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Variability of *Prunus fruticosa* Pall. and the problem of an anthropohybridization

Jan J. WÓJCICKI

1. INTRODUCTION

Unintentional man's intervention in the wild plant evolution is progressively documented on a local and global scale (e.g. ANDERSON 1956, OWNBEY 1950, WOODSELL 1969, LANDOLT 1970, SUKOPP 1972, STACE 1975, HINTON 1976, GRANT 1981, KORNAS 1983, WOJCICKI 1988, KUTA 1991). One of the results of unintentional man's influence upon wild plants is spontaneous hybridization between autochthonic and allochthonic taxa, presented in this paper by the example of native *Prunus fruticosa* Pall. and introduced *P. cerasus* L., which is unknown wild but exclusively as a cultivar or "garden escaper". The phenomenon of hybridization was analysed within the total range of *P. fruticosa*.

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I thank the directors, curators, and private owners of the herbaria for loaning the materials without which this research would not have been possible.

2. MATERIAL AND METHODS

To present the main consequences of *P. cerasus* introduction within the range of *P. fruticosa* the herbarium specimens both from 68 institutional herbaria or private collections were examined: B, BAS, BHU, BM, BP, BRA,

BRNM, BRNU, BUCA, BUCG, CLA, DR, FI, FR, G, GAT, GHT, GJO, GLM, GOET, GZU, HAL, HBG, JE, KTCG, KOR, KRA, KRAM, KW, LAU, LBL, LE, LECB, M, MHA, MW, NBSI, PAD, POZ, PR, PRC, RO, SAV, SLO, SO, SOA, SOM, STU, TRN, TUB, VER, W, WA, WRSL, WU, Z, ZMT, ZT, ZV, Institute of Botany, University of Beograd (Yugoslavia), Prof. J. Kornas (Krakow, Poland), Prof. D. Korneck (Bonn, Germany), Dr. W. Maurer (Graz, Austria), Prof. J. Madalski (Wroclaw, Poland), Dr. H. Melzer (Graz, Austria), Dr. Z. Mirek (Krakow, Poland), Dr. W. Schnedler (Asslar-Bechlingen, Germany), and the author's herbarium (for acronyms see HOLMGREN et al. 1990).

Morphological analysis of the herbarium specimens was performed 1) to estimate the total range of variation of *P. fruticosa*, *P. cerasus* and their hybrids, and 2) to establish frequency of *P. fruticosa* x *P. cerasus* (= *P. x eminens* Beck) hybrids within *P. fruticosa* range, expressed as a percentage of the herbarium sheets in 15° gradient of geographical longitude.

Variability of three "regional populations" from different parts of *P. fruticosa* range (Fig. 1) were analysed on the base of two quantitative and seven qualitative characters of vegetative short shoot leaves (as in Fig. 2).

Results of detailed morphological, cytological and biochemical studies of *P. fruticosa* and its hybrids will be published separately.

3. RESULTS AND DISCUSSION

Morphological variation of *P. fruticosa* and *P. cerasus* short shoot leaves is presented in Fig. 2. It is clear that these species are sharply distinct. The presence of diagnostic characters in leaves is of particular value as it allows to separate easily both "pure" species in sterile herbarium material. Useful diagnostic characters for separation of *P. fruticosa* from *P. cerasus* are also in generative organs not presented here (cf. WOJCIKI 1988).

The analysis of variation within three "regional populations" from areas I-III (marked in Fig. 1) shows Fig. 3. Lines showing the total range of variation found in the "pure" species (as in Fig. 2) are in all scatter diagrams. All of the individuals analysed from the sampler I are within the range of *P. fruticosa*. The sampler II can be seen to consist mainly of *P. fruticosa*, but there are three intermediates of hybrid origin. Almost the opposite situation is represented by population III. There are many hybrids and only a few individuals of pure *P. fruticosa*. The scale of hybridization in the third population is

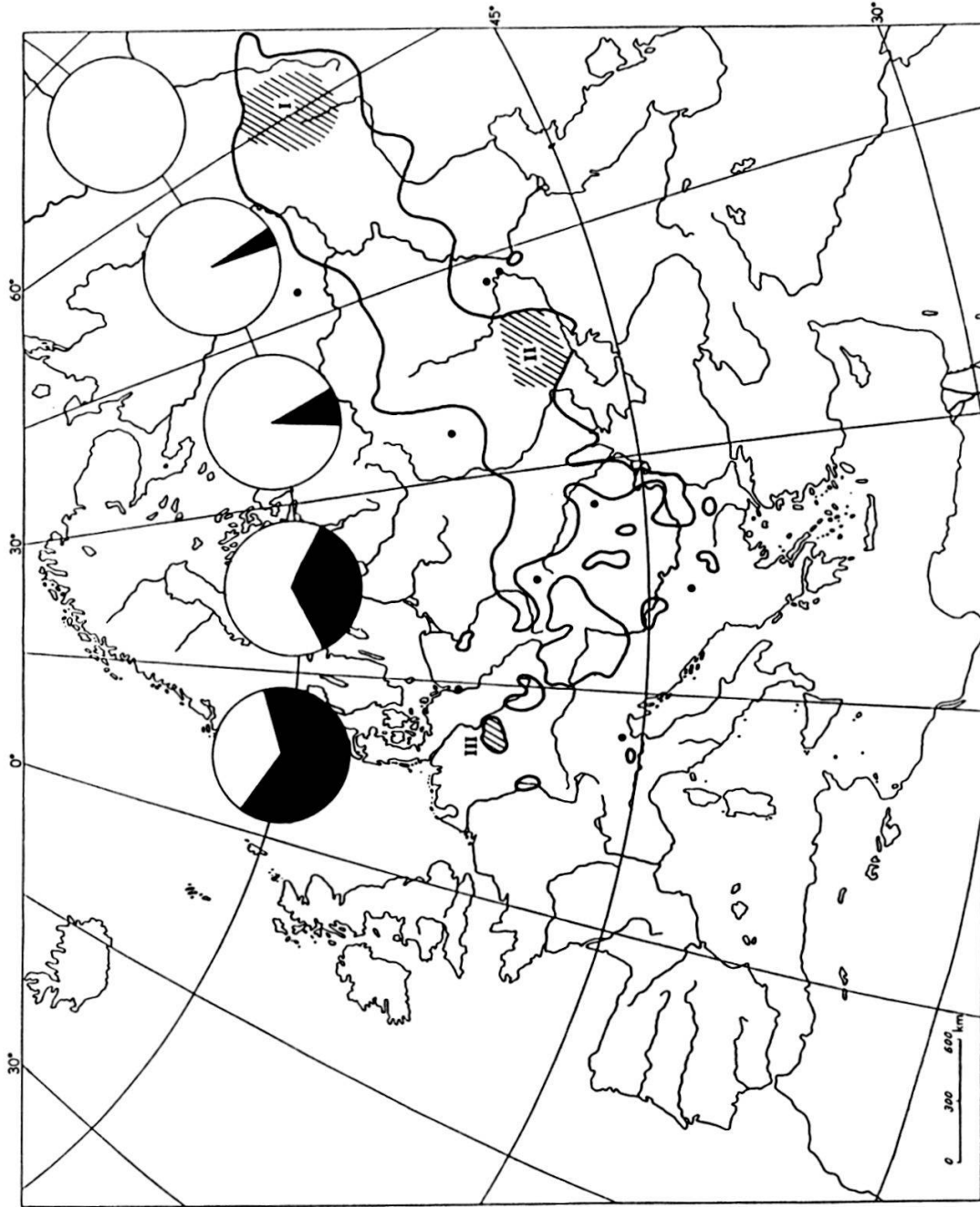


Fig. 1. Distribution of *P. fruticosa*, "regional populations" (I-III), and frequency of *P. fruticosa* x *P. cerasus* hybrids with- in the range of *P. fruticosa* (black part of circle = % of the hybrids in 15° gradient of geographical longitude).

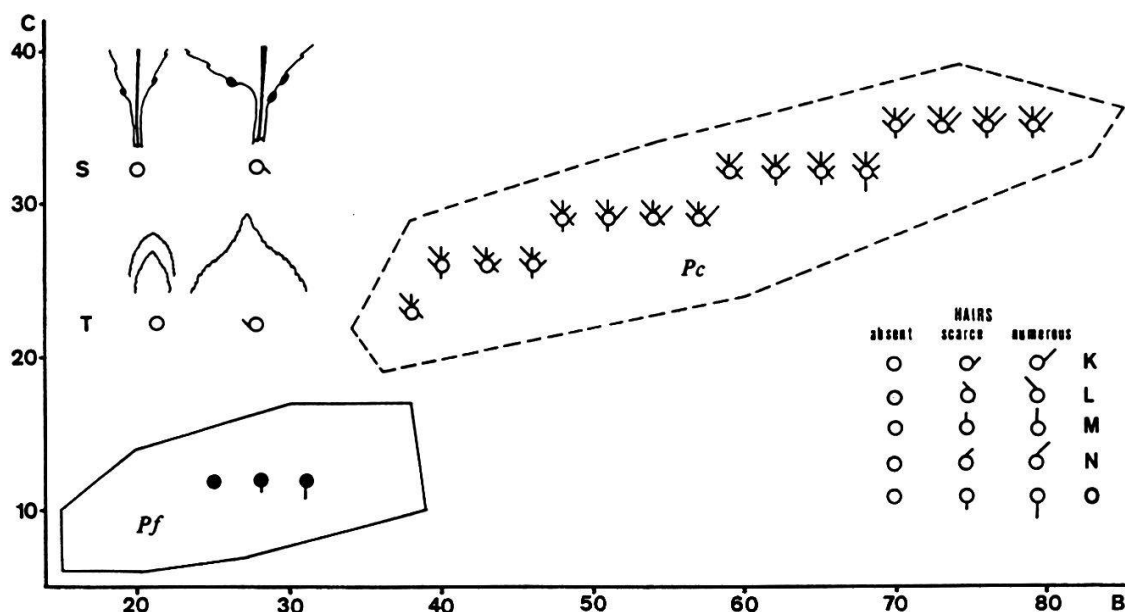


Fig. 2. Variation of vegetative short shoot leaves of *P. fruticosa* (Pf) and *P. cerasus* (Pc). B = length, C = width of leaf blade (in mm); hairs on: petiole = K, main vein of abaxial lamina = L, lateral veins of abaxial lamina = M, surface of abaxial lamina = N, main vein of adaxial lamina = O; — = total range of *P. fruticosa* and - - - = *P. cerasus* variation. Only for representative individuals pictograms are presented.

fairly large. An increase in hybrids of *P. fruticosa* x *P. cerasus* frequency observed in Fig. 3 became more clear in Fig. 1, where frequency of hybrids is presented in 15° gradient of geographical longitude. In the easternmost part of the range exclusively "pure" *P. fruticosa* has been found. Then percentage of hybrids increase gradually and in the westernmost part hybrids prevail.

Hybrids are not restricted to a classic hybrid zone which usually appears when ranges of related allopatric taxa overlap (REMINGTON 1968, HEWITT 1988), but their frequency increases gradually westwards forming a characteristic cline. It corresponds markedly with distribution and intensity of *P. cerasus* cultivation (cf. ZYLKA 1971), and with long-term man's activity becoming more intense westwards, causing, inter alia, disturbance of natural habitats. Hybrids *P. fruticosa* x *P. cerasus* grow mainly in man-disturbed habitats (roadsides, balks, fallow, vineyards, etc). Conditions in these environments seem to be ideal for almost unrestricted hybridization. In open habitats permanently or periodically hybrid swarms were observed (WOJCIKI 1988).

History of *P. fruticosa* and *P. cerasus* hybridization is relatively short as it is connected with the introduction and cultivation of *P. cerasus*. This man-made species according to different sources (e.g. DE CANDOLLE 1883, HYAMS

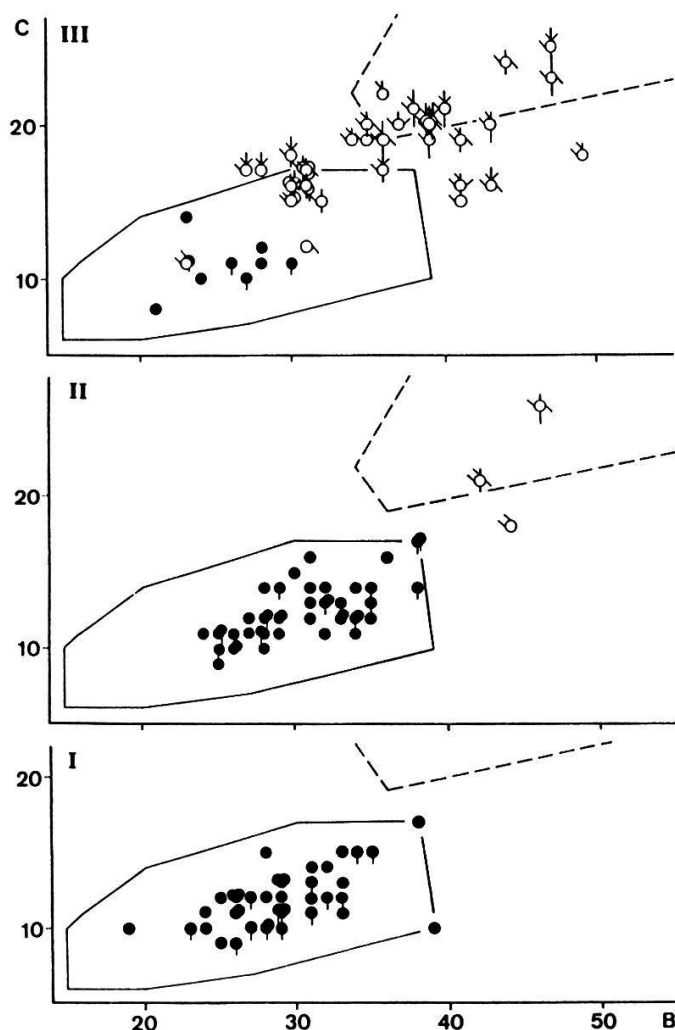
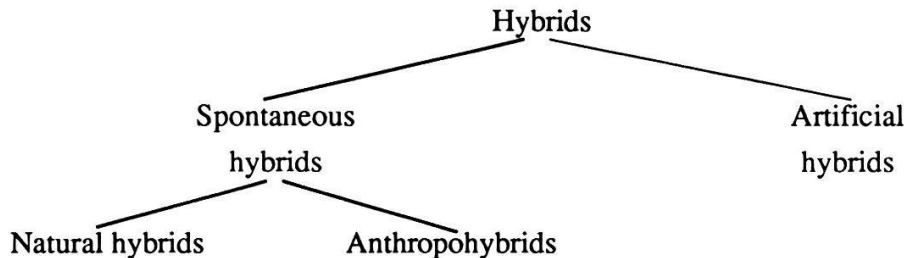


Fig. 3. Scatter diagrams of "regional populations" I-III (as in Fig. 1). For details see Fig. 2.

1971, NOWINSKI 1977) was probably introduced to South and later West Europe by Romans at the beginning of the Christian era. Taking into account the scale of *P. fruticosa* and *P. cerasus* hybridization presented above, the rate of this phenomenon is fairly great.

Hybridization of *P. fruticosa* and *P. cerasus* is a consequence of man's activity and as such is proposed to be called an "anthropohybridization". Among many factors promoting this process the most significant are 1) artificial synthesis of a new species *P. cerasus* - there is no evidence for the existence of its wild forms (e.g. DE CANDOLLE 1883, VAVILOV 1935, ZHUKOVSKY 1950, ZEVEN and ZHUKOVSKY 1975), 2) introduction of *P. cerasus* within the range of sympatric *P. fruticosa*, and 3) creation of suitable habitats for the survival and expansion of hybrids.

As spontaneous hybrids originated due to unintentional man's activity from spontaneophyte and anthropophyte (cf. MIREK 1991) they are proposed to be named "anthropohybrids". The classification of hybrids would then be as presented below.



Hybrid *P. fruticosa* x *P. cerasus* as well as the recently described threefold hybrid *P. fruticosa* x *P. cerasus* x *P. avium* (= *P. x stacei*) (WOJCICKI 1990) can serve as a good example of anthropohybrids.

Anthropohybridization is a new process of threat to gene pool of native flora and of great importance for nature conservation but the problem is still rather poorly known.

SUMMARY

Unintentional man's activity in the wild plant evolution is presented by the example of spontaneous hybridization between native *Prunus fruticosa* Pall. and introduced sympatric *P. cerasus* L., which is unknown wild. The phenomenon of hybridization was analysed within the total range of *P. fruticosa*. Frequency of *P. fruticosa* x *P. cerasus* (= *P. x eminens* Beck) hybrids increases gradually westwards forming a characteristic cline.

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