



# CHROMOSOME DATA – A USEFUL TOOL IN TAXONOMY OF *Symphyotrichum ciliatum*

MARTA TUCCHARZ<sup>1\*</sup>, AGNIESZKA NOBIS<sup>2</sup>, AND MARCIN NOBIS<sup>2</sup>

<sup>1</sup>Department of Plant Cytology and Embryology, Jagiellonian University,  
Grodzka 52, 31–044 Cracow, Poland

<sup>2</sup>Department of Plant Taxonomy and Phytogeography, Jagiellonian University,  
Kopernika 27, 31–501 Cracow, Poland

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We used chromosome data to verify the taxonomic affiliation of specimens previously recognized as *Brachyactis ciliata*. All analyzed plants were diploids based on  $x = 7$  ( $2n = 2x = 14$ ), the basic number characteristic for *Symphyotrichum ciliatum*, allowing the examined species to be shifted from the genus *Brachyactis* to the genus *Symphyotrichum* sect. *Conyzopsis*. The chromosome number ( $2n = 2x = 14$ ) for specimens of *S. ciliatum* from Poland is reported for the first time.

**Key words:** *Symphyotrichum ciliatum*, Asteraceae, chromosome number, distribution, Poland.

## INTRODUCTION

Members of the Asteraceae (Compositae) family have long been studied for chromosome number. The earliest data come from the early 20<sup>th</sup> century (e.g., Juel, 1990; Land, 1900; Merrell, 1900). Since that time a great number of papers reporting chromosome numbers in Asteraceae have been published, and an online database, *Index to Chromosome Numbers in Asteraceae*, has been prepared (Watanabe, 2008). Chromosome number is a very important character used in classifying *Symphyotrichum ciliatum* within the tribe Astereae (Nesom, 1994).

According to Nesom (1994) the phyletic origin of the genus *Symphyotrichum* lies in the New World, and its extension into the Old World is relatively recent. Some reports of the occurrence of *S. ciliatum* are known from European countries: Russia (Tzvelev, 1994), Moldavia (Gejdeman, 1986), Ukraine (Dubina et al., 1986; Tzvelev, 1994; Mosyakin and Fedoronchuk, 1999), Slovakia (Mikoláš, 1988; Mráz, 2005; Martonfiova, 2007), Hungary (Mészáros, 2009) and Romania (Popescu and Sanda, 1998; Oprea, 2005).

*Symphyotrichum ciliatum* was first recorded in Poland by Guzik (2003; Appendix), who determined collected specimens as *Brachyactis ciliata* (Ledeb.)

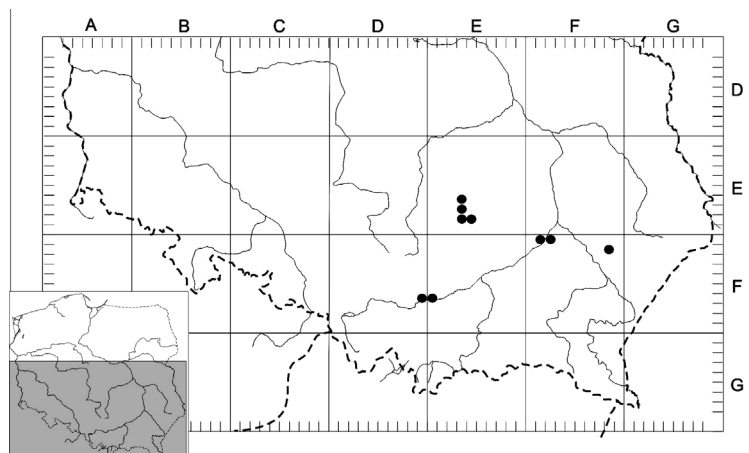
Ledeb. The same name was also used for that plant in the checklist of vascular plants of Poland (Mirek et al., 2002). Later, based on a publication by Nesom (1994), Bróz and Podgórska (2005) suggested that the specimens known from Poland as *B. ciliata* should be named *S. ciliatum* and placed within the genus *Symphyotrichum* Nees subgenus *Symphyotrichum* section *Conyzopsis* (Torr. & Gray). According to Nesom (1994) the chromosomal base number of *Brachyactis* is  $x = 9$ , whereas that of *Symphyotrichum* sect. *Conyzopsis* is  $x = 7$ .

Currently there are 12 stations of *S. ciliatum* known in Poland (Appendix). They are located in nine 10 km × 10 km ATPOL grid squares in central, southern and southeastern Poland (Fig. 1).

In Poland, *S. ciliatum* occurs exclusively at sites altered by human activity, most frequently in moist or wet places. It can grow on alkaline substrate rich in calcium as well as in poor sandy soil. *S. ciliatum* is a component of vegetation patches representing initial stages of succession of synanthropic plant communities which cannot be phytosociologically classified with precision.

The aim of the study was to establish the chromosome numbers of specimens from Poland first determined as *Brachyactis ciliata* and then as *Symphyotrichum ciliatum*, to confirm their taxonomic affiliation.

\* e-mail: marta.tucharz@uj.edu.pl



**Fig. 1.** Distribution of *Symphyotrichum ciliatum* in Poland.

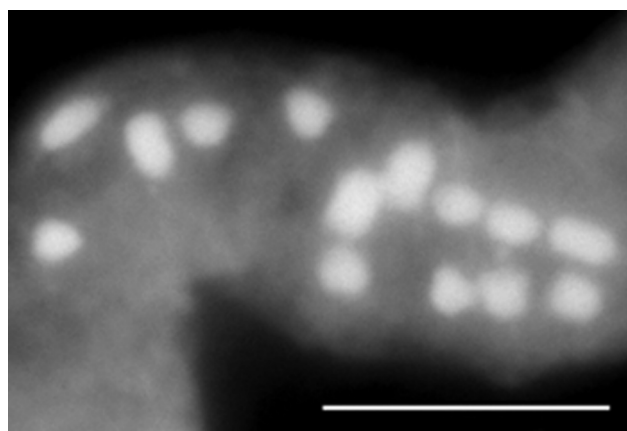
## MATERIAL AND METHODS

Plant material for karyological analysis was collected from sites in Harasiuki and Tarnobrzeg (eastern part of town near train station) (Fig. 1; Appendix). Mature seeds were germinated on wet filter paper in Petri dishes at room temperature. Young seedlings 4 or 5 days old were pretreated with 8-hydroxyquinoline for 2 h at room temperature and fixed in 96% ethanol/glacial acetic acid (3:1) for a minimum 24 h at 4°C. Root tip meristems were cut off and squashed in a drop of 45% (v/v) acetic acid. Preparations were made by the dry ice method and stained with 1 µg/ml 4'-6-diamidino-2-phenylindole (DAPI, Sigma) in phosphate-buffered saline (PBS) in a humidity chamber for 20 min and then mounted in glycerin. Mitotic chromosomes were analyzed under a Nikon Eclipse E 400 epifluorescence microscope. Photographs were taken on Fuji PROVIA 400 film. Chromosomes were counted in 140 seedlings from 3–10 metaphase plates of each seedling. The frequency of mitotic division was highest at 2 a.m.

## RESULTS AND DISCUSSION

In all examined samples the chromosome number  $2n = 2x = 14$  was determined in the analyzed metaphase plates (Fig. 2). The chromosomes were poorly differentiated and small. Chromosome length from analyses of 50 metaphase plates ranged from 1.5 to 3 µm.

The chromosome number  $2n = 2x = 14$  for specimens first determined in Poland as *Brachyactis ciliata* and then as *Symphyotrichum ciliatum* was established for the first time. The presented count ( $2n = 14$ ) is consistent with previous reports for specimens from North America (Houle and Brouillet, 1985) and Central Europe (Mráz, 2005; Martonfióva, 2007).



**Fig. 2.** Metaphase plate of *Symphyotrichum ciliatum* ( $2n = 14$ ). Chromosomes in root meristem cell, stained with DAPI. Bar = 10 µm.

Our results confirm the affiliation of the studied species occurring in Poland to the genus *Symphyotrichum* sect. *Conyzopsis*.

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APPENDIX. List of *Symphytotrichum ciliatum* sites in Poland

ATPOL* grid square	Locality and habitat	Author
DF69	Kraków-Nowa Huta (T. Sendzimir Steelworks) – waste heap and settling ponds; Kraków-Nowa Huta (Pleszów-Kujawy) – settling ponds	Guzik, 2003; Guzik, 2000 unpubl. ATPOL data base; Zajac et al., 2006
EE63	Kostomłoty Drugie (near Kielce) – bottom of quarry, in places with stagnant water, wheel ruts	Bróz and Podgórska, 2005
EE73	Szczukowskie Górkę (near Kielce) – bottom of quarry, in places with stagnant water, wheel ruts	Bróz and Podgórska, 2005
EE83	Bolechowice (near Chęciny) – by a ditch and puddles near the road entrance to the mine	Bróz and Podgórska, 2005
EE84	Kowala Sobków – bottom of quarry, in periodically flooded wells, along roads, ditches and small streams	Bróz and Podgórska, 2005; Nobis et al., 2006
EF60	Kraków-Nowa Huta (Pleszów) – waste heap	Guzik, 2000 unpubl. in ATPOL data base; Zajac et al., 2006
FF01	Between Krzcin and Piaseczno villages – disused quarry	A. Nobis and M. Nobis, 2005 unpubl.
FF02	Tarnobrzeg (eastern part of town) – shallow depressions on edge of square ~20 m E of train station; Tarnobrzeg – roadside; Tarnobrzeg – construction site	A. Nobis and M. Nobis, 2004 unpubl.; Szymański, 2010
FF18	Harasiuki (near Biłgoraj) – at bottom of sand pit	Nobis, 2008

\*ATPOL grid square system of 10 km cartogram units. Letter symbols correspond to 100 km × 100 km squares. Each square is divided into a hundred 10 km × 10 km grid squares which are assigned numbers (Zajac, 1978). The habitat, author's name and the publication/collection date are given for all records.