

Proposition of a key to *Equisetum* genus

Propozycja klucza do rodzaju *Equisetum*

Dominik Wróbel

Karpacka Państwowa Uczelnia w Krośnie, Rynek 1, 38-400 Krosno, e-mail: dominik.wrobel@kpu.krosno.pl

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Streszczenie

Rodzaj *Equisetum* L. jest obecnie jedynym żyjącym przedstawicielem, niegdyś bardzo licznej w gatunki rodziny *Equisetaceae*. Do dziś przetrwało zaledwie kilkanaście gatunków. Niestety stopień poznania, zarówno rodzaju jako całości, jak i poszczególnych gatunków jest niewystarczający. W szczególności nie znany jest dokładnie zakres zmienności ich poszczególnych cech anatomicznych i morfologicznych. Ponadto, występowanie mieszańców w jeszcze większym stopniu utrudnia prawidłowe oznaczanie okazów. Skutkiem takiej sytuacji jest duża ilość błędnych oznaczeń nawet w renomowanych kolekcjach zielnikowych. Przedstawiony klucz jest propozycją, która pozwoli, być może uniknąć wielu takich pomyłek w przyszłości.

Summary

The *Equisetum* L. genus is the only living representative of the *Equisetace* family which used to be very large. Only a dozen species have survived to this day. Unfortunately, the degree of knowledge of both the genus as a whole and individual species is insufficient. In particular, the range of variability of their individual anatomical and morphological features is not accurately known. In addition, the occurrence of hybrids further impedes the correct determination of specimens. The result of this is a large amount of misleading determination even in renowned herbarium collections. The key presented is a proposal that will allow, perhaps, to avoid many such mistakes in the future.

Introduction

The genus *Equisetum* belongs to the oldest evolutionarily taxa which are morphologically similar to their oldest ancestors [1]. Additionally, it should be emphasized that they are an extremely archaic group [2], represented today by only several species and about 20 hybrids. Horsetails are poorly researched species and, what is worse, often mislabeled with each other. This is confirmed by numerous erroneous markings in herbarium collections of prominent domestic and foreign universities. In general opinion, the most important herbal raw material is field horsetail *Equisetum arvense*, and herb of other species is used sporadically. However, even a cursory query of scientific literature indicates the diverse properties of individual *Equisetum* species [3,4]. This is confirmed by preliminary laboratory tests. This situation, in the context of insufficient knowledge about the biology of species of the genus *Equisetum*, has become an important argument for conducting in-depth research on representatives of the genus. The starting point for these tests, as well as for the necessary laboratory analyzes is the ability to precisely identify horsetail species.

Below is presented a new key for the determination of *Equisetum* species, which takes into account not only the division into two sub-genus (*Equisetum* and *Hippochaete*), but also allows the identification of hybrids found in Poland. Bearing in mind the provisional nature of the key presented below, and being aware that the selection of appropriate features useful for field research requires many attempts, I ask my colleagues botanists and herbalists to test the key during their research and to send to the author's address any comments that will allow refine the key in the future. Thank you in advance for all of them.

Subgenus key

Spore-bearing stems strikingly different from the sterile shoots, usually appearing earlier, more or less short-lived. If spore-bearing stems similar to sterile shoots, then the top of the cone is rounded or faintly acute, similar to the top of the vegetative shoot. Stems smooth or at most slightly rough – **Subgenus *Equisetum*.**

Spore-bearing stems similar to the sterile shoots appearing simultaneously. The cone at the top is acute, lengthened in a distinct, short spike, the tip of the vegetative stem acute. Shoots distinctly rough – **Subgenus *Hippochaete*.**

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Subgenus Equisetum

Spore-bearing stem key

1. Spore-bearing shoots not green, before the spores are matured without whorls of side branches.

2. Cones massive, even more than 2 cm in diameter, hollow inside, usually more than 4 cm in length. Shoots 5-15 mm thick white or ivory. Main stem sheaths teeth 16-40, needle-like, coupled together for a few to a dozen or so – *E. telmateia*.

2*. Cones finer fully inside or cones die on the surviving shoot. Creamy brown shoots, 3-5 mm in diameter.

3. Spore-bearing stems grow simultaneously with sterile ones, initially different. After the spores have matured, spore-bearing stems turn green and form whorls of side branches.

4. Main stem sheaths teeth coupled together for a few. Side branches 2-3 fold, regularly branched, slender – *E. sylvaticum*

4*. Main stem sheaths teeth usually one by one, 10-20. Side branches unbranched – *E. pratense*

3*. Spore-bearing stems are formed earlier than distinct, sterile ones and die off after spores have been spilled – *E. arvense*

1*. Spore-bearing shoots green, not regularly branched.

2. Central hollow wide, at least 1/2 stem diameter

3. Central hollow very wide, 4/5-5/6 stem diameter – *E. fluviatile*

3*. Central hollow about 1/2 stem diameter – *E. x litorale*

2*. Central hollow narrow, less than 1/2 stem diameter

3. Central hollow about 1/6 stem diameter – *E. palustre*

3*. Central hollow about 1/4-1/2 stem diameter – *E. x font-queri*

Sterile stem key

1. Stem slightly branched, usually irregular or unbranched, Central hollow very wide, 4/5-5/6 stem diameter – *E. fluviatile*

1*. Stem branched, more or less regularly

2. Branches slender, usually 2-3 times branched – *E. sylvaticum*

2*. Side branches more or less rigid, usually unbranched

3. Main stem sheath teeth needle-like

4. Stems ivory in colour, at most greenishly stained. Main stem sheaths teeth usually not less than 20 – *E. telmateia*

4*. Stems pale green. Main stem sheaths teeth 16-22 – *E. x robertsii*

3*. Main stem sheath teeth triangle

4. Side branches with 3 ridges – *E. pratense*

4*. Side branches usually with 4(5-6) ridges.

5. The first segment of the side branches is always longer than the adjacent stem sheath. Spore-bearing stems different than sterile ones – *E. arvense*

5*. Spore-bearing stems similar to sterile ones

6. Central hollow about 1/2 stem diameter – *E. x litorale*

6*. Central hollow significantly narrower

7. Central hollow about 1/6 stem diameter. The first segment of the side branches is always shorter than the adjacent stem sheath – *E. palustre*

7*. Central hollow about 1/4 stem diameter – *E. x font-queri*

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Subgenus *Hippochaete*

1. Stem with or without irregular branches, raised or prostrated. Ridges distinctly convex. Stem sheath funnel-like. Main stem sheaths teeth triangular-ovate white margined with an easily falling off tip – *E. ramosissimum*

1*. Stem without whorl of side branches, at most branched at the base. Ridges slightly convex or planar.

2. Main stem sheath adjoining. Teeth narrowly, whitey margined. Stems wintergreen.

3. Stems firmed, about 0.5 cm diameter, erected (30)40-100(150) cm, with very wide central hollow. Stems wintergreen. Main stem sheaths teeth early falling off – *E. hyemale*

3*. Stems finer, 20-50 cm height. Teeth persistent – *E. xtrachyodon*

2*. Main stem sheath wide. Stems usually wintergreen, fine 10-30(50) cm, often branched from the base. Teeth sheath persistent, at most, their tip is easily falling off. Teeth wide, hitey margined – *E. variegatum*.

Literature

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