

NOTES ON THE GENUS ALLIUM SUBGEN. ALLIUM SECT. LONGIVAGINATA IN IRAN

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Allium L. (Amaryllidaceae) comprises bulbous plants and is one of the largest monocots genera in the world. Members of the *Allium* subgen. *Allium* sect. *Longivaginata* were studied and updated in Iran. So far, five species from this section have been reported from Iran. During the study, an interesting specimen of this section was identified as *Allium arlgirdense* Blakelock from west Azerbaijan (at the border of Iran, Turkey, and Iraq). It is reported as a new record for the flora of Iran. Furthermore, *Allium petri* and *A. jaegeri* are recognized as synonyms of *A. longivaginatum*, and *A. dolichovaginatum* as a synonymy of *A. autumniflorum*. Description, distribution map of species, and an identification key for the section are presented.

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Keywords: Alpine flora; *Allium*, section *Longivaginata*; new record; West Azerbaijan; Iran

مروری بر جنس *Allium* زیرجنس *Allium* بخش *Longivaginata* در ایران

محمد امینی‌راد: دانشیار پژوهش، موسسه تحقیقات جنگلها و مراتع کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران. گیاهان جنس *Allium* از تیره Amaryllidaceae، گیاهانی پیازدار و یکی از بزرگترین جنس‌های تک‌لپه‌ای در دنیا هستند. در این مقاله، اعضای بخش *Longivaginata* از زیرجنس *Allium* در ایران مطالعه شدند. تا کنون، پنج گونه از این بخش از ایران گزارش شده است. بعد از بازبینی نمونه‌های هرباریومی، یک نمونه جالب از این بخش از استان آذربایجان غربی (منطقه مرزی بین ایران، ترکیه و عراق) مشاهده و به نام *Allium arlgirdense* Blakelock نامگذاری شد که به عنوان یک گونه جدید برای فلور ایران گزارش می‌گردد. همچنین، گونه‌های *A. petri* و *A. jaegeri* به عنوان مترادف با گونه *A. longivaginatum* و گونه *A. dolichovaginatum* به عنوان مترادف با گونه *A. autumniflorum* شناخته شدند. همچنین شرح گیاه‌شناسی و نقشه پراکنش گونه‌ها به همراه کلید شناسایی برای اعضاء این بخش نیز ارائه می‌گردد.

INTRODUCTION

Allium Linnaeus with 815 species of geophytic plants is the largest genus in the Amaryllidaceae family (Govaerts & al. 2022) and is known as the 25th species-rich genus among angiosperms (Frodin 2004). Based on Govaerts & al. (2022), the number of accepted species in the genus *Allium* is 1006, distributed all around the world. However, the status of its current position among the largest genera is unknown. The genus is distributed in the northern hemisphere and southwest and central Asia are the

main biodiversity centers followed by North America as the second area (Friesen & al., 2006). About 155 *Allium* species occur in Iran (Dolatyari & al. 2020), these are classified into seven subgenera including, *Allium*, *Amerallium* Traub., *Cepa* (Mill.) Radić., *Melanocrommyum* (Webb & Berthel.) Rouy., *Nectaroscordum* (Lindl.) Asch. & Graebn., *Polyprason* Radić and *Reticulobulbosa* (Kamelin) N.Friesen (Friesen & al. 2006). Subgenus *Melanocrommyum* with roughly six sections and about 70 species is the largest one in Iran and subgenus

Allium with 11 sections and about 20 species is the second largest subgenus in Iran. Within the subgenus *Allium*, the section *Longivaginata* (Kamelin) F. O. Khass., R.M. Fritsch & N. Friesen is an important and complicated section. Five species of this section are present in Iran as follows: *A. autumniflorum* F.O. Khass. & Akhani (Khassanov & al. 2006), *A. dolichovaginatum* R.M.Fritsch (Fritsch & Abbasi 2008), *A. longivaginatum* Wendelbo (Wendelbo 1971), *A. petri* F.O. Khass. & R.M. Fritsch (Fritsch & al., 2002) and *A. jaegeri* R.M. Fritsch (Fritsch & Maroofi, 2010).

During the study on the genus *Allium* for the Flora of Iran project, an interesting specimen from west Azerbaijan (at the border of Iran, Turkey, and Iraq) belonging to section *Longivaginata* was identified as *Allium arlgirdense* Blakelock. The newly discovered species was previously reported from Turkey and Iraq. Furthermore, *Allium petri* and *A. jaegeri* are recognized as synonymies of *A. longivaginatum* and *A. dolichovaginatum* as a synonymy of *A. autumniflorum*. Description, distribution map, and an identification key to the species are also presented.

MATERIALS AND METHODS

The study is based on the investigation of herbarium specimens from the following herbaria in Iran: IRAN, TARI, FUMH and TUH and also images of herbarium specimens available in K, E, W and BG herbaria. The revisionary work is further based on the critical evaluation of the following publications on the subject: Flora Iranica (Wendelbo 1971), Flora of Turkey (Kollmann 1984) and Flora of Iraq (Wendelbo 1985). Morphological characteristics of the herbarium specimens were studied using Olympus SZH stereomicroscope.

RESULTS & DISCUSSION

Section *Longivaginata* (Kamelin) F.O.Khass., R.M. Fritsch & N. Friesen, *Aliso*, 22: 389 (2006). Type: *A. longivaginatum* Wendelbo
Syn.: *Allium* subsect. *Longivaginata* Kamelin, *Florogenet. Anal. Estest. Fl. Gorn. Sred. Azii* 238 (1973).

Stem covered 3/4 to below inflorescence by leaf sheaths. Leaves with sheaths smooth or papillose or puberulent.

Allium arlgirdense Blakelock, *Kew Bull.*: 209 (1953), Fig.1.

Type: [N. Iraq] Arl Gird Dagh (Algurd Dagh), 3000 m, on the mountain side, 21 vii 1932, E.R. Guest & E.R. Ludlow-Hewitt 2829 (holotype K!).

Bulb broadly ovoid, to 1.5 cm long and 1.2 to 1.5 mm in diam.; one or two outer tunics membranous; inner tunic coriaceous, brown-blackish. Stem 3 to 5 cm, bearing leaves to 3/4 or more; mostly 2 leaves emitted from the bulb. Leaves 2 to 3, shorter or equal to longer than stem; sheaths in lower half smooth to few papillose, in upper half densely papillose or puberulent; blades linear, 0.5 to 2.5 mm broad, contorted, semi-cylindrical, fistulous, scabrous along veins on the under surface and edges, withered by flowering time. Spathe 2-valved, shorter than inflorescence, persistent. Inflorescence hemispherical, 1.5 to 2.5 cm diam., 1 to 1.2 cm long; pedicels to 8 mm, unequal, bracteolate; perianth broadly campanulate; tepals pink with purple nerves, elliptic-oblong, ca. 4 mm, subacute. Filaments 2.5 to 3 mm long, connate at base and adnate to tepals, shorter than tepals, inners filiform from a triangular base, entire or occasionally with a small obtuse lateral tooth on each side; anthers yellow. Ovary ca. 2 mm long and 1.5 mm in diam., coarse. Capsule and seeds not seen, (Figs. 1, 2 and 3).

Phenology and habitat: Flowering in May-June; fruiting in July-August. Dry stony places and the edge of lake in the high mountains, 2600-3000 m a.s.l.

Specimens examined: Iran: W Azerbaijan: Piranshahr to Naghadeh, 5 km Silveh, Gerde sor, Kuh-e Chigh Darreh, 3260 m a.s.l., 23 July 2011, *Gholipour* 70639 (IRAN). Iraq: Arlgird Dagh, 4876 m, Guest & Ludlow-Hewitt 2829 (Kew); Montes Qandil ad confines Persiae, 3300-3500 m, Rechingen 11801 (W and E). Turkey: Sat Dağ (above Yüksekova), 2600 m, 20.08.1967, Duncan & Tait 42! (E).

Notes

The species was introduced by Blakelock (1953) based on one specimen collected from Arl Gird Dagh or Halgurd Mountain (3000 m) from Iraq. He compared the species with *A. scabrellum* Boiss. & Buhse and according to him, this species differs from the latter in its lower growth, leaf sheaths to 3/4 of stem length, contorted blades and blunter tepal. Kollmann (1984) reported *A. arlgirdense* with two specimens from Turkey (Yüksekova) in an area near the border with Iraq. Also, the Iranian specimen has been collected from Chigh Darreh Mt. which is adjacent to Halgurd Mt. (location of type specimen). Therefore, *A. arlgirdense* is a subendemic species which grows exclusively in the borderline between the three countries of Iraq, Turkey and Iran (Fig. 4).



Fig. 1. Type of *Allium arlgirdense* Blakelock (Guest & Ludlow-Hewitt 2829).

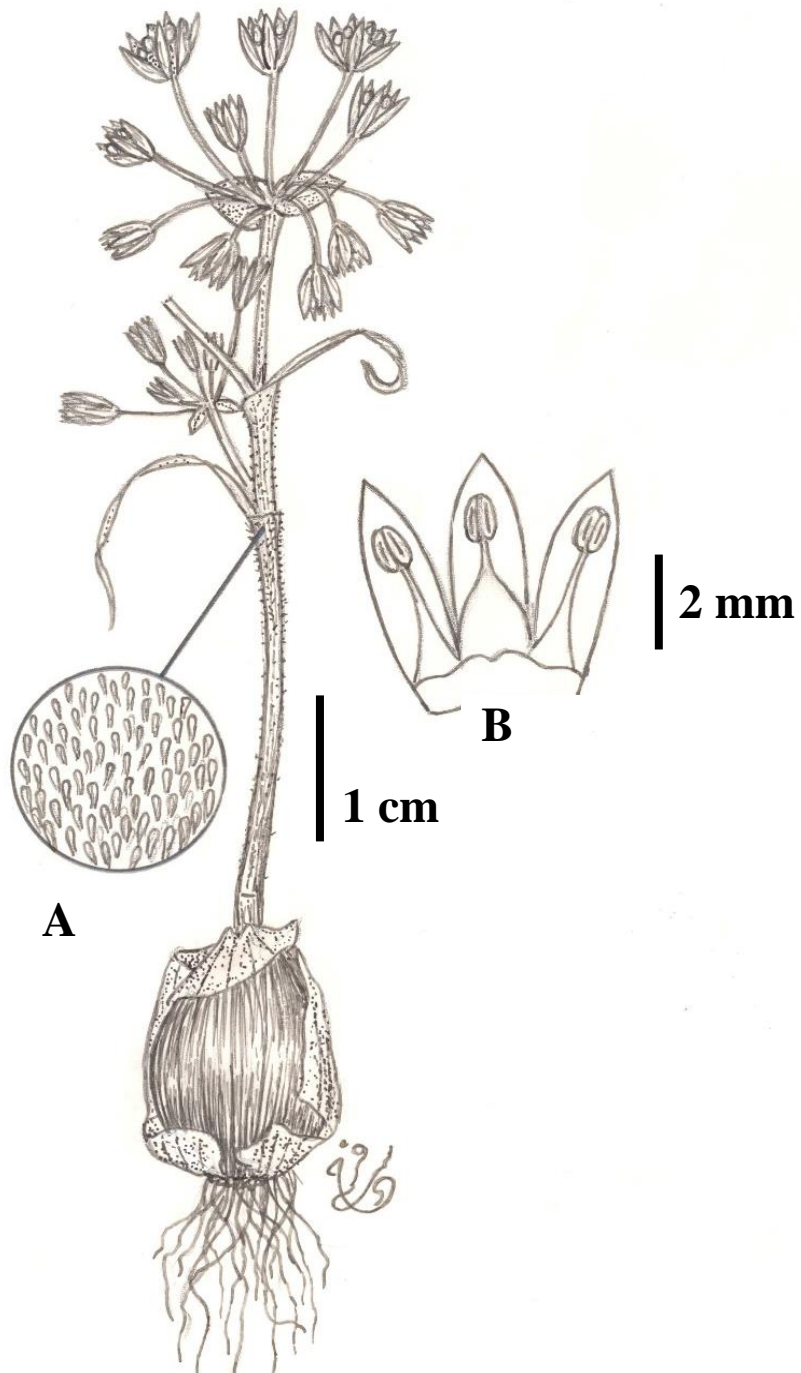


Fig. 2. *Allium arlgirdense*. A. Habit; B. Flower (tepals and filaments).

Allium longivaginatum Wendelbo, Acta Horti Gotob. 28: 26 (1966).

Syn.: *A. petri* F.O. Khass. & R.M. Fritsch, Stapfia 80: 389 (2002), **syn. nov.**; *A. jaegeri* R.M. Fritsch, Phytion (Horn) 50(1): 14 (2010), **syn. nov.**

Type: Lorestan: Dorud, 1800 m, Koelz 18533 (holotype W; isotype MICH and BG).

Bulb ovoid, 1 to 1.5 mm diam.; outer tunics, brown-greyish. Stem 16 to 46 cm, bearing leaves to 3/4 or more. Leaves 3, shorter to longer than stem; sheaths smooth or with few and small papillae; blades linear, to 3 mm broad, subcylindrical, fistulous, above canaliculate. Spathe 3-valved, shorter than inflorescence, ovate. Inflorescence semi-spherical, with 20 to 30 flowers; pedicels to 10 mm, equal, mostly curved, with small hyaline bracteole; perianth campanulate-cylindrical; tepals reddish-purple with dark nerves, narrowly elliptic-oblong, 5 to 6 mm, cucullate. Filaments ca. 3 mm long, connate at base for ca. 0.5 mm and adnate to tepals, shorter than tepals; inner filaments widened for 1/3 of the base and with a fleshy rounded tooth at both sides, subulate in upper 2/3; outer filaments subulate. Ovary broadly ellipsoid, narrowly obtuse, with 6 nerves on the surface.

Phenology and habitat: Flowering in April-July; fruiting in July-August. Stony places and dry grassy top of hills, 1800 to 3600 m a.s.l.

Specimens examined: Mazandaran: N. side of Kandavan, Karaj-Chalus Road, Wendelbo, Foroughi & Assadi 14451-TARI; Chalus valley, just above Siah Bisheh, 2200 m, Wendelbo, Foroughi & Assadi 14070-TARI. Lorestan: Azna, Oshtrankuh, between Bidestaneh village and Sanboran summit, 3600 m, Mahmoodi & Hoseini 98517-TARI; Dorud, neck mt. between Saravand and Gahar lake, 2300-3500 m, Mozaffarian & Sardabi 42350-TARI. Chaharmahal va Bakhtiari: Zardkuh, 2710 m, Mozaffarian 96908-TARI. Semnan: ca. 50 km N of Semnan, between Sheli and Hikuh Villages, 2400 m, Assadi & Mozaffarian 40536-TARI; Shahrud, Kuh-e Abr, 2580 m, Rowshan 5847-TARI. Tehran: Vally abad, Chalus valley, 1950 m, Riazi 2773-TARI; Velenjak, Iranian Research Institute of Plant Protection (cultivated), Abbasi & Fritsch 70784-IRAN.

Allium petri and *A. jaegeri* (type specimens from Chelgerd at 2400 to 2600 m a.s.l.) were introduced as new species with two teeth or lobes on both sides of the basal part of the inner filaments. The two species are very similar to *A. longivaginatum* Wendelbo due to inner filament shape. Wendelbo (1971) mentioned two small teeth at the base of the anther-bearing spike for *A. longivaginatum*. Probably, in living specimens this protruding is swelling form which is seen as a

small tooth when it dries. In all specimens belonging to these three species, the tooth is seen with slightly different sizes. Furthermore, other slight differences of the tepal and filament size are almost overlapping among these species and not a diagnostic character. Due to the lack of differences between the three species *A. petri* and *A. jaegeri* are considered as synonyms of *A. longivaginatum*.

Allium autumniflorum F.O.Khass. & Akhani, Rostaniha 7(Suppl. 2): 120 (2006).

Syn.: *A. dolichovaginatum* R.M.Fritsch, Rostaniha, 9 (Supplement 2): 66 (2008), **syn. nov.**

Type: Golestan: 6 km SE Maraveh Tappeh towards Yeke-Chenar, 37 52 03 N, 55 59 47 E, 413 m a.s.l., Akhani 18086 (holotype: Hb. Akhani; isotype: IRAN). Bulbs ovate, 1.5 to 2 cm long and to 1 to 3 cm in diameter; outer tunics brown and coriaceous, with longitudinal nerves; bulblets probably absent. Scape 30 to 50 cm high, over the whole length covered by leaf sheaths. Leaves 4, equal to longer than scape, the last one 2 mm thick, 3 to 4 cm long, glabrous, cylindrical, scabrous on nerves and at margins. Spathe 5 mm long, bipartite, persistent. Inflorescence obconical or subglobose, to 2.2 cm long, with few flowers; pedicels of nearly equal length, 10 to 15 cm long, without basal bracts. Flowers narrowly campanulate; tepals 3.5 to 4.5 mm long, whitish or yellow with brown or purple midvein; outer tepal ovate-oblong or widely oblong, acute to obtuse, recurved at the apex. Filaments simple, triangular-subulate, 4 mm long, usually shorter or sometimes longer than tepal; anthers brownish, ca. 0.5 mm long. Style included. Capsule 3.5 mm in diameter, valves cordate, nearly equal to tepal.

Phenology and habitat: Flowering in August-September; fruiting in September-October. On steep limestone slopes of the valleys and dry grassy regions, 400 to 1530 m a.s.l.

Specimens examined: Golestan: 6 km SE Maraveh Tappeh towards Yeke-Chenar, 37 52 3 N, 55 59 47 E, 413 m, Akhani 18086. Khorasan: West of Bujnord, 4 km Jozak to Chamanbid, 1225 m, Memariani & Arjomandi 44611-FUMH.

Allium dolichovaginatum R.M.Fritsch (Fritsch & Abbasi, 2008) was described as a new species based on a cultivated specimen in the Iranian Research Institute of Plant Protection (bulbs collected from Khorasan-e Razavi Province, Binalud massif, north exposed valley above the Village Akhlamd, near waterfall, 1530 m, N 36 35 58 E 58 55 59, 22.04.2004, leg. Fritsch, Keusgen & Amini Rad). Unfortunately, there is no living specimen in the collection and it seems that *A. dolichovaginatum* has not survived in cultivation.

The differences between the two species, in Fritsch point of view are flowering time, height of plant, the shape and length of the tepals, and the length of the filament relative to the tepal. Study and morphometry of the type specimen of *A. autumniflorum* indicated ranging of 30 to 50 cm height of plant (20 to 30 cm in description) and 4 to 4.5 mm for flower length (4 to 5 mm in description). After close examination of the

type specimens, descriptions as well as the other herbarium specimens of both species, it was concluded that *A. dolichovaginatatum* is conspecific with *A. autumniflorum* and the mentioned diagnostic characters determining the two species (Fritsch & Abbasi, 2008), are all subject to considerable variation and of little taxonomic value.



Fig. 3. *Allium arlgirdense* in natural habitat.

Identification key to the Iranian species of *Allium* sect. *Longivaginata* (Kamelin) F.O. Khass., R.M.Fritsch & N. Friesen

1. Plants up to 5 cm high. Leaf twisted; sheaths densely papillose or puberulent in upper half
*A. arlgirdense*
 - Plants 15 to 50 cm high. Leaf not or slightly twisted; sheaths smooth and glabrous 2

2. Inner filaments with thickened and blunt appendages along the distal margins of the dilatated basal part*A. longivaginatum*
 - Inner filaments triangular, without appendages and not denticulate*A. autumniflorum*

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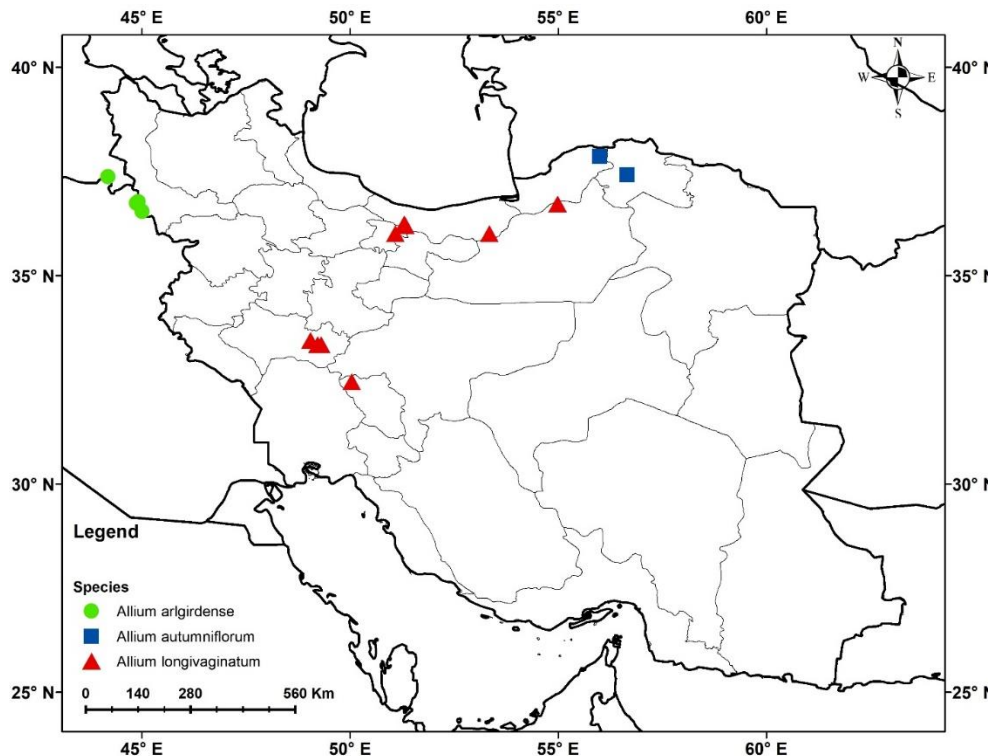


Fig. 4. Distribution map of the species of *Allium* sect. *Longivaginata*: ● *A. arlgirdense*; ■ *A. autumniflorum*; ▲ *A. longivaginatatum*.

REFERENCES

- Blakelock, R. A. 1953: The Rustam Herbarium, 'Iraq: Part V. Systematic List. -Kew Bulletin 8(2): 207–229. <https://doi.org/10.1038/144504a0>
- Dolatyari, A., Moazzeni, H., Hosseini, S., Blattner, F. R., & Fritsch, R. M. 2020: *Allium schisticola*, a new species with peculiar morphological characters and an unexpected phylogenetic position. -Phytotaxa 450(3): 246–256.
- Friesen, N., Fritsch, R. M., & Blattner, F. R. 2006: Phylogeny and new intrageneric classification of *Allium* (Alliaceae) based on nuclear ribosomal DNA its sequences. -Aliso 22: 372–395.
- Fritsch, R. M., & Abbasi, M. 2008: New taxa and other contributions to the taxonomy of *Allium* L. (Alliaceae) in Iran. -Rostaniha 9 (Suppl. 2): 1–77.
- Fritsch, R. M., Khassanov, F. O., & Matin, F. 2002: New *Allium* taxa from Middle Asia and Iran. -Stapfia 80, 381–393.
- Fritsch, R. M., & Maroofi, H. 2010: New species and new records of *Allium* L. (Alliaceae) from Iran. -Phyton 50(1): 1–26.
- Khassanov, F. O., Noroozi, J., & Akhani, H. 2006: Two new species of the genus *Allium* (Alliaceae) from Iran. -Rostaniha 7(Suppl. 2): 119–129.
- Govaerts, R. 1995: World Checklist of Seed Plants. Vol. 1. [Vol. 1, 1995 (letter "A"); Vol. 2, 1996 (letter "B"); Vol. 3 (letter "C"), 1999]. MIM, Continental Publishing, Antwerp.
- Govaerts, R., Kington, S., Friesen, N., Fritsch, R. M., Snijman, D. A., Marcucci, R., Silverstone-Sopkin, P. A. & Brullo, S. 2022: World checklist of Amaryllidaceae. Facilitated by the Royal Botanic Gardens, Kew. Available at: <https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:30000901-2#sources.do> (accessed 4 June 2022)
- Kollmann, F. 1984: *Allium* L. In: Davis, P. H. (Ed.) Flora of Turkey and the East Aegean Islands, vol. 8. -Edinburgh Univ. Press, Edinburgh, pp. 98-208.
- Wendelbo, P. 1971: Alliaceae. In: Rechinger, K. H. (ed.) Flora Iranica, No. 76. -Graz, Akademische Druck-und Verlagsanstalt, 100 pp.
- Wendelbo, P. 1985: *Allium* L. In: Townsend, C. C. and Guest, E. (eds.) Flora of Iraq, vol. 8. -Baghdad, Ministry of Agriculture & Agrarian Reform, pp. 137-177.