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Natural hybrids of Lonicera nigra x L. xylosteum (=L. helvetica) (Caprifoliaceae) in the Polish Carpathians

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ABSTRACT: Among the natural infraspecific hybrids encountered in the genus *Lonicera* L., the hybrids between *L. nigra* L. and *L. xylosteum* L. described as *L. helvetica* Brügger occur in the Polish Carpathian Mountains. In the hybrids the influence of the genes of *L. xylosteum* is stronger in the shape and dense pubescence of the leaves as well as in the length of the petiole.

KEY WORDS: *Lonicera*, leaves, variability, hybrids, Carpathian Mts, Poland

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The genus *Lonicera* L. consists of over 200 species (Rjabova 1980), of which only three are alien in Poland, namely *L. nigra* L., *L. xylosteum* L. and *L. periclymenum* L. The first two represent the type subgenus, whereas the third species belongs to subgenus *Caprifolium* (Adans.) Dipp.

Lonicera nigra occurs in the mountains of central and southern Europe. It has its northern distribution limit in Poland at the foothills of the Sudetes and Carpathian Mountains. Owing to the break in its continuous range in the depression of the Moravian Gate, two Polish centres of the occurrence of this species can be recognized, namely the Sudetes centre and the Carpathian centre (Browicz & Gostyńska-Jakuszewska 1967).

The optimum of the occurrence of *L. nigra* is in the lower part of the upper montane belt and in the upper part of the lower montane belt whence, however, it descends onto lower elevations. The lowest locality in the Sudetes is at an altitude of 450 m (Krawiecowa *et al.* 1964), and according to Fiek & Uechtritz (1881) and Zarzycki (1967) even at an altitude of 400 m. On the other hand, the lowest locality has been recorded from the Carpathians at an altitude of 380 m (Kornaś 1957). In addition, some localities of *L. nigra* have also been recorded outside the mountains, for example from the Wielkopolska Region.

Lonicera xylosteum is a Euro-Siberian species, extending as far south as north-eastern

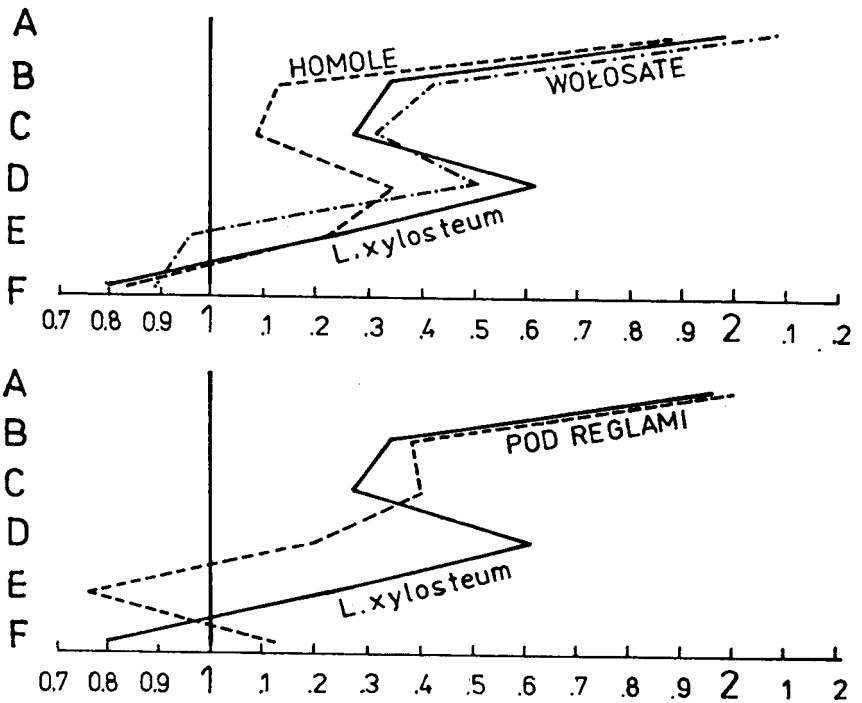

Fig. 1. Comparison of size and shape of *Lonicera xylosteum* L. and local samples (broken lines) with the arithmetical mean of *L. nigra* L. (vertical lines). Features A–F as on p. 341.

Turkey and North Africa (Browicz & Gostyńska-Jakuszewska 1967). Unlike *L. nigra*, it is a lowland species, though it reaches an altitude of 1070 m in the Alps (Weihe 1972) and 1190 m in the Tatras (Zarzycki 1967) and 1140 m on Mt. Polica (Stuchlikowa & Stuchlik 1962) in the Carpathians. As it can be inferred from the above description, the ranges of both species overlap over a considerable area in the Sudetes and Carpathian Mountains.

In spite of the fact that *L. nigra* belongs to section *Isika* (Adans.) Rehd. and *L. xylosteum* to section *Lonicera* (Rjabova 1980), both species form hybrids called *L. x helvetica* Brügger. They have been reported from France, Switzerland and Austria (Browicz & Gostyńska-Jakuszewska 1967) and from Czecho-Slovakia (Maloch 1932; Bertova 1985).

Recently, as a result of population studies on variability of the genus, the hybrids between *L. nigra* and *L. xylosteum* have also been found in Poland in three mountain groups, namely in the Tatras, Pieniny and the Bieszczady Zachodnie Range but their alleged occurrence throughout the Carpathians, is viewed with quite a moderate interest.

The origin of the hybrid samples of *L. nigra x L. xylosteum* is as follows:

1. Tatra Mountains, at the tourist route "Pod Reglami" between the valleys of Dolina Białego and Dolina Strążyska, at an elevation of 930 m.

2. Pieniny Mountains, in the lower part of the Homole Gorge, at an elevation of ca 600–620 m.

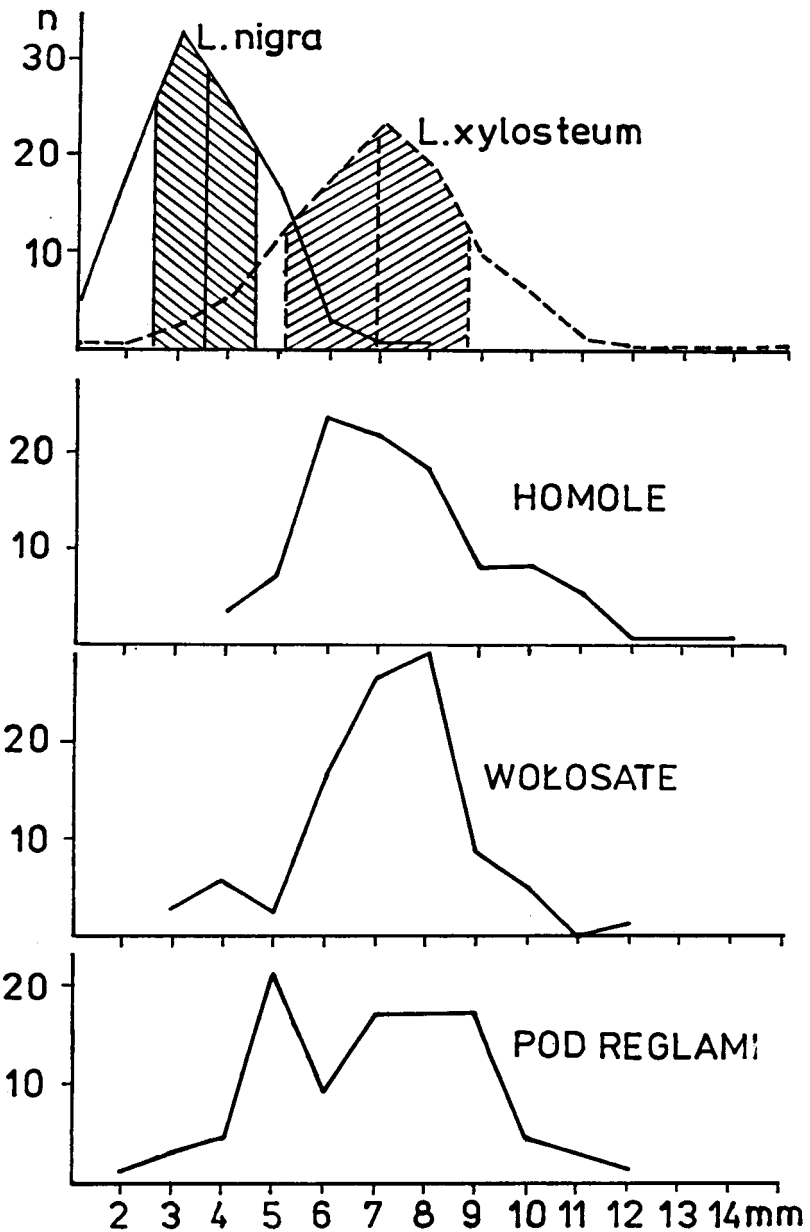

Fig. 2. Frequency diagram of the length of petiole (feature A).

3. Bieszczady Zachodnie Range, in the valley of Wołosaty stream, near the raised peat-bog "Wołosate", at an elevation of ca 680 m.

All above-mentioned samples were determined by collectors as *L. nigra* but with a question mark because of some differences in the shape of the leaf-blade.

The leaves of *L. xylosteum* differ from the leaves of *L. nigra* in the shape, nervation and pubescence and these differences are presented in Fig. 1 by means of the graphic method of Jentys-Szaferowa (1959). The following six features have been used for comparison:

A – the length of the petiole;
B – the space between the widest part and the base of the leaf-blade;
C – the length of the blade;
D – the width of the blade;
E – the angle between the base of the blade and the main vein;
F – the leaf-blade length/width ratio.

These differences refer to all the features analysed.

As far as the shape and size of the leaves of the local samples are concerned, the leaves in the samples collected from Wołosaty most of all resemble the general sample of *L. xylosteum*. Distinctly, between the lines representing *L. xylosteum* and *L. nigra*, there is the line of the sample from the Homole Gorge, while the sample of the Tatra is in some features identical to, intermediate, or even falls within the range of variability of *L. nigra*.

The length of the petiole is the feature in which *L. xylosteum* and *L. nigra* differ markedly (Fig. 2). Although the range of variability of this feature in one species overlaps the range of variability of the other, however, if we consider the arithmetical mean with one standard deviation on each side, then the two species are conspicuously different. It can be assumed that the majority of petioles in *L. nigra* is 2.5–4.5 mm long, and 5.0–10 mm in *L. xylosteum*. Similar metrical difference in the discontinuity of this feature was given by Zarzycki (1967).

The graphs of frequency of the length of the petiole in three local samples are congenial to the range of variability of the general sample of *L. xylosteum*, though the curves have no normal distribution. In case of the sample from the Homole Gorge the asymmetry of the curve is markedly conspicuous and its shift towards *L. nigra*, while in other samples small secondary apices mark themselves at the left side of the curves, in which they also resemble *L. nigra*.

One of useful diagnostic feature allowing to distinguish the leaves of *L. nigra* from the leaves of *L. xylosteum* is, in my opinion, their pubescence. The leaves of *L. nigra* are quite naked or pubescent only at the base of the blade along the main vein, while the leaves of *L. xylosteum* are pubescent on both sides of the blade (Zarzycki 1967). In the present study the pubescence of the leaves is treated as four separate features:

G – pubescence of the petiole;
H – pubescence of the main vein;
I – pubescence of the margin of the blade;
J – pubescence of the upper part of the blade.

The pubescence is here described by means of grades. In order to determine the level of the pubescence a four degree scale was applied:

0 – no hairs; 1 – a few hairs (single); 2 – quite numerous hairs; 3 – very numerous hairs (dense).

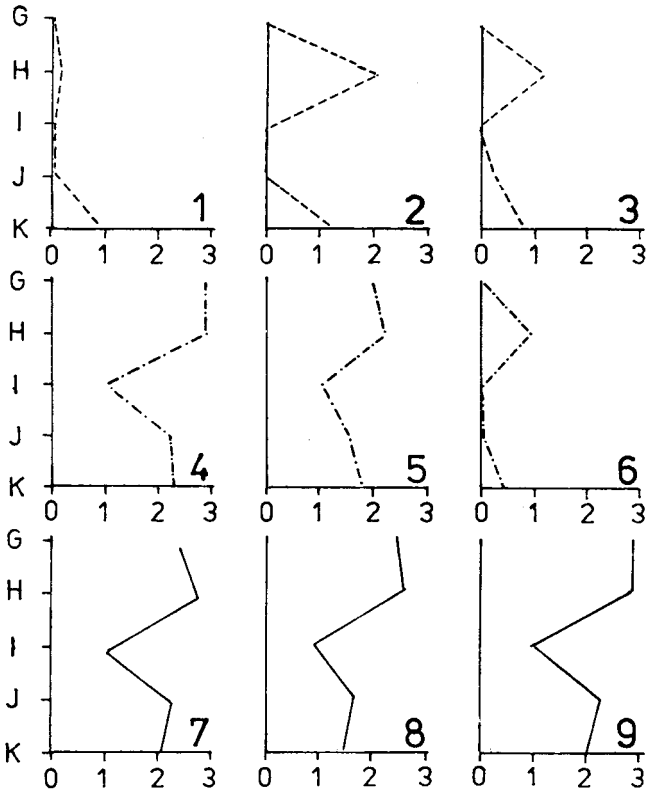

Fig. 3. Pubescente level of leaves in the local samples of *L. nigra* (1–3), with hybrids (*L. x helvetica*) (4–6) and *L. xylosteum*. Features G–J as on p. 342 and key to grades of pubescence as on p. 342.

In Fig. 3 an average pubescence of each feature studied was given. Marked differences can be noticed here. The population sample of *L. nigra* collected at Wielki Staw in the Sudetes Mountains (1) has almost naked leaves, whereas the samples of *L. nigra* from Złoty Stok (2) and Zawoja (3) has numerous hairs but only on the main vein, and single hairs on the lower surface of the blade. The leaves of the *L. xylosteum* samples from Świdna Kępa (7), Wiosło (8) and Góra Św. Wawrzyńca have very numerous hairs on the petiole and main vein, whereas the margin of the blade is covered with single hairs, though the upper and lower part of the blade is strongly pubescent. As far as other three studied Carpathian samples are concerned, the pubescence of the leaves in the samples from Homole (4) and Wołosaty (5) are similar to that of *L. xylosteum*, whereas the pubescence in the sample collected "Pod Reglami" (6) resembles the that of *L. nigra*.

Therefore, it is evident that all three samples consist of individuals of hybrid origin, mostly introgressive, though in the Bieszczady Zachodnie Range and in the Pieniny Mountains the influence of the genes of *L. xylosteum* is stronger, which is best expressed in densely pubescent leaves. Undoubtedly this is the result of the fact that hybrids of the generation F_1 and the following generations of hybrids crossed more frequently with *L.*

xylosteum rather than with *L. nigra*. The situation is quite different in the Tatra Mts where hybrids and its subsequent crosses had a greater chance to cross with *L. nigra*, which dominates in this area, while *L. xylosteum* just reaches here its upper distribution limit. In all three local samples, however, individuals with the long petiolated leaves which are characteristic of *L. xylosteum* are dominant.

Undoubtedly, in some parts of the Tatras introgressive forms are more frequent than in other parts. Presumably, such forms occur often in the Pieniny Mts. The individuals of *L. nigra* recorded from that area by Zarzycki (1967) have the leaves pubescent to almost tomentous at the base along the veins. This is an evidence of the introgression of the genes of *L. xylosteum* to the gene complex of *L. nigra*.

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STRESZCZENIE

W wyniku badań morfologicznych nad zmiennością liści *Lonicera nigra* L. i *L. xylosteum* L. stwierdzono na terenie polskich Karpat występowanie populacji o charakterze rojów mieszańcowych morfologicznie, na pierwszy rzut oka, przypominających *L. nigra*. Znaleziono je w następujących miejscach:

1. Tatry, w pobliżu „Ścieżki pod Reglami" na jej odcinku między Doliną Białego a Doliną Strążyską (930 m n.p.m.);
2. Małe Pieniny, dolna część Wąwozu Homole (600–620 m n.p.m.);
3. Bieszczady Zachodnie, dolina Wołosatego, niedaleko torfowiska (680 m n.p.m.).

Szczegółowe badania wykazały iż u liści wielu osobników ujawniają się tam cechy *L. xylosteum*. W mniejszym stopniu dotyczy to kształtu blaszki liściowej (Ryc. 1), natomiast wyraźnie ujawnia się w długości ogonka (Ryc. 2). Liście prób z Homola i doliny Wołosatego były ponadto owłosione w takim samym stopniu jak liście *L. xylosteum*. W próbie z Tatr, owłosienie było identyczne jak u *L. nigra* (Ryc. 3). Wszystkie osobniki mieszańcowego pochodzenia zaliczono do *L. helvetica* Brügger. Takson ten znany jest z Czechosłowacji, Austrii, Szwajcarii i Francji.