

AMMANNIA (LYTHRACEAE) IN GREECE AND THE BALKANS

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Abstract

Ammannia (Lythraceae) is a xenophytic genus of the Greek flora, neglected in relevant basic floras and checklists. The known distribution in Greece of *A. coccinea* is given in a dot map. *A. verticillata* is excluded, for the time being, from the flora of Greece. Occurrences of nine different *Ammannia* species throughout the Mediterranean are shortly discussed, with special respect to *A. auriculata* and *A. verticillata* in the Balkan countries.

Introduction

Ammannia (Lythraceae), a genus named by Linnaeus in honour of Paul Ammann (1634-1691, professor of botany at Leipzig/Germany; see ASCHERSON & GRÄBNER, 1909: 132; STAFLEU & COWAN, 1976: 42), consists of c. 30 species of annual, glabrous herbs with opposite or whorled, sessile, entire leaves and inconspicuous flowers mostly arranged in axillary subsessile clusters or small cymes (KOEHNE, 1903: 43; WILLIS, 1973: 53).

Style length, compactness of inflorescence, and presence or absence of an epicalyx are of major taxonomic significance in the genus, which is widespread in the tropical and subtropical regions of both hemispheres. Several synanthropic, weedy *Ammannia* species regularly invade summer crops of warm-temperate regions (WEBB 1968: 302, ZOHARY 1972: 367).

Ammannia in the Mediterranean

Occurrences of *Ammannia*, considered native in the Mediterranean basin by GREUTER & al. (1989: xiii, 228), are patchy and confined to swampy habitats, springs and stream sides in the extra-European countries, where some four species (*A. auriculata* Willd., *A. baccifera* L., *A. prieuriana* Guillemin & Perrottet, and *A. senegalensis* Lam.) grow in S Anatolia, Palestine, Jordan, Egypt and Libya (AL-EISAWI, 1982: 154; CHAMBERLAIN, 1972: 179; FEINBRUN-DOTHAN & DANIN, 1991: 453; QAISER & SIDDIQI, 1983: 2; TÄCKHOLM, 1974: 377-378); most of these species, together with the xenophytes *A. attenuata* A. Rich. and *A. multiflora* Roxb., have also spread as weeds in irrigated fields of, e.g., Egypt (EL HADIDI & FAYED, 1995: 105).

In the European portion of the Mediterranean, on the contrary, *Ammannia* occurs exclusively as an alien, weedy xenophytic genus, and as such is represented by *A. auriculata* and *A. baccifera* (syn. *A. aegyptiaca* Willd.) in Italy and Spain (GREUTER, & al. 1989: 228). In addition, two taxa of American origin, *A. coccinea* Rottb. and *A.*

robusta Heer & Regel, and the SW Asian *A. verticillata* (Ard.) Lam., have been introduced to Portugal, Spain, S France, N Italy and NW Turkey as weeds of rice fields (AMARAL FRANCO, 1971: 483-484; CARRETERO, 1983: 275-277; DAVIS & al., 1988: 138-139; KERGUÉLEN, 1987: 10; MIYAWAKI, 1960: tab. 12; PIGNATTI, 1982: 146). A doubtful record of *A. senegalensis* for Spain (BOLÒS & VIGO 1984: 655) has been revoked (BOLÒS & al., 1990: 269).

***Ammannia* in Greece**

Surprisingly, species of *Ammannia* have not been recorded for Greece in basic checklists and floras so far. In reality, however, no rice field of adequate size can be found in Sterea Ellas, Makedonia and W Thrace that does not host a weedy *Ammannia* population!

Cultivation of rice as a grain crop in Greece is proved since the Ottoman period, almost probably having been imported from Ottoman Egypt (LAVRENTIADES, 1973: 146). The considerable amount of contemporary rice cultivation in Greece is given in table 1 (official data of the Hellenic Ministry of Agriculture and the Hellenic Statistical Service kindly communicated by C. Lienau, in litt.). In the late 1980s, rice cultivation has been abandoned in S Peloponnisos (Nomos Lakonias) but newly founded in the northern vicinity of Mt. Olympus (Nomos Pierias).

The single *Ammannia* taxon observed and collected in Greek rice fields in recent years is *A. coccinea*, the stabilized hybrid of *A. auriculata* and *A. robusta*. Specific status is retained for this amphidiploid taxon, because it is distinct morphologically and cytologically, has 95-100% pollen fertility, and is maintained by inbreeding (GRAHAM,

Nomos(from S to NE)	Area of rice fields 1986 (in hectares)	Rice production 1986 (in tons)	Rice production 1991 (in tons)	Weedy <i>Ammannia</i>
Lakonias	20	100	—	?
Messinias	394	1.995	557	?
Etoloakarnanias	152	782	1.440	?
Fthiotidos	1.500	9.495	4.455	+
Imathias	19	98	1.080	+
Pellis	205	1.323	886	+
Pierias	—	—	2.760	+
Thessalonikis	10.716	78.000	46.101	+
Serron	4.679	27.372	32.804	+
Kavalas	7	25	360	+
Xanthis	93	382	64	+

Tab. 1: Documented [+] or expected [?] occurrence of *Ammannia* populations, and contemporary cultivation of rice (*Oryza sativa*) in Greece, per Nomos (source: The Hellenic Ministry of Agriculture, Athens 1991; The Hellenic Statistical Service, Athens 1992).

1979: 174). Specimens from all investigated Greek populations show sessile flower-clusters, 2-3 mm long styles, and ripe capsules of 3-4 mm diameter. The dot map (fig. 1), presenting the localities where *A. coccinea* has been collected by the author from 1989 to 1992, is based on the following herbarium material, kept in Berlin-Dahlem (B):

Specimens seen:

Greece, Sterea Ellas: Nomos & Eparchia Fthiotidos, 2 km E of Anthili (38°51'N/22°31'E), rice fields of the Sperchios delta, alt. 2 m, 11.10.1992, *Raus & Schiers 20022*. — **North Central (W Makedonia):** Nomos & Eparchia Pierias, 2 km N of Ejinion (40°32'N/22°34'E), rice fields S of river Aliakmon, alt. 5 m, 8.10.1992, *Raus & Schiers 19888*; Nomos & Eparchia Imathias, Platanos (40°34'N/22°33'E), rice fields N of river Aliakmon, alt. 10 m, 7.10.1992, *Raus & Schiers 19858*; Nomos & Eparchia Thessalonikis, Anatolikon (40°37'N/22°41'E), rice fields W of river Axios, alt. 10 m, 8.10.1992, *Raus & Schiers 19884*. — **North East (E Makedonia):**

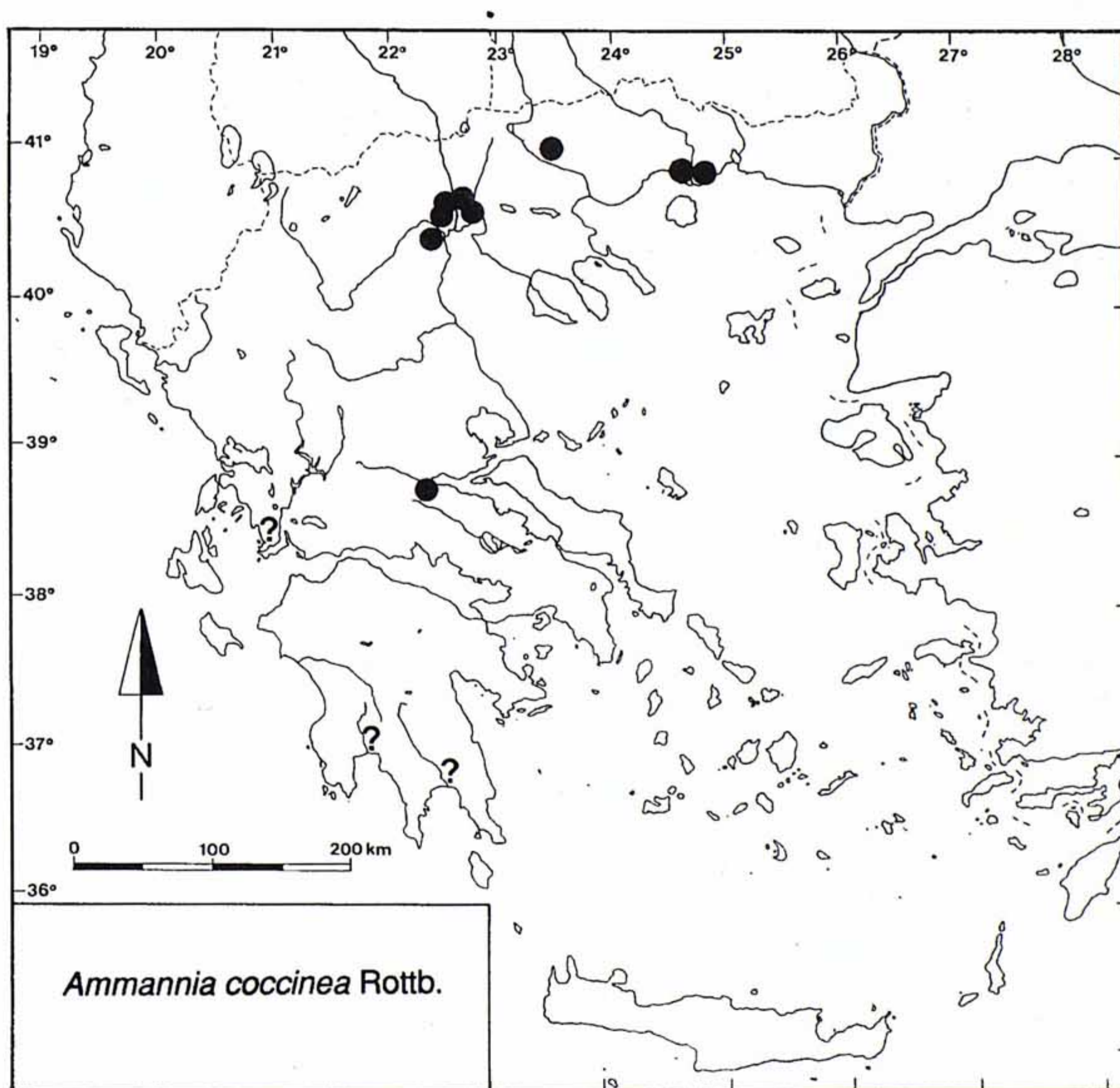


Fig. 1. Known distribution of *Ammannia coccinea* Rottb. in Greece; for question marks, see text.

Nomos & Eparchia Thessalonikis, Anatolikon (40°30'N/22°34'E), rice fields E of river Axios, alt. 10 m, 8.10.1992, *Raus & Schiers 19877*; Nomos & Eparchia Thessalonikis, Kalochori 7 km W of Thessaloniki (40°38'N/22°52'E), rice fields in the Gallikos delta, alt. 1-2 m, 2.9.1989, *Raus & Schiers 13781*; *ibidem* 7.10.1992, *Raus & Schiers 19855*; Nomos & Eparchia Serron, Ano Kamila (41°04'N/25°26'E), rice fields N of river Strimon, alt. 60 m, 6.10.1992, *Raus & Schiers 19849*; Nomos Kavallas, Eparchia Nestou, Ajiasma (40°54'30"N/24°39'E), rice fields W of river Nestos, alt. 2 m, 4.10.1992, *Raus & Schiers 19700*. — **North East (Thraki)**: Nomos & Eparchia Xanthis, Neon Erasmion to Dasochori (40°55'N/24°50'30"E), rice fields E of river Nestos, alt. 2-5 m, 2.10.1992, *Raus & Schiers 19579*.

In addition, *A. coccinea* has been seen in rice fields N of river Loudias near Nea Pella (Nomos Pellis, Eparchia Jiannitson, 7.10.1992, *Raus & Schiers obs.*). The localities cited above refer to squares FJ 2, FK 1, FL 2, FL 4, GL 2, and LF 2 of Atlas Florae Europaeae (JALAS & SUOMINEN, 1972-1994). It should be noted that *A. coccinea* has always been found accompanied by *Cyperus difformis* L., another oryzicolous xenophyte undercollected in Greece (see RAUS, 1991: 573). Question marks in the map (fig. 1) denote areas of rice cultivation in Greece (see tab. 1) which were not visited by the author but almost certainly host *Ammania* populations as well, referring namely to the coastal plains of Nomos Etolo-Akarnanias (Acheloos delta; square EH 1), Nomos Messenias (Pamisos delta; square EG 4), and Nomos Lakonias (Evrotas delta, square FF 3).

An earlier literature record of *A. verticillata* from rice fields near Thessaloniki (LAVRENTIADES, 1973: 153 & table VII), not substantiated by herbarium specimens (TAU!; V. Karagiannakidou, in litt.), presumably has resulted from misidentification, simply based on HAYEK (1926: 940) used as the sole source for determination (as evidenced from LAVRENTIADES, 1973: 165). Revisiting the rice fields near Thessaloniki only revealed populations of *A. coccinea*. Therefore *A. verticillata* is excluded, for the time being, from the flora of Greece.

***Ammania* in the Balkans**

However, *A. verticillata* is reported as an alien from adjacent Bulgaria, occurring in semi-natural wet habitats in the Burgas district close to the Black Sea coast (JORDANOV, 1979: 433; based on DAVIDOV, 1910: 63-64 and BONDEV & POPOV, 1971: 222). Recently, also *A. auriculata* has been introduced to Bulgarian rice fields near Plovdiv (ANDREEV & al., 1992: 524; for "Bu" not yet known to GREUTER & al., 1989: 228). *A. coccinea*, although widespread as the sole member of the genus in Greece, has apparently not yet invaded (or been identified in) Bulgaria.

Literature records of *Ammania* from present Yugoslavia all refer to *A. verticillata*. In Montenegro, this species became known from semi-natural riverbank habitats in the late 19th century (PANTOCSEK, 1874: 116). Serbian localities of *A. verticillata* are concentrated in the lowlands of Vojvodina (near Kikinda) and in the Sava valley (JOSIFOVIĆ, 1973: 7), chorologically cohering with occurrences of *A. verticillata* in adjacent parts of Hungary (near Szeged; SOÓ, 1980: 326) and Romania (banks of the Danube river near the Iron Gate; SĂVULESCU, 1976: 42). Herbarium material from the

Balkan Peninsula outside Greece has not been seen by the present author but certainly deserves revision, on an advanced taxonomic and floristic background (GRAHAM, 1979; CARRETERO, 1983), to reveal possible misidentifications. *Ammannia* has not so far been recorded from Albania or other parts of the former Yugoslav federation.

Acknowledgements

While preparing the present paper I was helped in various ways by friends and colleagues, to whom I express my cordial thanks. Professor C. Lienau, Münster, put geographical and statistical data on rice production in Greece at my disposal, and Dr. V. Karagiannakidou searched for Lavrentiades's specimens of *Ammannia* in the Thessaloniki herbarium (TAU). Christof Schiers, gardener in charge of the scientific living collections at the Botanical Garden Berlin-Dahlem, kindly and helpfully accompanied me on my collecting expeditions to Greece, in 1989 and 1992.

References

- AL-EISAWI, D. M. (1982). List of Jordan vascular plants. *Mitt. Bot. Staatssamml. München* **18**: 79-182.
- AMARAL FRANCO, J. DO (1971). *Nova flora de Portugal (Continente e Açores) 1. Lycopodiaceae - Umbelliferae*. Lisboa.
- ANDREEV, N., M. ANCEV, S. KOZUHAROV, M. MARKOVA, D. PEEV & A. PETROVA (1992). *Opredelitel na bissite rastenija v Bălgarija*. Sofija.
- ASCHERSON, P. & P. GRÄBNER (1908-1913). *Synopsis der mitteleuropäischen Flora* **4**. Leipzig.
- BOLÒS, O. DE & J. VIGO (1984). *Flora dels paisos Catalans* **1**. Barcelona.
- , J. VIGO, R. M. MASALLES & J. M. NINOT (1990). *Flora manual dels paisos Catalans*. Barcelona.
- BONDEV, I. & S. POPOV (1971). Floristichni materialii ot Burgaski okrug. *Izv. Bot. Inst. (Sofia)* **21**: 221-222.
- CARRETERO, J. L. (1983). El género *Ammannia* L. (Lythraceae) en España. *Anales Jard. Bot. Madrid* **39**: 273-277.
- CHAMBERLAIN, D. F. (1972). *Ammannia* L. in: P. H. DAVIS (ed.), *Flora of Turkey and the East Aegean Islands* **4**: 179-180. Edinburgh.
- DAVIDOV, B. (1910). Rastenija sabirani ota pokojnija Prof. Dr. St. Georgieva po krajbržieto na Južna Bălgarija. *Trav. Soc. Bulg. Sci. Nat.* **4**: 60-71.
- DAVIS, P. H., R. R. MILL & K. TAN (eds.) (1988). *Flora of Turkey and the East Aegean Islands* **10**. Edinburgh.
- EL HADIDI, M. N. & A.-A. FAYED (1995). Materials for excursion flora of Egypt. *Taeckholmia* **15**: 1-233.
- FEINBRUN-DOTHAN, N. & A. DANIN (1991). *Analytical flora of Eretz-Israel*. Jerusalem.
- GRAHAM, S. A. (1979). The origin of *Ammannia x coccinea* Rottboell. *Taxon* **28**: 169-178.
- GREUTER, W., H. M. BURDET & G. LONG (1989). *Med-Checklist 4. Dicotyledones (Lauraceae-Rhamnaceae)*. Genève.
- HAYEK, A. VON (1924-1927). *Prodromus florum peninsulae Balcanicae, 1. Repert. Spec. Nov. Regni Veg. Beih.* **30/1**.
- JALAS, J. & J. SUOMINEN (1972-1991). *Atlas Florae Europaeae* **1-10**. Helsinki.
- JORDANOV, D. (ed.) (1979). *Flora na Narodna Republika Bălgarija* **7**. Sofija.

- JOSIFOVIĆ, M. (ed.) (1973). *Flora S R Srbije* 5. Beograd.
- KERGUÉLEN, M. (1987). Données taxonomiques, nomenclaturales et chorologiques pour une révision de la flore de France. *Lejeunia*, ser. 2, **120**: 1-263.
- KOEHNE, E. (1903). Lythraceae in: A. ENGLER (ed.), *Das Pflanzenreich* 17. Heft (IV.216). Leipzig.
- LAVRENTIADIS, G. (1973). I chloris ke i vlastisis ton orizonon tou Kalochoriou. *Prakt. Inst. Okeanol. Alievt. Erevnon* **11**: 145-165 + table VII.
- MIYAWAKI, A. (1960). Pflanzensoziologische Untersuchungen über Reisfeld-Vegetation auf den Japanischen Inseln mit vergleichender Betrachtung Mitteleuropas. *Vegetatio* **9**: 345-402.
- PANTOCSEK, J. (1874). Adnotationes ad floram et faunam Hercegovinae, Crnagorae et Dalmatiae. *Verh. Vereins Natur-Heilk. Presburg*, ser. 2, **2**: 1-143.
- PIGNATTI, S. (1982). *Flora d'Italia* 2. Bologna.
- QAISER, M. & M. A. SIDDIQI (1983). Lythraceae in: S. M. H. JAFRI & A. EL-GADI (eds.), *Flora of Libya* **105**. Tripoli.
- RAUS, TH. (1991). Notes on rare vascular wetland plants of Greece. *Bot. Chron.* **10**: 567-578.
- SĂVULESCU, T. (ed.) (1976). *Flora Republicii Socialiste România*, **13**. Bucuresti.
- SOÓ, R. (1980). *A magyar flóra és vegetáció rendszertani-növényföldrajzi kezikönyve*, **VI**. Budapest.
- STAFLEU, F. A. & R. S. COWAN (1976). Taxonomic literature 1: A-G, ed. 2. *Regnum vegetabile* **94**.
- TÄCKHOLM, V. (1974). *Students' flora of Egypt*, ed. 2. Beirut.
- WEBB, D. A. (1968). *Ammania* L. in: T. G. TUTIN, N. A. BURGESS, V. H. HEYWOOD, D. M. MOORE, D. H. VALENTINE, S. M. WALTERS & D. A. WEBB (eds.), *Flora Europaea* 2. *Rosaceae to Umbelliferae*: 302. Cambridge.
- WILLIS, J. C. (1973). *A dictionary of the flowering plants and ferns*, ed. 8. Cambridge.
- ZOHARY, M. (1972). *Flora Palaestina* 2. *Text. Platanaceae to Umbelliferae*. Jerusalem.

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