TAXONOMY AND DISTRIBUTION
OF MACROSCIADIUS ALATUM (BIEB.) V. TICHOMIROV & LAVROVA (APIACEAE):
A NEW ALIEN SPECIES IN THE FLORA OF EUROPE

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ABSTRACT

The paper presents the taxonomical position and the description of the characteristic features of Macroscia-
dium alatum (=Ligusticum alatum). The species was recorded in the Western Bieszczady Mts (the northern part of
the Carpathians) in July 2007 and is new to the flora of Europe. Its natural range comprises mainly the Caucasus
region and the origin of M. alatum in south-east Poland is quite puzzling. The species has most likely been delib-
erately brought into the area. M. alatum spreads quite intensively. It penetrates semi-natural vegetation systems
and seems to be expansive.

KEY WORDS: Macrosciadum alatum, distribution, taxonomy, kenophyte, Carpathians, Europe.

INTRODUCTION

A number of alien, previously unrecorded species have settled in Central Europe in recent years. Some of them be-
gin to spread shortly after establishing, rapidly increasing their ranges of distribution. They may be very expansive
and can penetrate both typically human-made habitats as well as semi-natural and natural vegetation communities
(Pyšek and Prach 1993, 1995; Baryla et al. 2005; Tokarska-Guzik 2005; Nobis et al. 2006). In the near future, a si-
milar phenomenon may be observed in the case of Macro-
sciadum alatum (Bieb.) V. Tichomirov & Lavrova, a spe-
cies new to the flora of Europe, but already spreading fairly
intensively.

TAXONOMY

In 1808, M. Bieberstein described a plant he had collec-
ted in the northern Caucasus as Athamanta alata Bieber.
Five years later, the species was transferred by C. Sprengel
(1813) to the polyphyletic genus Ligusticum, as L. alatum
(Bieb.) Spreng. Identical views on its taxonomical position
were held by Candolle (1830), Ledebour (1844), Boissier
(1872), Drude (1898), Shishkin (1950) and Leute (1970).
Some researchers, however, differed, placing the species in
the following genera: Selinum L. – S. alatum (Bieb.) Poir,
Siliaus Bernh. – S. alatus (Bieb.) Link or Meun L. – M.
alatum (Bieb.) Baill. In the late 1980s, V. N. Tichomirov
and T. V. Lavrova (1988) placed the species in a newly-de-
scribed genus, Macrosciadum V. Tichomirov & Lavrova,
as Macrosciadum alatum (Bieb.) V. Tichomirov & Lavro-
va. However, as stressed by Spalik et al. (2004), this place-
ment should be considered in molecular analyses. Spalik et
al. (2004) concluded that the genus Macrosciadum seems
to be very closely related to the genus Cnidiocharpa Pime-
nov. Recently, the species Ligusticum physospermifolium
Albov, once placed by Tichomirov and Lavrova (1988) in
the genus Macrosciadum (Pimenov 2005; Valjic-Roman
et al. 2006), was also transferred to the genus Cnidiocharpa
based on morphological and molecular similarities.

IDENTIFICATION

The identification of the species was based on the Flora
Caucasica (Tamamshian 1967), Flora of Turkey (Hedge
and Lamond 1972), Flora USSR (Shishkin 1950) and a
study by Tichomirov and Lavrova (1988). The material
collected and identified by us was compared with the her-
barium material of Ligusticum alatum deposited in the Herbarium of the Polish Academy of Sciences (KRAM) in
Kraków (a specimen from Georgia sheet 524630, 09.08.2002, leg. R. Gagnidze, S. Shetekauri) and the spe-
cimens from the Caucasus deposited in the Herbarium Ko-
marov Botanical Institute (LE) in St. Petersburg, Russia
(specimens from: Abhasia, 31.08.1901, leg. G. Woronov;
Georgia, 25.08.1970, leg. Yu. Mienitskij; northern Ossetia,
29.08.1989, leg. Yu. Mienitskij, S. Kuzmienkova, T. Vy-
schenskaya; Dagestanskaia, 09.07.1961, leg. N. N. Tsve-
lev, S. K. Criejanpanov, G. N. Niepli, A. E. Bobrov; Sta-
ropol, 19.08.1990, leg. Yu. Mienitskij, T. Popova, O.
Morozienko).

Set out below is a description of characteristic features of
the species based on the authors’ own observation of speci-
mens found at different localities in the Western Bieszczad-
y Mts (Polish Eastern Carpathians), also supported by the
descriptions given in the above floras.

Macrosciadium alatum (synonym Ligusticum alatum) is a
rhizomatous plant, producing one to several straight, top-
branched and slightly S-shaped bare stems, 50-150 cm tall,
purple-coloured (whole or almost to the top) with distinct
wings. The wings are 1-2 mm-wide, intensely purple (or
green but only at the top of the stem). Basal leaves broad-
triangular to triangular-ovate, 15-50×3-20 cm, segments ±
ovate, coarsely serrate or with serrated lobes, teeth apicula-
te, glabrous or minutely asperulous on the margin and ve-
ins below, veins often winged. Rays 20-40, asperuous,
aggregating at base at maturity, 1-6 cm, outer longer than
the inner. Bracts narrow-lanceolate, numbering from 0-10 (13),
2-3 times longer than the rays of the umbel, caducous. Pedi-
cels similar to rays, 2-10 mm. Flowers primarily pink, then
white, fruit glabrous, ovate, 3-5 mm long, with 5 distinct
wings (Fig. 1).

GENERAL DISTRIBUTION

A great majority of Macrosciadium alatum locations are
situated within the Caucasus, which is the centre of its di-
stribution. Its locations are known from the following co-
ctries: Russia (south-eastern part), north-eastern and ea-
ern parts of Turkey, Georgia, Armenia, Azerbaijan and
the north-western part of Iran (Fig. 2).

DISTRIBUTION AND SIZE OF POPULATIONS
IN THE CARPATHIANS

Macrosciadium alatum was found in the Western Biesz-
chady Mts in south-east Poland (ca. 4 km north of the
border with Slovakia) in July 2007. The first locations we
were found in Strzebowiska village near Cisna. Further
targeted searches yielded findings at other locations in the
region, around the villages of Krzywe and Przysłup. Gro-
ups of up to a hundred individuals were discovered at parti-
cular sites, while only the population around the Krzywe
village was larger and comprised ca. 500 individuals. A de-
tailed description of the locations of M. alatum found in
the Bieszczady Mts is given below.

The herbarium material collected is deposited in the Her-
barium of the Jagiellonian University in Kraków (KRA).

List of localities

1. Strzebowiska – in a meadow, along a gravel road and on
abandoned land, 49°10′58.0″N/22°23′58.0″E, alt. 640 m,
16.07.2007, leg. A. Nobis & M. Nobis; near the tracks of a di-
sued narrow-gauge railway, 49°10′51.3″N/22°23′50.5″E,
alt. 640 m, 16.07.2007, leg. A. Nobis & M. Nobis; a rubble
heap near buildings in the northern part of the village,
49°11′10.6″N/22°24′04.4″E, alt. 620 m, 18.07.2007, leg.
M. Nobis; roadside escarpment, between the wood and bu-
ldings in the southern part of the village (close to a stream)
49°10′35.0″N/22°23′47.4″E, alt. 680 m, 17.07.2007,
leg. M. Nobis; roadside and slope of a stream bank (near
fencing) in the central part of the village, 49°10′42.5″
N/22°23′54.3″E and 49°10′45.0″N/22°23′55.7″E,
16.07.2007, rec. M. Nobis, A. Nobis & M. Kozak; unused
meadow on a slope, south of the railway tracks, 49°10′48.5″
N/22°23′30.0″E, 17.07.2007, rec. M. Nobis, A. Nobis & M.
Kozak.

2. Krzywe – side of the main road, 49°12′08.6″N/
22°21′52.5″E, alt. 580 m, 19.07.2007, leg. A. Nobis & M.
Nobis; fresh meadow and scrub edge, west of the village,
49°11′54.9″N/22°21′41.8″E, alt. 610 m, 19.07.2007,
leg. M. Nobis, A. Nobis & M. Kozak.

3. Przysłup – an abandoned plot of land near the railway
tracks, 49°11′01.1″N/22°23′23.0″E, alt. 670 m, 21.08.2007,
leg. M. Nobis & A. Nobis.

OCCURRENCE IN PLANT COMMUNITIES

Five relevés were performed in patches where Macro-
sciadum alatum occurred (Table 1) using the standard
Braun-Blanquet (1964) methodology to illustrate its habitat
requirements in the Bieszczady Mts. A phytosociological
analysis shows that the species occurs mostly in patches of
ruderal communities representing the Artemisietea class
(relevé 3). Floristically, these communities are often com-
posed of a large number of common meadow species that
penetrate them from the surrounding phytocoenoses of the
Molinio-Arrhenatheretalia class. Macrosodiadum alatum
finds the most favourable conditions to establish and de-
velop in those habitats that have been greatly disturbed and
are therefore open to newcomers. Plants attain considerable
sizes in such locations, often form compact concentrations
through vegetative reproduction and cover up to several
square metres.

Macrosciadum alatum was also recorded in other types
of habitats. The species penetrates patches of semi-natural
communities relatively often. These are mostly abandoned,
overfertilised and disturbed fresh meadows of the order Ar-
renatheretalia (relevé 1). In one such habitat, the species
occurs near an old graveyard in the Krzywe village, where
it grows in high numbers and forms separated patches, co-
vering more than 100 m² (relevé 4). Single individuals we
re also noted in patches of slightly wetter meadows, resem-
bling the phytocoenoses of the Molinietalia order (relevé
2). This species also emerges at the edges of scrub and on
escarpments of stream banks (relevé 5), but always near
buildings, roads or railway tracks.

DISCUSSION

The origin of Macrosciadum alatum in this part of Euro-
pe is quite puzzling. As the plant is fairly tall and morpho-
logically characteristic, it is not very likely to go unnoticed
or be incorrectly identified. Given that its nearest localities
are as far away as in the Caucasus, i.e. they are separated by over 1000 km as in a straight line, the following questions could be posed: Where did the species come from? How could it have arrived in the Western Carpathians without any documented locations over the vast area that extends between the two massifs?

The manner and timing of the arrival of Macros ciadi um alatum in the Bieszczady Mts are very difficult to explain unambiguously. M. alatum was most likely deliberately brought in by former inhabitants of the Bieszczady Mts as a plant with medicinal properties or of ritual importance. When mashed, its fruits have a fairly ethereal smell of turpentine. Because of the content of the latter substance, M. alatum fruits may have been used as a component in a medicine (an ointment) for treating neuralgias or rheumatoid pains, similarly to fruits of other plants containing turpentine (Skarżyński 1994). However, despite literature search, we failed to identify any records detailing curative properties of the plant. Because the largest population of M. alatum was observed in the vicinity of an old graveyard, the plant may had been treated as a ritual plant. This is supported by aromatic properties of the species as many aromatic herbs used to be recognised for their ritual importance. Bringing this species exclusively for ornamental purposes

Fig. 1. Macros c iadium alatum: A – general habit of the plant; B – leaf on the stem; C – stem fragment with distinct purple wings; D – inflorescences; E – habit of the fruit; F – transverse section of the fruit.
seems unlikely as its appearance, typical of the family Apiaceae, is not particularly decorative.

It cannot be excluded that the species was brought into the area accidentally. A form of military transport may have been responsible for an accidental transfer of its diasporas. Large armies have passed through south-eastern Poland throughout its history, especially during World War II (e.g. withdrawal of German units from the Caucasus in 1943), but also later on when the Bieszczady Mts were home to Soviet units that were stationed there for over a few decades. However, if diaspora migration did occur, a number of other locations would also be found elsewhere, chiefly in Ukraine.

Despite the occurrence of *Macrosciadium alatum* along railway tracks, its accidental transportation by railway is not very likely either. This area does not have, and never had, an eastward railway and the Bieszczady narrow-gauge rail has always been only of local importance. Assuming the railway route of migration for the diasporas would require them to travel from Slovakia to Łupków in Poland. In addition, *M. alatum* would perhaps have spread in the Łupków locality itself and further along the railway in the direction of Cisna and Komarnica, and such localities were not noted in this study. Its single locations along the railway escarpment in the Strzebowiska-Krzywe section are the likely effects of a later dispersion of the species in the area. At present, the main routes of migration are roadsides and, sporadically, stream valleys.

The presence of *Macrosciadium alatum* in Central Europe is noteworthy. Its fairly broad distribution range in the Carpathians and a high number of individuals in its populations indicate that this species is fully established and constitutes a permanent component of the local flora (kemophyte, hemiagriophyte). Moreover, it can be expected that the plant could spread further in the near future. This is supported first by the biology of the species: it grows in tussocks, produces great numbers of wind-dispersed seeds (sometimes as many as 1500 in one umbel) and shows a tendency for fast, vegetative, expanding growth. Secondly, *M. alatum* has a significant expansion potential: its re-

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*Sporadic*: Ch. *Arbenatheretalia*: Alchemilla acutloba 3; Centaurea phyxiella 4(1); Knautia arvensis 1; Lotus corniculatus 2; Trisetum flavescens 4(1). Ch. *Molinietalia*: Betonica officinalis 4; Cirsium rivulare 2(2); Glechoma hederacea 5; Juncus effusus 2; Lychnis flos-cuculi 1; Lysimachia vulgaris 2; Selinum carvi 4; Stachys palustris 4; Symphytum officinale 3(1). Ch. *Molinio-Arbenatheretalia*: Carex hirta 1(1); Festuca pratensis 3; Lysimachia nummularia 5(1); Mentha longifolia 3; Prunella vulgaris 2(1); Ranunculus repens 3; Rumex acetosa 1(1); R. crispus 2. Ch. *Artemisietea vulgaris*: Anthriscus sylvestris 3(1); Calamagrostis epigeios 4(1); Chaerophyllum aureum 5(3); Cirsium arvense 2(1); C. vulgare 5; Galiun aparine 5. Ch. *Querco-Fagetea*: Agropyron caninum 5; Alnus incana B 2; Astrantia major 5; Cerasus avium A 5(3); B 3(1); Stellaria nemorum 5. Others: Acer pseudoplatanus A 4(1); Betula pendula B 3; Carduus pycnanthus 5; Carex bretrices 3(2); C. pallescens 1; C. contigua 4; Chaerophyllum hirsutum 3(2); Clinopodium vulgare 1; Convolvulus arvensis 5; Dianthus deltoides 4; Equisetum sylvaticum 4; Fragaria vesca 3; Fraxinus excelsior B 3(1); Galeopsis hirsuta 2(2); G. speciosa 4; Geum rivale 2; Juniperus communis B 1; Ononis arvensis 1; Parnassia palustris 2; Petasites hybridus 5(2); Pimpinella saxifraga 2; Populus tremula B 3; Prunus spinosa B 4(1); Ribes nigrum B 5; Rosa canina B 1(1); Rubus idaeus 3(1); Salix purpurea B 2(1); C 2; s. sp. B 5; Sambucus nigra 2; Senecio fuchsii 3.
**TABLE 1.** Plant communities with *Macrosciadum alatum* in the Carpathians.

<table>
<thead>
<tr>
<th>No. of relevé</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td>Strzebowiska</td>
<td>Przysłup</td>
<td>Strzebowiska</td>
<td>Krzywe</td>
<td>Strzebowiska</td>
</tr>
<tr>
<td><strong>Date</strong></td>
<td>17.07.2007</td>
<td>21.08.2007</td>
<td>17.07.2007</td>
<td>19.07.2007</td>
<td>17.07.2007</td>
</tr>
<tr>
<td><strong>Area of relevé [m²]</strong></td>
<td>100</td>
<td>20</td>
<td>20</td>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td><strong>Latitude [N]</strong></td>
<td>49°10'48.5''</td>
<td>49°11'01.2''</td>
<td>49°10'35''</td>
<td>49°11'55''</td>
<td>49°10'45''</td>
</tr>
<tr>
<td><strong>Longitude [E]</strong></td>
<td>22°23'30''</td>
<td>22°23'23''</td>
<td>22°23'47''</td>
<td>22°21'42''</td>
<td>22°23'55''</td>
</tr>
<tr>
<td><strong>Cover of tree layer ‘A’ [%]</strong></td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td><strong>Cover of shrub layer ‘B’ [%]</strong></td>
<td>5</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>40</td>
</tr>
<tr>
<td><strong>Cover of herb layer ‘C’ [%]</strong></td>
<td>100</td>
<td>95</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Cover of moss layer ‘D’ [%]</strong></td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Slope (°)</strong></td>
<td>3</td>
<td>–</td>
<td>3</td>
<td>–</td>
<td>20</td>
</tr>
<tr>
<td><strong>Exposure</strong></td>
<td>N</td>
<td>–</td>
<td>S</td>
<td>–</td>
<td>W</td>
</tr>
<tr>
<td><strong>No. of species</strong></td>
<td>39</td>
<td>49</td>
<td>49</td>
<td>38</td>
<td>31</td>
</tr>
</tbody>
</table>

**Macrosciadum alatum**

<table>
<thead>
<tr>
<th>Ch. Arrhenatheretalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dactylis glomerata 3</td>
</tr>
<tr>
<td>Crepis biennis +</td>
</tr>
<tr>
<td>Veronica chamaedrys 1</td>
</tr>
<tr>
<td>Gálium mollugo 3</td>
</tr>
<tr>
<td>Pimpinella major 2</td>
</tr>
<tr>
<td>Achillea millefolium 1</td>
</tr>
<tr>
<td>Alectrolophus glaber +</td>
</tr>
<tr>
<td>Henricus sponhydium</td>
</tr>
</tbody>
</table>

**Ch. Molinietalia**

| Angelica sylvestris 2 | + | 2 | + | + | IV |
| Deschampsia caespitosa + | 2 | 1 | + | – | IV |
| Poa palastris + | + | 2 | 1 | + | IV |
| Filipendula ulmaria + | – | – | + | + | III |
| Cirsium palustrum + | – | + | – | – | II |
| Myosotis palustris | – | + | – | – | II |
| Trifolium hybridum | 2 | 3 | 1 | – | II |

**Ch. Molinio-Arrhenatheretalia**

| Centaurea jacea 2 | + | + | + | – | IV |
| Lathyrus pratensis 1 | 1 | + | 1 | – | IV |
| Pileum pratense 4 | 1 | + | 1 | + | IV |
| Vicia cracca | – | 1 | + | 1 | – | III |
| Alopecurus pratensis | – | 1 | + | 1 | – | III |
| Poa trivialis + | + | – | – | + | III |
| Ranunculus acris | + | + | – | – | III |
| Elymus repens | 2 | + | – | – | III |
| Agrostis alba | – | 3 | 2 | – | II |
| Trifolium pratense | – | 1 | 1 | – | II |
| Holcus lanatus | + | 1 | – | – | II |
| Poa pratensis | – | – | + | – | II |

**Ch. Artemisietea vulgaris**

| Chaerophyllum aromaticum | N | 1 | 3 | 1 | 1 | IV |
| Urtica dioica | – | + | 2 | – | + | III |
| Rudbeckia laciniata | – | – | 1 | 3 | 3 | III |
| Epilobium montanum | – | – | – | + | + | II |

**Ch. Querco-Fageta**

| Festuca gigantea | – | – | 1 | – | + | II |

**Others**

| Vicia sepium | + | + | 1 | – | IV |
| Crucis glabra | + | + | + | – | IV |
| Stellaria graminea 2 | + | – | 1 | – | III |
| Plagionemum sp. D | + | 1 | – | – | 1 | III |
| Rubus plicatus | 2 | – | – | + | – | II |
| Agrostis capillaris | 2 | 1 | 1 | 1 | – | II |
| Epilobium sp. | – | + | + | – | – | II |
| Equisetum arvense | – | + | – | – | – | II |
| Geranium phaeum | – | – | 1 | – | + | II |
| Holcus mollis | + | – | – | + | – | II |
| Hypericum maculatum | 1 | – | – | 1 | – | II |
| Lapsana intermedia | – | – | 1 | – | 2 | II |
| Medicago lupulina | – | 1 | 1 | 1 | – | II |
| Potentilla erecta | + | + | – | – | + | II |
| Salix caprea B | 2 | 2 | – | – | + | II |
| Trifolium medium | 2 | + | – | – | + | II |
| Tussilago farfara | – | + | 2 | – | – | II |
latively broad ecological amplitude and migration manner allow it to penetrate various synanthropic and semi-natural plant communities and may ultimately consolidate its success to invade natural vegetation systems.

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LITERATURE CITED


