L. Koumpli-Sovantzi, O. Pitsoyani & T. Tsinopoulos

Macrophytes from artificial aquatic ecosystems of Karditsa Prefecture (Thessalia, Greece)

Abstract

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The flora of a dam lake and twenty six ditches in the Karditsa Prefecture (Greece) is here reported: 98 taxa of marsh and water plants (1 charophyte, 2 bryophytes, 4 pteridophytes and 91 spermatophytes) were recorded. Eleven taxa (*Agrostis stolonifera, Apium nodiflorum, Ceratophyllum demersum* subsp. *demersum*, *Cyperus longus, Lythrum salicaria, Mentha spicata, Paspalum paspalodes, Phragmites australis, Rumex conglomeratus, Typha domingensis, Veronica anagallis-aquatica*) are the most frequent, inhabiting 21 (-22) ditches. *Cardamine matthioli* may be considered as new to Greece as no exact locality has been previously reported. 8 taxa (*Aster squamatus, Azolla filiculoides, Lemna gibba, Nasturtium oficinale, Potamogeton graminrus, Ranunculus peltatus* subsp. *saniculifolius* and *R. sphaerospermus*) are recorded as new to Thessalia. *Ranunculus peltatus* subsp. *saniculifolius* is also recorded as new for the Greek mainland. Comments are also given on some taxa, most of them having few previous records from Greece.

Key words: Artificial aquatic ecosystems, Aquatic macrophytes, distribution, frequency.

Introduction

The area on which the investigated stands lie is found in Karditsa Prefecture, SW Thessalia, and extends between 21º 42´ E and 22º 34´ E longitude and 39º 12´ N and 39º 34´ N latitude. Its western and southern part is mountainous (southern Pindos mountain range), while a part of the Thessaliki plain extends eastwards and northwards (Fig. 1). The plain is crossing by a great number of irrigated and drainage ditches, several streamlets and tributaries of Pinios and Acheloos rivers. In 1959 a dam constructed in a tributary of Acheloos river, named Tavropos or Megdovas, and an dam lake has been formed, known as Plastiras lake, Tavropos lake or Megdovas lake. Plant collections from twenty six ditches and from the northeast part of the dam lake are used in the present study. Some marshes there are also in the area. Further collections of plant material from natural aquatic ecosystems (marshes, tributaries and streamlets) are expected in the next future to complete the knowledge of the aquatic flora of Karditsa Prefecture.

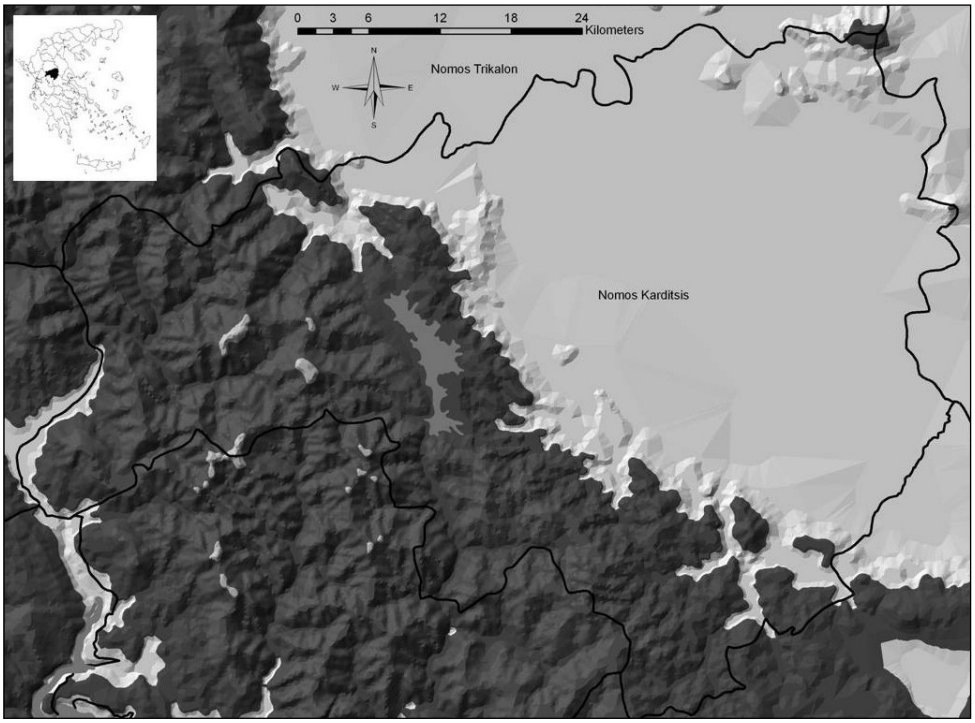

Fig. 1. Map of Karditsa Prefecture showing the mountainous part on which the Plastiras dam lies and its plain part (Thessaliki plain).

From a floristic point of view nomos Karditsis, as well as most of Thessalia, must be considered as a rather ill-explored area. This study giving for the first time a rather complete list of hydrophytes, helophytes and hygrophytes found in the artificial systems of the investigated area, also contributes to the floristic knowledge of Thessalia and Greece in general.

The western Karditsa Prefecture geological substratum consists of the Pindos zone alpine sediments. The Pindos zone sedimentary sequence commences with a clastic formation of Triassic age, followed by siliceous and calcareous pelagic sediments, ranging from the Upper Triassic to the Cretaceous. The sequence ends with the clastic flysch formation of Paleocene to Middle Eocene age. The sedimentary environment, inferred for the Pindos zone formations, is the Pindos western oceanic margin. The Pindos Ocean, a Neotethys ocean branch, opened at the end of the Triassic and closed during the Upper Cretaceous. The remaining parts of the Karditsis Prefecture (including the city of Karditsa) are lying on recent alluvial deposits, which overlie the Mesohellenic basin sediments (Karakitsios, pers. comm.).

The investigated area has a continental Mediterranean climate. The main climatic factors reflecting the vegetation growth, e.g. temperature and rainfall are presented in Fig. 2. The climatic data originates from Trikala Station (39º 33´ N, 21º 46´ E, 110.2 m altitude) located ca. 15 km NW of the area under study. The bioclimate of the area is illustrated by the climatic

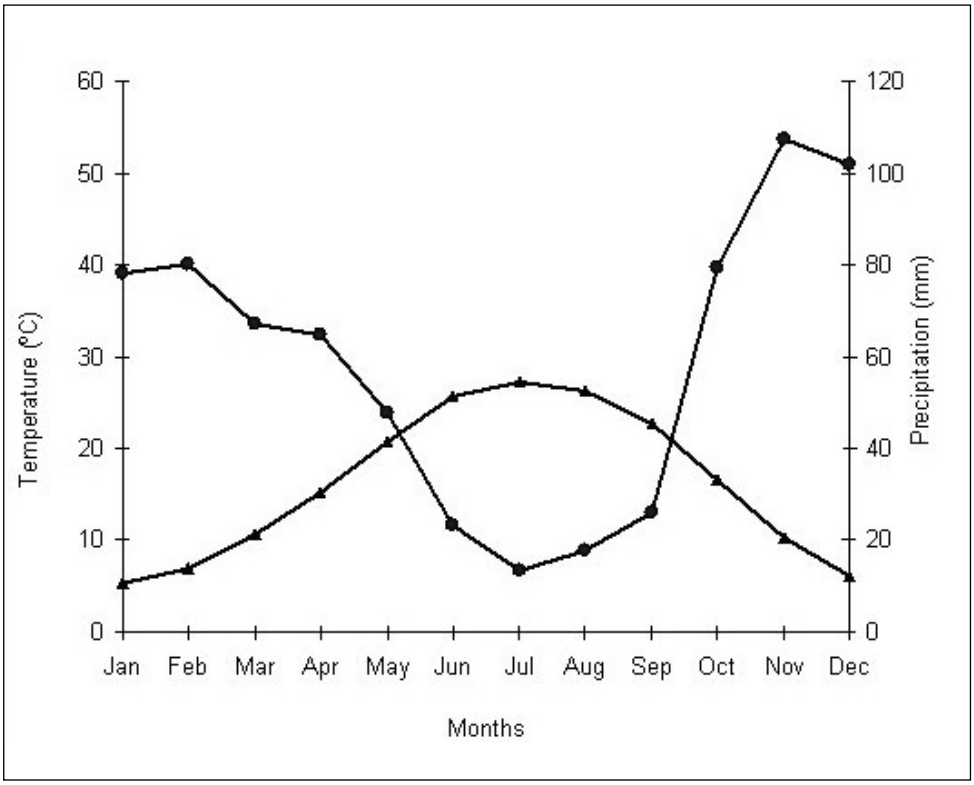

Fig. 2. Climatic diagram according to Bagnouls & Gaussen of Trikala Meteorological Station.

diagram of Emberger (1955, 1959) modified by Sauvage (1961) in Fig. 3. According to the Emberger and Sauvage climatic diagram the area belongs to the subhumid bioclimatic zone with cold winter. The dry period lasts from early June to late September.

Material and Methods

The present study is based on plant material collected from sites in and around water bodies of twenty six ditches in the years 1994-1996 and of the Plastiras dam in the year 2007.

The floristic list is based on L. Koumpli-Sovantzi collections and vouchers are deposited in her herbarium which is kept in ATHU.

Categories of growth forms are given, between dashes, after the accepted plant name and the following abbreviations apply:

Ch = Chamaephyte
G = Geophyte
H = Hemicryptophyte
Hel = Helophyte

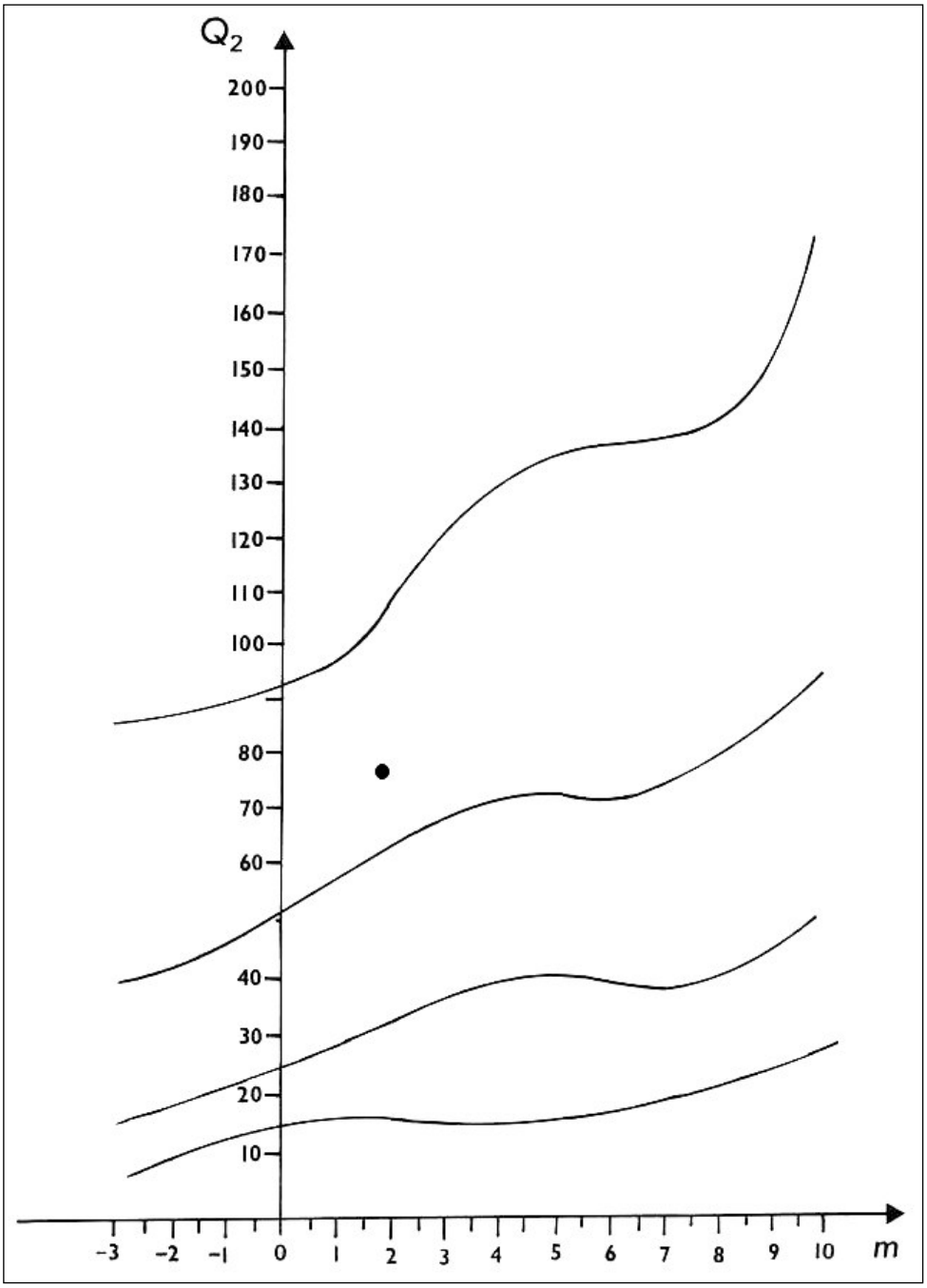

Fig. 3. Biological classification of Nomos Karditsas (data of Trikala Meteorological Station) according to Emberger-Sauvage. m = mean temperature of the coldest month of the year. Q_2 = ombrothermic quotient according to Emberger.

Hydr = Hydrophyte
acropleu = acropleustophyte
ephyd = ephydate
hyphyd = hyphydate
mesopleu = mesopleustophyte
Ph = Phanerophyte
Th = Therophyte

The ecosystem of the Plastiras dam and the number of ditches in which each taxon was found growing is also mentioned in the list of taxa; the frequency class follows in brackets after the number of ditches. The following five frequency classes are used:

A 0-20 per cent frequency
B 21-40 " "
C 41-60 " "
D 61-80 " "
E 81-100 " "

The nomenclature of *Pteridophyta* and *Spermatophyta* follows mainly Greuter & al. (1984, 1986, 1989), or Tutin & al. (1968-1980, 1993), or Strid & Tan (1997, 2002).

Flora

The following list consists of 98 taxa (86 species, 11 subspecies, 1 hybrid) which are connected with the aquatic habitat and belong to *Charophyta* (1), *Bryophyta* (2), *Pteridophyta* (4) and *Spermatophyta – Angiospermae* (91). The proportion of monocotyledonous to dicotyledonous plants is 1: 1.46. Taking into account the hydrophytes and helophytes this proportion is 1: 0.78; it is in accordance with the corresponding relationship appearing in other similar floras (Ganiatsas 1970, Hutchinson 1975, Koumpli-Sovantzi 1983, Sarika-Hatzinikolaou 1999). *Gramineae* and *Ranunculaceae* are the richest families (in number of taxa).

Floristic list

CHAROPHYTA
CHAROPHYCEAE
Nitella opaca (Bruzelius) Agardh – Hydr hyphyd – Plastiras dam.

BRYOPHYTA
AMBLYSTEGIACEAE
Amblystegium riparium (Hedw.) Br. Eur. – Hydr hyphyd – Plastiras dam.

RICCIACEAE
Riccia fluitans L. – Hydr acropleu – 1 ditch (A).

PTERIDOPHYTA

AZOLLACEAE

Azolla filiculoides Lam. – Hydr acropleu **– 3** ditches (A).

New to Thessalia and fairly rare in Greece.

EQUISETACEAE

Equisetum arvense L. – G - Plastiras dam.

Equisetum palustre L. – Hel G - Plastiras dam.

It is known from several localities in Greece, but it is rare in Thessalia.

Equisetum ramosissimum Desf. – Hel G- **3** ditches (A).

ANGIOSPERMAE - DICOTYLEDONES

CALLITRICHACEAE

Callitriche stagnalis Scop. – Hydr ephydate – 4 ditches (A).

CAPRIFOLIACEAE

Sambucus ebulus L. – H – 1 ditch (A).

CARYOPHYLLACEAE

Cerastium dubium (Bast.) Guépin – Th – 4 ditches (A).

According to Strid & Tan (1997) it is a rare and scattered plant in N Greece as well as Evvia (near Kimi) and Lesvos (Megali Limni). In Thessalia it is previously reported only from one locality (2 km SW of the village of Zappion, nomos Larisis) (Theodoropoulos & Eleftheriadou 2005), and according to the Flora Hellenica database (Strid pers. comm.) it has been collected by Willing from nomos Karditsis (four localities) and nomos Trikalon (one locality).

CERATOPHYLLACEAE

Ceratophyllum demersum L. subsp. demersum – Hydr mesopleu – Plastiras dam, 21 ditches (E).

Known from several localities in Greece, but not previously reported from Thessalia, as only an old collection by Sintenis, no. 1088, 02.08.1896, prope Gorgovites, nomos Karditsis and a newer one by Raus, no. 3079, 25.09, 1974, Eleftherion, nomos Larisis are referred in the Flora Hellenica database (Strid pers. comm.).

COMPOSITAE

Aster squamatus (Spreng.) Hieron. – Th/H – 18 ditches (D).

Widespread in Greece, but the species is recorded here for the first time from Thessalia. It must be noted that only two collections from nomos Magnisias (Raus) and one from nomos Larisis (Schuler) are presented in the Flora Hellenica database (Strid pers. comm.).

Cirsium arvense (L.) Scop. – G – 9 ditches (B).

Picris echioides L. - Th/H – 14 ditches (C).

Pulicaria dysenterica (L.) Bernh. – H – 20 ditches (D).

CONVOLVULACEAE

Calystegia sepium (L.) R. Br. subsp. *sepium* – H – 5 ditches (A).

Cruciferae

Cardamine matthioli Moretti – H – Plastiras dam.

This may be considered as the first published locality for Greece as the distribution map of the species given by Strid & Tan 2002 is based only on collections and shows five dots in the mainland Greece but the exact localities are impossible to be determined. According the Flora Hellenica database (Strid pers. comm.) the species *Cardamine matthioli* has been collected from nomos Ioanninon (1 locality), nomos Karditsis (4 localities), nomos Kozanis (1 locality) and nomos Trikalon (1 locality).

Nasturtium officinale R.Br. – Hel H – 8 ditches (B).

Known from several localities in Greece, but new for Thessalia as only one collection by Willing from nomos Karditsis, one by Strid & al. from nomos Larisis and one by Rechinger from nomos Larisis are referred in the Flora Hellenica database (Strid pers. comm.).

Dipsacaceae

Dipsacus fullonum L. – H – 9 ditches (B).

Haloragaceae

Myriophyllum spicatum L. - hydr hyphyd – Plastiras dam, 14 ditches (C).

Labiatae

Lycopus europaeus L. – Hel H – 5 ditches (A).
Mentha aquatica L. - Hel H – 15 ditches (C).
Mentha aquatica L. × *M. spicata* L.- Hel H – 5 ditches (A).
Mentha spicata L. - Hel H –Tavropos dam lake, 21 ditches (E).
Stachys palustris L. – Hel G – 5 ditches (A).

Leguminosae

Galega officinalis L. - H – 7 ditches (B).
Glycyrrhiza echinata L. – H – 3 ditches (A).
Lotus tenuis Waldst. & Kit. - H – 5 ditches (A).
Medicago arabica (L.) Hudson – Th – 4 ditches (A).
Trifolium pratense L. – H – Plastiras dam.
Trifolium repens L. subsp. repens – H – 5 ditches (A).
Trifolium resupinatum L. - Th – 4 ditches (A).

Lythraceae

Lythrum hyssopifolia L. – Th – 2 ditches (A).
Lythrum salicaria L. – Hel H – 21 ditches (E).

Onagraceae

Epilobium hirsutum L. – Hel H – 9 ditches (B).
Epilobium tetragonum L. subsp. *tetragonum* – H – ditches 7(B).

POLYGONACEAE

Persicaria hydropiper (L.) Spach. – Th – 14 ditches (C).

Persicaria lapathifolia (L.) S.F.Gray – Hel Th – 20 ditches ((D).

Persicaria maculosa S.F.Gray – Th – 14 ditches (C).

Persicaria mitis (Schrank) Assenov – Th – 10 ditches (B).

The species is rare and scattered in northern Greece, known only from two previous published localities: island of Samothraki (Katsikopoulos 1936) and Pinios delta, nomos Larisis (Eleftheriadou & al. 1995), but according the Flora Hellenica database (Strid pers. comm.) the first record needs confirmation. Except them, four collections from northern Greece are also referred in the Flora Hellenica database (Strid pers. comm.).

Rumex conglomeratus Murray – H – 21 ditches (E).

Rumex palustris Sm. - Hel Th – 18 ditches (D).

RANUNCULACEAE

Ranunculus ficaria L. (s.l.) – G/H – 4 ditches (A).

Ranunculus marginatus Dum.-Urville – H/hel – 10 ditches (B).

Ranunculus muricatus L. – Th – 4 ditches (A).

Ranunculus ophioglossifolius Vill. – Th – 1 ditch (A).

Ranunculus peltatus subsp. *saniculifolius* (Viv.) C.D.K. Cook – Hydr ephydate - Plastiras dam.

Although *Ranunculus peltatus* subsp. *saniculifolius* is the most widespread subspecies of *Ranunculus peltatus* in Greece, particularly in the Aegean area, there is no published record for the Greek mainland; there is only one spot on the Greek mainland in the subspecies distribution map given by Strid & Tan (2002) and six collections from northern Greece (nomos Evrou and nomos Rodopis) according the Flora Hellenica database (Strid pers. comm.).

Ranunculus sardous Crantz – Th –Tavropos artificial lake.

Ranunculus sceleratus L. Th – 15 diches (C).

Ranunculus sphaerospermus Boiss. & Blanche – Hydr hyphydate - 4 ditches (A).

Scattered and fairly rare in Greece (Strid & Tan 2002). The species is new to Thessalia as only one collection by Bergmeier from nomos Larisis is referred in the Flora Hellenica database (Strid pers. comm.).

Ranunculus velutinus Ten. – H - Plastiras dam, 1 ditch (A).

ROSACEAE

Potentilla reptans L. - H – 5 ditches (A).

RUBIACEAE

Galium debile Desv. – H – 4 ditches (A).

Galium verum L. subsp. *verum* – H – Plastiras dam, 9 ditches (B).

SALICACEAE

Salix alba L. subsp. *alba* – Ph - 14 ditches (C).

Scrophulariaceae
Veronica anagallis - aquatica L. – Hel H – 21 ditches (E).
Veronica serpyllifolia L. – H - Plastiras dam.

Solanaceae
Solanum dulcamara L. – Ch – 1 ditch (A).

Umbelliferae
Apium nodiflorum (L.) Lag. – Hel H – 21 ditches (E).
Berula erecta (Hudson) Coville –Hel H – 4 ditches (A).
Oenanthe pimpineloides L. - Hel H – 3 ditches (A).

Urticaceae
Urtica dioica L. – H – 5 ditches (A).

ANGIOSPERMAE - MONOCOTYLEDONES

Alismataceae
Alisma lanceolatum With. – Hel H – Plastiras dam, 12 ditches (C).

Butomaceae
Butomus umbellatus L. – Hel G – 4 ditches (A).

Cyperaceae
Carex divulsa Stokes - H – 3 ditches (A).
Carex hirta L. – H/G – Plastiras dam.
Carex otrubae Rodp. – H/Hel - 5 ditches (A).
Cyperus longus L. – Hel G – 22 ditches (E).
Scirpus lacustris L. – Hel G – 4 ditches (A).
Scirpus maritimus L. subsp. *maritimus* – Hel G - 4 ditches (A).

Gramineae
Agrostis stolonifera L. – H/Hel – 21 ditches (E).
Alopecurus myosuroides Hudson – Th – 9 ditches (B).
Arundo donax L. – G/Hel – 5 ditches (A).
Echinochloa crus-galli (L.) Beauv. – Th – 5 ditches (A).
Elymus repens (L.) Gould subsp. *repens* – H – 3 ditches (A).
Known from several localities in Greece, but rare in Thessalia.
Holcus lanatus L. – H – 6 ditches (B).
Paspalum paspalodes (Michx) Scribner – H/Hel – 21 ditches (E).
Phacelurus digitatus (Sibth.& Sm.) Griseb. – H – 10 ditches (B).
Phragmites australis (Cav.) Trin. ex Steudel – G/Hel – 21 ditches (E).
Poa annua L. – Th – 2 diches (A).
Poa trivialis L. – Th – 2 ditches (A).

Polypogon monspeliensis (L.) Desf. – Th – 8 ditches (B).
Sorghum halepense (L.) Pers. – H – 13 ditches (C).

JUNCACEAE
Juncus articulatus L. – Hel/H – 2 ditches (A).
Juncus inflexus L. – H – 11 ditches (C).

LEMNACEAE
Lemna gibba L. – Hydr acropleu – 4 ditches (A).
Not common in Greece; new to Thessalia as only one collection by Raus from nomos Larisis is referred in the Copenhangen University database for Flora Hellenica.
Lemna minor L. - Hydr acropleu – 18 ditches (D).

NAJADACEAE
Najas minor All. - Hydr hyphyd – Plastiras dam.
Rare in Greece. The species is also rare in Thessalia. According the Flora Hellenica database (Strid pers. comm.) it is previously reported by Haussknecht from nomos Larisis/Trikalon and has been collected by Raus from nomos Larisis.

ORCHIDACEAE
Orchis laxiflora Lam. subsp. *laxiflora* – G – 5 ditches (A).

POTAMOGETONACEAE
Potamogeton crispus L. – Hydr hyphyd – Plastiras dam.
Potamogeton gramineus L. - Hydr ephyd – Plastiras dam, 14 ditches (C).
Rare in Greece and new to Thessalia.
Potamogeton nodosus Poiret – Hydr ephyd – Plastiras dam, 14 ditches (C).
Potamogeton pectinatus L. – Hydr hyphyd – 8 ditches (B).
Potamogeton perfoliatus L. – Hyd hyphyd – Plastiras dam.

SPARGANIACEAE
Sparganium erectum subsp. *neglectum* (Beeby) Schinz &Thell. – Hel G – 5 ditches (A).

TYPHACEAE
Typha angustifolia L. – Hel G - 2 ditches (A).
Not much common in Greece. The species is also rare in Thessalia as it is only known from Pinios delta, nomos Larisis (Eleftheriadou & al. 1995).
Typha domingensis (Pers.) Steudel – Hel G – 21 ditches (E).
Typha latifolia L. – Hel G – 18 ditches (D).

ZANNICHELLIACEAE
Zannichellia palustris L. subsp. *palustris* - Hydr hyphyd – 1 ditch (A).

In addition to the taxa included in the above floristic list some other plants occur in the stands under study without being strongly connected with the aquatic habitat. To mention but some of the most widespread ones the reader is referred to the following alphabetical list:

Althaea officinalis L., *Ammi majus* L., *Ammi visnaga* (L.) Lam., *Anagallis arvensis* L., *Anthoxanthum odoratum* L., *Avena barbata* Pott ex Link subsp. *barbata, A. sterilis* subsp. *ludoviciana* (Durieu) Nyman,

A. sterilis L. subsp. *sterilis, Brachypodium pinnatum* Beauv., *Bromus hordeaceus* L., *B. intermedius* Guss., *B. japonicus* Thunb., *B. madritensis* L., *Capsella bursa-pastoris* (L.) Medicus, *Centaurea solstitialis* L. (s. l.), *Cephalaria transylvanica* (L.) Roemer & Schultes, *Cerastium glomeratum* L., *Chamomilla recutita* (L.) Rauschert, *Chenopodium strictum* Roth., *Cichorium intybus* L., *Convolvulus arvensis* L., *Cruciata laevipes* Opiz, *Cruciata taurica* subsp. *euboea* (Ehrend.) Ehrend., *Cuscuta europaea* L., *Cynodon dactylon* (L.) Pers., *Dactylis glomerata* L. subsp. *glomerata*, *Daucus broteri* Ten., *D. carota* subsp. *hispanicus* (Gouan) Thell., *Erophila verna* subsp. *praecox* (Steven) Walters, *Fumaria officinalis* L., *Galium aparine* L., *Geranium dissectum* L., *Geranium molle* L., *Hordeum bulbosum* L., *H. murinum* subsp. *leporinum* (Link) Arcangeli, *Humulus lupulus* L., *Hypericum perforatum* L., *Lactuca serriola* L., *Lathyrus annuus* L., *Lathyrus aphaca* L., *Lolium multiflorum* Lam., *Medicago polymorpha* L., *Medicago sativa* L. subsp. *sativa, Melilotus alba* Medicus, *Melilotus indica* (L.) All., *Nigella damascena* L., *Parentucellia latifolia* (L.) Caruel, *Petrorhagia velutina* (Guss.) P.W.Ball & Heywood, *Phalaris paradoxa* L., *Plantago lanceolata* L., *Polygonum aviculare* L., *Prunella vulgaris* L., *Raphanus raphanistrum* L. subsp. *raphanistrum, Rapistrum rugosum* subsp. *orientale* (L.) Arcangeli, *Rubus ulmifolius* Schott, *Scandix pecten-veneris* L., *Scolymus hispanicus* L., *Setaria pumila* (Poiret) Schultes, *Sherardia arvensis* L., *Silene gallinyi* Reichenb., *Stachys germanica* L. (s.l.), *Stellaria media* (L.) Vill., *Tordylium apulum* L., *Torilis arvensis* (Hudson) Link subsp. *arvensis, T. japonica* (Houtt.) DC., *Trifolium echinatum* Bieb., *Trifolium purpureum* Loisel., *Verbascum sinuatum* L., *Verbena officinalis* L., *Veronica arvensis* L., *Vicia lutea* L. subsp. *lutea, Vicia sativa* cf. subsp. *nigra* (L.) Ehrh., *Vicia villosa* Roth subsp. *villosa, Vicia villosa* subsp. *eriocarpa* (Hausskn.) P.W.Ball, *Xanthium strumarium* subsp. *italicum* (Moretti) D. Löve, etc.

Discussion

More than 170 macrophytes were found inhabiting the investigated stands, 98 of which are connected with the aquatic habitat and are presented in the floristic list, while the rest are referred in an alphabetical list. The taxa of the floristic list may be sorted into three general groups of taxa: hygrophytes (50 taxa), helophytes (30 taxa) and hydrophytes (18 taxa).

The hygrophytes and helophytes consist of annual or perennial herbs (42 hemicryptophytes, 19 therophytes, 17 geophytes) and woody plants (1 phanerophyte, 1 chamaetophyte). Hygrophytes are found growing on wet soil, nearby the aquatic systems. Helophytes are rooted in the sediment of the water bodies and part of their vegetative structures emerge above the water surface for most of the year. *Agrostis stolonifera, Apium nodiflorum, Cyperus longus, Mentha spicata, Lythrum salicaria, Paspalum paspalodes,*

Phragmites australis, Rumex conglomeratus, Typha domingensis and *Veronica anagallis - aquatica* are the most frequent plants among them.

The hydrophytes fall into the following four categories of growth forms: **a.** - Surface floating plants (acropleustophytes): *Azolla filiculoides, Lemna gibba, L. minor, Riccia fluitans.* **b.** - Plants entirely submerged, floating at mid-depth (mesopleustophytes): *Ceratophyllum demersum.* **c.** - Rooted in sediment, with all their leaves or at least some of them floating but usually not emergent (ephydates): *Callitriche stagnalis, Potamogeton gramineus, P. nodosus, Ranunculus peltatus* subsp. *saniculifolius.* **d.** - Rooted in sediment, plants which except their flowers or inflorescences, are submerged (hyphydates): *Amblystegium riparium, Myriophyllum spicatum, Najas minor, Nitella opaca, Potamogeton crispus, P. pectinatus, P. perfoliatus, Ranunculus sphaerospermus, Zanichellia palustris* subsp. *palustris.*

Ceratophyllum demersum subsp. *demersum, Lemna minor, Myriophyllum spicatum, Potamogeton gramineus* and *P. nodosus* are the most frequent hydrophytes.

The biological spectrum (Fig. 4) of the investigated aquatic systems reveals a supremacy of hemicryptophytes (43.4 %), which is due not only to to subhumid type of climate (see Fig. 3), but also to the nature of the ecosystems under study. Therophytes and hydrophytes follow with a contribution of 19.2 % and 18.2 % respectively.

Ditches house the maximum number of macrophytes (88 taxa: 52 hygrophytes, 22 helophytes, 12 hydrophytes). In contrast, Plastiras dam has a poorer flora (21 taxa: 9 hygrophytes, 2 helophytes, 10 hydrophytes). 8 of the found taxa live in both type of the investigated aquatic systems, ditches and lake.

Taking into account the number of ditches in which each taxon is present, we found that the total number of taxa is devided into five frequency classes: A (45 taxa, 51.14 %), B (14 taxa, 15.90 %), C (12 taxa, 13.64 %), D (6 taxa, 6.82 %) and E (11 taxa, 12.50 %) (Fig. 5). The

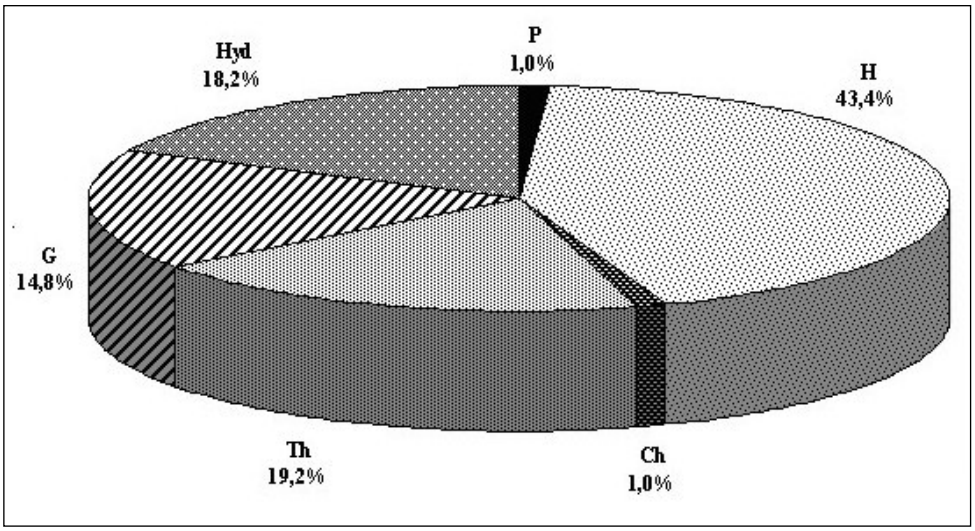

Fig. 4. Biological spectrum of the artificial aquatic systems (Nomos Karditsis).

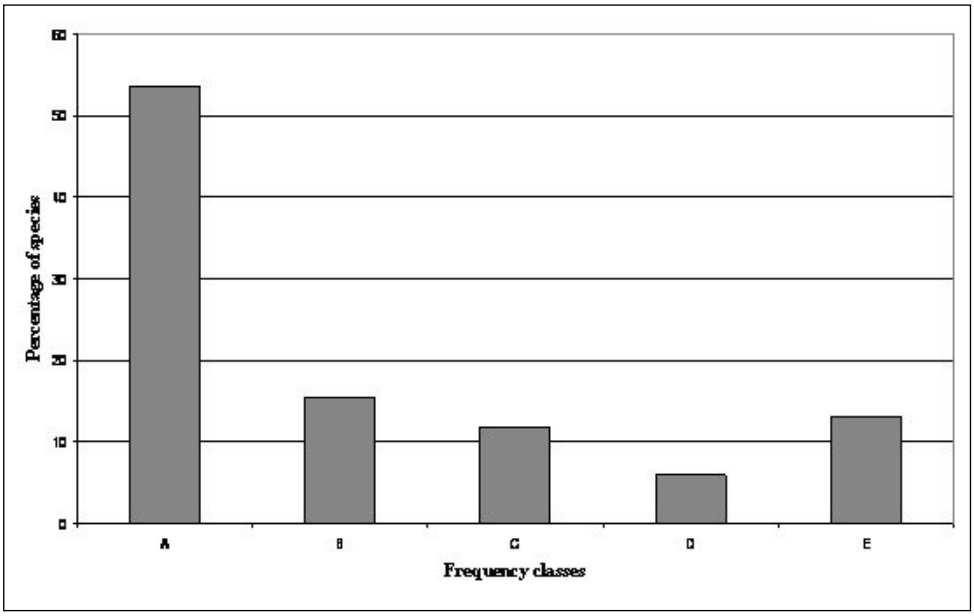

Fig. 5. Distribution of frequencies in five classes: A = 1 - 20 %, B = 21 – 40 %, C = 41 – 60 %, D = 61 – 80 %, E = 81 -100 %.

hydrophyte *Ceratophyllum demersum*, the helophytes *Apium nodiflorum, Cyperus longus, Lythrum salicaria, Mentha aquatica, Phragmites australis, Typha domingensis, Veronica anagallis – aquatica* and the hygrophytes *Agrostis stolonifera, Paspalum paspalodes, Rumex conglomeratus* are the most frequent taxa which fall into the last frequency class (E).

From a chorological point of view we notice the following:

a. *Cardamine matthioli* was collected from Plastiras dam which is the first published locality from Greece. **b.** *Azolla filiculoides, Cerastium dubium, Persicaria mitis, Ranunculus sphaerospermus, Lemna gibba, Najas minor* and *Potamogeton gramineus* are of great interest as having a limited or scattered distribution in Greece. **c.** *Ranunculus peltatus* subsp. *saniculifolius* is new to the Greek mainland and 8 taxa are new to Thessalia.

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