks, lacking in the cretaceous limestone areas. It hardly exceeds the line of more than 200 mm mean annual rainfall, but on the other hand it is apparently lacking in the areas of extreme summer dry season or with excessive temperature maxima in summer. *Brachypodium sylvaticum*, according to Zohary (1950), belongs to the Eurosib.-Boreoam.-Médit.-Irano-Turanian element (but in North America it is only introduced). In Iraq it does not descend below the 500 mm isohyete of mean annual rainfall.

Arrhenatherum bulbosum (Willd.) Presl

MSU: Kopi Qaradagh, Waziara, 29.5.1961, *Hadač* 6301.

Bor (1968) does not consider *A. bulbosum* a distinct species. The differences between *A. elatius* and *A. bulbosum* are not only in the bulbous base of culms in *A. bulbosum*, but also in the shape of the glumes; these are narrower in *A. elatius* as compared with *A. bulbosum*.

Arrhenatherum elatius (L.) Pal. Beauv.

MRO: between Sheikhan and Sakri Sakran, 5.6.1961, *Hadač* 5421.

MSU: Kopi Qaradagh, Waziara, 29.5.1961, *Hadač* 6301.

Arrhenatherum kotschyi Boiss.

MRO: Sarcal, on the right bank of the brook, 2210 m alt., in the ass. Aethionemo-Astragaletum tragacanthae (cf. *Hadač* et Agnew 1963), 4.6.1960, *Hadač* 2690; at the foot of mt. Helgurd 2200 m alt., 4.6.1960, *Hadač* 2098. First records from MRO.

MSU: slope above Penjwin, 26.5.1961, *Hadač* 4893; slope of Shakhra Khau above Zawiya, 22.10.1960, *Hadač* 2860; Azmir dagh, 26.5.1960, *Hadač* 1827.

Arrhenatherum palaestinum Boiss.

MSU: two collections on the northern slope and at the summit of Kopi Qaradagh, 29.5.1961, *Hadač* 5208, 5224.

Bor (1968) does not cite this species from Iraq; he refers the *A. palaestinum* of Zohary (1950), from the Kirkuk distr., to *A. kotschyi*. Our specimens differ nevertheless from *A. kotschyi* by their shorter awns and by the form of the glumes, which resemble more to those of *A. bulbosum* than of *A. kotschyi*. Boissier (1884: 550) considers *A. palaestinum* as a subordinate taxon of *A. elatius*, characterised by him in the following way: "Spiculae minores, flosculi superiori glumella non inferne tantum sed 2/3 longitudinis longe et adpresse hirsuta." Samuelsson (1959) writes to this: "Bornmüller bemerkt vollkommen richtig, dass es ein Irrtum (Schreibfehler) sein muss, wenn Boissier sagt, dass *A. palaestinum* kleinere Ährchen haben soll als *A. elatius*." *A. palaestinum* stands in fact by the spikelet's size and by the length of awns at the midway between *A. bulbosum* or *A. elatius* and *A. kotschyi*. It might be of interest to note that Bornmüller (1927) described from Kuh Sefin E of Erbil, not far from our localities, *A. palaestinum* var. *kurdicum* Bornm.

Length in mm	14-16	17-19	20-22	23-25	26-28	29-31	32-34	35-37	38-40	41
<i>A. elatius</i>	10	6	2	—	—	—	—	—	—	—
<i>A. bulbosum</i>	—	3	14	—	—	—	—	—	—	—
<i>A. palaestinum</i>	—	—	—	7	12	3	—	—	—	—
<i>A. kotschy</i>	—	—	—	—	—	1	9	15	21	4

Tab. — Length of the awns in the Iraqui species of *Arrhenatherum*



Map 3. — ● *Stipa parviflora*; ⊙ *Arrhenatherum kotschy*.
Stipa parviflora has a broadly Mediterranean distribution from Spain and North Africa to S Iran. In Iraq it is evidently restricted to the *Artemisia herba-alba* steppe region on cretaceous limestones near Rutba, with ca. 110-150 mm mean annual rainfall and $\pm 19^{\circ}\text{C}$ mean annual temperature (absolute minimum -15° , summer temperature $\pm 30^{\circ}\text{C}$). *Arrhenatherum kotschy* is an Irano-Turanian element, restricted in Iraq to the region with more than 800 mm mean annual rainfall.

As it is difficult to deal with the genus *Arrhenatherum* in Iraq, we give a key, derived from our own Iraqi material:

- 1a Culm bases not thickened to bulbs at the base. *A. elatius*
- 1b Culm bases thickened at the base to a conspicuous bulb 2
- 2a Lemmas of the lower flower glabrous or shortly hairy in lower third, awns 17-22 mm long *A. bulbosum*
- 2b Lemmas of the lower flower hairy, awns 23-40(44) mm long 3
- 3a Awns 23-29(31) mm long, glumes \pm acute *A. palaestinum*
- 3b Awns (30)34-40(44) mm long, glumes \pm acuminate *A. kotschyi*

***Asthenatherum forskalii* (Vahl) Nevski**

DWD: desert SW of Falluja, 5.11.1960, *Hadač* 3016.

This is the only species of the genus in Iraq; it may not be excluded that in the vicinity of the Saudi Arabia border *A. gracile* (Guinet et Sauvage) Monod will be found, as it is known from the Nefud desert of Saudi Arabia.

***Boissiera squarrosa* (Banks et Sol.) Nevski**

MSU: Azmir dagh, 26.5.1960, *Hadač* 1968.

Lemmas minutely and dispersely pilose, thus reminding var. *glabriflora* (Boiss.) Bor.

***Botriochloa ischaemum* (L.) Keng**

MRO: slopes near Mergazor, 1070 m alt., 18.6.1961, *Hadač* 5831.

***Brachiaria eruciformis* (Sm.) Griseb.**

MSU: Pira Magrun above Zawiya, 21.10.1960, *Hadač* 2826.

According to Bor (1968) found hitherto only twice in Iraq.

Brachypodium sylvaticum (Huds.) Pal. Beauv.

MRO: near Shaqlawa, 4.6.1961, *Hadač* 5281; Hopkins bridge, 14.6.1960, *Hadač* 2621; at Sakri-Sakran, 2000 m alt., 6.6.1961, *Hadač* 5423; slopes at Mergazor, 1070 m, 18.6.1961, *Hadač* 5833.

Scattered in the oak woods, ascending nearly to the timberline.



Map. 4. – ● *Asthenatherum forskalii*; ● *Calamagrostis pseudophragmites*
Asthenatherum forskalii is distributed from Central Sahara and N Africa to W Pakistan and Central Asia; it seems to be restricted, in Iraq, to sandy places in the district of miocene rocks with mean annual rainfall about 80-150 mm and summer temperatures above 30°C. *Calamagrostis pseudophragmites* is an Euroasian species. Living in wet places, it does not seem to be so directly dependent on annual rainfall as the other mapped grasses. It occurs in a region with ca 150-1000 mm rainfall.

Brizochloa humilis (M. B.) Chrtek & Hadač, comb. nova

Basion.: *Briza humilis* M. B., Fl. Taur-Cauc. 1: 66. 1808.

Syn.: *Briza spicata* Sm. in Sibth. et Sm., Fl. Graeca 1: 60. 1806, non Burm. fil.

MRO: between Naprdan and Sheikhan, 5.6.1961, *Hadač* 5349; between Rowanduz and Mazna, 18.6.1961, *Hadač* 5798.

MSU: Pira Magrun above Zawiya, limestone, 21.10.1960, *Hadač* 2814; Azmir dagh, 26.5.1960, *Hadač* 1888.



Map 5. — ● *Cenchrus ciliaris*; ○ *Brizochloa humilis*.

Cenchrus ciliaris is distributed from S Europe and Africa to Afghanistan and India. In Iraq it grows on sandy dunes in the district of miocene rocks in the region of 100-200 mm main annual rainfall. *Brizochloa humilis*, an Eastern Mediterranean species occurring also in the Irano-Turanian region, grows in Iraq on limestones and does not descend below the 500 mm isohyete of mean annual rainfall.

The genus *Brizochloa* Jirásek et Chrték (1967) was separated from *Briza* mainly according to the form of the lower lemma and to the different type of thickening of the epidermal cells in the roots. In *Briza* the lemmas are distinctly lobate whereas in *Brizochloa* there are no lobes. Cells of the endodermis in transverse sections of the roots are, in *Briza*, thickened in the form of the letter V, in *Brizochloa*, in the form of the letter O.

Bromus fasciculatus Presl

- FNJ: Báshiqa, 12.4.1960, *Hadač* 1559.
 FPF: Jebel Hamrin, between Baquba and Khanequin, near the road, 4.3.1960, *Hadač* 594.
 DSD: Khidr al Mai, 8.3.1961, *Hadač* 3396.

In all three sheets plants with entirely or nearly glabrous lemmas are mixed with hairy ones. Bor (1968) cites from Iraq only the hairy form (var. *alexandrinus* Thell.), but it seems that the glabrous type (var. *fasciculatus*) is not rare in Iraq.

Calamagrostis pseudophragmites (Hall. fil.) Koel.

- MRO: between Derbend and Haji Omran, 13.6.1960, *Hadač* 2346.
 MSU: Tasluja, 28.5.1960, *Hadač* 2003; wet places 8 km NW from Penjwin, 27.5.1961, *Hadač* 5013; Sarchinar, 27.5.1960, *Hadač* 1925; Nalparaiz, 25.5.1961, *Hadač* 4842.
 FPF: Saduur, near Diyala, 29.4.1960, *Hadač* 1757.
 DLJ: between Samarra and Wadi Tharthar, at a canal, 5.5.1961, *Hadač* 4529.

The taxonomy of the group designated as *C. pseudophragmites* is very intricate and needs to be studied in the whole of its area. This species, in Iraq, is sometimes named *C. persica* (Boiss.) Stapf; so e.g. Handel-Mazetti (1914) thinks, that "erscheint es nach meinen Grundsätzen angebracht, sie als geographische Art abzutrennen". On the other hand Bor (1968), having studied the original plants of Boissier and also of Handel-Mazetti, came to the conclusion that *C. persica* cannot be considered as a separate species.

Catabrosa aquatica (L.) Pal. Beauv.

- MRO: Sarcal, right bank of the brook, 2200 m alt., 9.6.1960, *Hadač* 2311; Shirzawa, on the S foot of mt. Helgurd, 11.6.1960, *Hadač* 2470.

Our plants are mainly with two-flowered spikelets. The nerves of the paleas are covered with long hairs. This corresponds with the statement that the hairiness of the paleas increases towards the south. In northern Europe the nerves of paleas are glabrous or with scattered hairs (cf. Chrték 1965).

Catapodium rigidum (L.) C. E. Hubbard

MRO: between Naprdan and Sheikhan, 5.6.1961, *Hadač* 5362.

MSU: Avroman mts., limestone slope above Khormal, 27.5.1961, *Hadač* 5024.

FNI: Ba'shiqa, 12.4.1960, *Hadač* 1564.

According to Bor (1968) rare in the lower forest zone of Iraq.



Map 6. — ● *Cutandia dichotoma*; ○ *Catapodium rigidum*.

Cutandia dichotoma is distributed from N Africa to Central Asia. In Iraq it grows mostly on sanddunes in the area of eocene and miocene rocks, where the main annual rainfall does not exceed 250 mm; it was not observed in the cretaceous limestone area covered by the *Artemisia herba-alba* vegetation. *Catapodium rigidum* is distributed from W and S Europe and N Africa to Iran and Caucasus. In Iraq it grows in a region with 400-1000 mm main annual rainfall.

Cenchrus ciliaris L.

DWD/

DSD: Sha'ib Hisb ad Rahba, 13.4.1961, *Hadač*.DSD: Jebel Sanam, 6.3.1961, *Hadač* 3303.

According to Bor (1968) found in only two or three localities in Iraq.

Chrysopogon gryllus (L.) Trin.MSU: Tasluja, 28.5.1960, *Hadač* 1988; Nalparaiz, 25.5.1961, *Hadač* 4806.**Colpodium violaceum** (Boiss.) Griseb.MRO: Hassar-i-Sakran, 2400-2800 m alt., 7.6.1960, *Hadač* 5645.

This is the second locality in Iraq; hitherto known from mt. Helgurd (Bor 1968).

Crypsis aculeata (L.) Ait.LCA: right bank of the Euphrates below Falluja, 7.10.1960, *Hadač* 2753; Baghdad, left bank of the Tigris near the Embassy, 26.11.1959, *Hadač* 63.**Crypsis alopecuroides** (Pill. et Mitterpl.) Schrad.LCA: Baghdad, left bank of the Tigris near the YMCA hostel, 19.11.1959 and 24.11.1959, *Hadač* 5, 42.**Cutandia dichotoma** (Forssk.) TrabutDWD: steppe 65 km E of Rutba, 27.4.1961, *Hadač* 4459; Jidal Fadj, 15.4.1961, *Hadač* 4258; desert 160 km W of Romadi, 26.4.1961, *Hadač* 4346.DSD: between Zubair and Jebel Sanam, 6.3.1961, *Hadač* 3355; Jebel Sanam, 6.3.1961, *Hadač* 3329; Khidr al Mai, 8.3.1961, *Hadač* 3374; desert 68 km NW of Khidr al Mai, 8.3.1961, *Hadač* 3439.

We agree with Bor (1968) in considering this plant to be a distinct species from *C. memphitica*.

Cutandia memphitica (Spreng.) Benth.

- DWD: between Kerbela and Najaf, 18.3.1960 and 31.3.1960, *Hadač* 927, 1063.
DSD: between Rahba and Najaf, 2.4.1961, *Hadač* 3960; Jebel Sanam, 6.3.1961, *Hadač* 3333; Khidr al Mai, 8.3.1961, *Hadač* 3374; sandy desert Shatt ar Ramal, 30 km N of Khidr al Mai, 7.3.1961, *Hadač* 3413.
LEA: 6 km NE from Khan Banni Saad, 13.3.1960, *Hadač* 786.
LCA: Sichar near Falluja, 1.3.1960, *Hadač* 511; S. Jezira 75 Km NW of Baghdad, 15.4.1960, *Hadač* 1623.

Cymbopogon oliveri (Boiss.) Bor

- FPF: Jebel Hamrin at the Baquba-Khanequin road, northern slope, 29.4.1960, *Hadač* 1730; steppe near Koma Sank, 10.5.1961, *Hadač* 4599.

Desmostachya bipinnata (L.) Stapf

- FPF: Saduur, 29.4.1960, *Hadač* 1762.
LCA: confluence of the Tigris and the Diyala, 24.12.1959, *Hadač* 117.
DGA: Deltawa, 16.3.1960, *Hadač* 842.

Dichanthium annulatum (Forsk.) Stapf

- MSU: Derbendi khan, bank of the river Diyala, 25.10.1960, *Hadač* 2940.

Zohary (1950) states that this species occurs in MSU, but without locality; Bor (1968) has no other data from this district.

Digitaria sanguinalis (L.) Scop.

- DWD: right bank of the Euphrates below Falluja, 7.10.1960, *Hadač* 2744.

Enneapogon persicus Boiss.

- FPF: Jebel Hamrin at the road Baquba-Khanaquin, 29.4.1960, *Hadač* 1731.

Eremopoa persica (Trin.) Rozhev.

- MRO: Sarcal, at the foot of mt. Helgurd, 2200 m alt., 4.6.1960, *Hadač* 2081, 2179; Sarcal, right bank of the brook, 2210 m alt., Aethionemo-Astragalum tragacanthae, 4.6.1960, *Hadač*; northern slope of the hill 2450 m alt. above Sarcal, 2250 m alt., 5.6.1960, *Hadač* 2215; between Derbend and Haji Omran, 13.6.1960, *Hadač* 2525.
- MSU: Derbendi khan, at the Diyala, 25.10.1960, *Hadač*.
- FKI: between Doraman and Altun Köprü, 420 m alt., 10.4.1960, *Hadač* 1297.
- LCA: Taji, 15.4.1960, *Hadač* 1585.

Eremopyrum bonaepartis (Spreng.) Nevski var. **bonaepartis**

- DWD: steppe 40 km E of Rutba, 27.4.1961, *Hadač* 4393; desert 160 km W of Romadi, 26.4.1961, *Hadač* 4334; desert 20 km W of Ukaidir, 15.4.1961, *Hadač* 4281; Tell Rufha, 15.4.1961, *Hadač* 4273.
- LCA: desert between Abu Graib and Falluja, 25.3.1961, *Hadač* 3956.

Eremopyrum confusum Meld. var. **confusum**

- DWD: desert 35 km E of Nukhaib, 15.4.1961, *Hadač* 4237; desert 160 km W of Romadi, 26.4.1961, *Hadač* 4335.
- DSD: desert 30 km W of Shubaicha, 14.4.1961, *Hadač* 4176.

Eremopyrum confusum Meld. var. **glabrum** Meld.

- DWD: desert 20 km W of Romadi, 26.4.1961, *Hadač* 4299.
- FKI: Adheim near Injana, 23.3.1961, *Hadač* 3937.

Eremopyrum distans (C. Koch) Nevski

- DWD: desert between Najaf and Rahba, 2.4.1961, *Hadač* 3980; slope of a tablemountain 61 km E of Rutba, 27.4.1961, *Hadač* 4448.
- FKI: Adheim near Injana, 23.3.1961, *Hadač* 3938.

Eriochloa succincta (Trin.) Kunth

- DWD: right bank of the Euphrates below Falluja, 7.10.1960, *Hadač* 2760.

Festuca arundinacea Schreb.

MRO: Nowanda, 13.6.1960, *Hadač* 2499.

Probably introduced. According to Bor (1968), 3 localities are known for this species in Iraq.

Henrardia pubescens (Bertol.) C. E. Hubbard

DWD: 76 km E of Rutba, 27.4.1961, *Hadač* 4481; 35 km E of Nukhaib, 15.4.1961, *Hadač* 4233.

Hyparrhenia hirta (L.) Stapf

FNI: Ba'shiqa, 12.4.1960, *Hadač* 1518.

FKI: between Jalaula and Derbendi khan, 24.5.1961, *Hadač* 4663.

FPF: Jebel Hamrin, Mansuriya, 4.3.1960, *Hadač* 639.

Milium pedicellare (Bornm.) Roshev.

MRO: Sakri Sakran, 6.6.1961, *Hadač* 5490.

MSU: Kopi Qaradagh, Waziara, 29.5.1961, *Hadač* 6257; Benawa Suta near Penjwin, 26.5.1961, *Hadač* 4970.

Milium vernale M. B.

MRO: Sarcal, at the foot of mt. Helgurd, 2200 m alt., 7.6.1960, *Hadač* 2174.

According to Bor (1968) found in Iraq only once, at Suwara Tuka.

Nardurus subulatus (Banks et Sol.) Bor

DWD: Telle Rufha, 15.4.1961, *Hadač* 4269.

Oryzopsis holciformis (M. B.) Hack.

- MRO: Potine, at the N foot of the mountain, 20.6.1961, *Hadač* 6069; Sarcad, right bank of the brook at 2200 m alt., Rheetum, 4.6.1960, *Hadač* 2684.
MSU: Kopi Qaradagh, Waziara, 29.5.1961, *Hadač* 6303; Kopi Qaradagh, on the summit of the mountain, 29.5.1961, *Hadač* 5178.

Oryzopsis miliacea (L.) Asch. et Schweinf.

- MAM: Dohuk-galli, 22.3.1961, *Hadač* 3770.

Panicum repens L.

- LSM: Amara, in the fields, 2.12.1960, *Hadač* 3770.

Parapholis incurva (L.) C. E. Hubbard

- MSU: Derbendi khan, bank of the Diyala, 25.10.1960, *Hadač* 2934.
LCA: Mussayib, 18.3.1960, *Hadač* 895.
DWD: Hur near Kerbela, 31.3.1960, *Hadač* 1049.

Paspalum paspaloides (Michx.) Scribn.

- LCA: Baghdad, left bank of the Tigris near the YMCA-hostel, 24.11.1959, *Hadač* 41; Baghdad, Adhamyia, College of Sciences, 3.12.1959, *Hadač* 92; below the bridge Al Kheir, 7.10.1960, *Hadač* 2768; Seleucia, 10.5.1960, *Hadač* 1777.

Pentatherum olympicum (Boiss.) Náb.

- MRO: Sarcad, right bank of the brook, 2220 m and 2230 m alt., 10.6.1960, *Hadač* 2134, 2402, 2698.
MSU: Pira Magrun, wet places on the E slope, 1900 m alt., 23.10.1960, *Hadač* 2879.

Bor (1968) places this species in the genus *Agrostis*, but we think that it is better placed in *Pentatherum*, thus forming a transition between *Agrostis* and *Calamagrostis* (Cvelev 1968).

Phleum bertolonii Bornm.

MSU: Girdabor, at the S foot of Pira Magrun, 25.5.1961, *Hadač* 4718.

First record for Iraq. The species is near to *Ph. pratense*, but its culm base is thickened to a bulb, its spikelets are shorter as well as the awns. *Hadač* 1979, from Tasluja, 28.5.1960, also probably belongs to this species but this specimen is incomplete.

Phleum commutatum Gaud.

MRO: Sarcāl, at the foot of mt. Helgurd, 2200 m alt., 4.6.1960, *Hadač* 2121; and on the right bank of the brook above Sarcāl, 2230 m alt., 10.6.1960, *Hadač* 2388; Hassar-i-Sakran, 2400-2800 m alt., 7.6.1961, *Hadač* 5628.

Ph. commutatum has been found hitherto only twice in Iraq, on mt. Helgurd and Ser Kurawa, which is situated more in the north, on the Turkish border. All our plants belong to the type with glumes having glabrous or shortly denticulate awns. Bor (1968) believes *Ph. alpinum* L. and *Ph. commutatum* Gaud. to be synonymous, but the differences in the hairiness of the awns are very conspicuous and clear-cut. The type with hairy awns is confined probably to Alps only and corresponds to *Ph. alpinum*, whereas *Ph. commutatum* has a wide distribution.

Phleum exaratum Griseb.

MRO: between Nowanda and Derbend, 13.6.1960, *Hadač* 2520.

MSU: Dar Mazala pass between Sulaimayia and Kopi Qaradagh, 28.5.1961, *Hadač* 5089; Nalparaiz, 25.5.1961, *Hadač* 4812.

Polypogon semiverticillatus (Forssk.) Hyl.

MRO: Derbend, 4.6.1960, *Hadač* 2070;

DWD: Hur near Kerbela, 31.3.1960, *Hadač* 1048. First record for DWD.

Psilurus incurvus (Gouan) Schinz et Thell.

FKI: Kirkuk, 10.4.1960, *Hadač* 1248.

LCA: Baghdad, Jadriya, on the banks of the Tigris, 7.4.1961, *Hadač* 4058.

Not recorded by Bor (1968) from LCA, though already published from Baghdad by Haines (1962).

Sclerochloa dura (L.) Pal. Beauv.

MSU: Sarchinar, at the Obara Chai, 30.5.1961, *Hadač* 4775.

Setaria glauca (L.) Pal. Beauv.

LCA: right bank of the Euphrates below Falluja, 7.10.1960, *Hadač* 2762; Safiyya near Baghdad, in fields, 23.2.1960, *Hadač* 466; Baghdad-Shakiriya, on the right bank of the Tigris, 27.11.1959, *Hadač* 72.

Sorghum halepense (L.) Pers.

LCA: Baghdad, left bank of the Tigris, 25.11.1959, *Hadač* 50; Baghdad, Zafra-nyia, 15.1.1960, *Hadač* 150; at the confluence of the Tigris and the Diyala, 24.12.1959, *Hadač* 120.

LBA: 20 km N of Fao, 6.2.1960, *Hadač* 209.

Sphenopus divaricatus (Gouan) Reichenb.

DWD: Hur near Kerbela, 31.3.1960, *Hadač* 1050.

LEA: Deltawa, 16.3.1960, *Hadač* 807.

Stipa parviflora Desf.

DWD: steppe 40 km E of Rutba, 27.4.1961, *Hadač* 4381, 4389.

This species grows only in the western part of Iraq. The length of awns corresponds to that of *S. parviflora* subsp. *parviflora* var. *parviflora*, though the size of the lemmas deviates somewhat from the above named variety (cf. Chrtek et Martinovský 1969).

Stipa retorta Cav.

FKI: Kirkuk, 10.4.1960, *Hadač* 1278; Adheim near Injana, 23.3.1961, *Hadač* 3939.

FPP: Jebel Hamrin on the Baquba-Kanaquin road, NE slope, 4.3.1960, *Hadač* 591; Jebel Hamrin, Mansuriya, 4.3.1960, *Hadač* 641.

DLJ: left bank of the Euphrates below Rawa, 11.2.1960, *Hadač* 376; Ashiq, 17.3.1960, *Hadač* 871.

DSD: Jebel Sanam, 6.3.1961, *Hadač* 3304; Khidr al Mai, 8.3.1961, *Hadač* 3395.

Bor (1968) believes the saharo-sindian plants of *S. retorta* to be conspecific with the South African *S. capensis* Thunb. A comparison of plants from S Africa and SW Asia clearly shows them to be distinct. The South African plants have shorter awns and lemmas, as compared to the saharo-sindian material. For this reason we use the name *S. retorta* Cav., which is, according to Maire (1953), older than the hitherto generally used name *S. tortilis* Desf.

***Stipagrostis obtusa* (Del.) Ness**

DSD: Jebel Sanam, 6.3.1961, *Hadač* 3299.

Stipagrostis plumosa* (L.) Munro var. *plumosa

DJD: wadi SE of Rawa, 11.2.1960, *Hadač* 442.

DWD: between Kerbela and Najaf, 5 km S of Kerbela, 31.3.1960 and 18.3.1960, *Hadač* 1057, 945.

DSD: Khidr al Mai, 8.3.1961, *Hadač* 3398; desert ca. 50 km N of Khidr al Mai 7.3.1961, *Hadač* 3412.

LCA: hasswa desert near Falluja, 20.11.1959, *Hadač* 27.

***Stipagrostis raddiana* (Savi) De Winter**

FPF: Jebel Hamrin, Mansuriya, 4.3.1960, *Hadač* 640.

Bor (1968) reports this species likewise from Jebel Hamrin, but from another locality. It must be a rare plant, perhaps restricted in Iraq to the ridge of Jebel Hamrin.

***Taeniatherum asperum* (Simonkai) Nevski**

MSU: between Derbendikhan and Sulaimaniya, 24.5.1961, *Hadač* 4691.

***Taeniatherum crinitum* (Schreb.) Nevski**

MSU: in the Dar Mazala pass between Sulaimaniya and Kopi Qaradagh, 28.5.1961, *Hadač* 5097.

Trachynia distachya (L.) Link

- DLJ: Ashiq, 17.3.1960 and 12.3.1960, *Hadač* 869, 765; between Samarra and Ashiq, 12.3.1960, *Hadač* 725.
- DSD: Sha'ib ib Hisb near Rahba, 13.4.1961, *Hadač* 4099; Jebel Sanam, 6.3.1961, *Hadač* 3335.
- LEA: 17 km N of the Diyala bridge at Baghdad, in the fields, 30.1.1960, *Hadač* 175.
- LCA: Babylon, in fields, 29.3.1960, *Hadač* 1008.

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