The cornelian cherry *Cornus mas* L. Collection at the Arboretum and the Department of Physiography in Bolestraszyce

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Abstract

The cornelian cherry collection at Bolestraszyce Arboretum was established by Jerzy Piórecki in the 1980s by collecting Polish ecotypes from the area. At the start of the 21st century, his work was continued by Narcyz Piórecki, who gathered a total of 117 cultivars and ecotypes of *Cornus mas* L. from Poland, Ukraine, Austria, Slovakia, France, Germany, Moldova, Georgia, Bulgaria and the United States of America. Currently, Bolestraszyce Arboretum has a collection of 770 shrubs and, at the Cisowa site, another 1700. Between 2008–2017, N. Piórecki bred the first 12 Polish cultivars of *C. mas* L. (‘Bolestraszycki’, ‘Dublin’,

‘Juliusz’, ‘Florianka’, ‘Kotula’, ‘Kresowiak’, ‘Paczoski’, ‘Podolski’, ‘Raciborski’, ‘Słowianin’, ‘Swietłana’, and ‘Szafer’). Traditional products such as pickled cornelian cherry berries, cornelian cherry vinegar, jellies, and jams are made from the berries of the cornelian cherry according to traditional recipes recreated at the Arboretum.

Bolestraszyce Arboretum’s cornelian cherry collection has caught the attention of many gardens and scientific institutions in Poland, including the Professor S. Białobok Forest Arboretum, Wojsławice Arboretum, and the universities in Wrocław, Łódź, and Rzeszów. It has also established international cooperation with botanical gardens in Kyiv, Lviv, Austria, and universities in Nitra (Slovakia) and Knoxville (United States of America). University research concerns areas such as the assessment of the composition of the bioactive compounds found in the fruits and products, the production of innovative cornelian cherry-based products, the possibility of using cornelian cherry supplements or products in the prevention and treatment of cardiovascular diseases or osteoporosis, as well as determining the origin of the Bolestraszyce cornelian cherries based on genetic tests.

The Arboretum popularises knowledge about cornelian cherries, their cultivation, reproduction, breeding requirements, properties and uses. Since 2012, it has organised the International Cornelian Cherry Festival, as well as taking part in lectures, consultations, workshops and presentations about cornelian cherry preserves.

Key words: Cornelian cherry, *Cornus mas*, Polish cultivars of cornelian cherry, cornelian Cherry Festival, Bolestraszyce Arboretum

The cornelian cherry *Cornus mas* L. was a well-known and widely used shrub in Poland until World War II. It was planted in suburbs, in parks and around manor houses (Jankowski 1888, Piórecki 2013a). Households would process the fruit, including ripe red and green unripe fruits, along with the leaves and pips. (Pfaff 1801, Kluk 1805, Burgsdorf and Kobierzycki 1809, Gerald-Wyżycki 1845, Lucas and Medicus 1873, Jankowski 1888, Strumiłło 1890, Brzeziński 1903. Industrial quantities of fruit from cornelian cherries was

made into flavoured vodkas and distillates. For example, in the *Ilustrowany Kurier Tygodniowy 'Światowid'* of 4 April 1925 (Saturday edition), 'Dereniówka' (cornelian cherry vodka) was advertised. In the 1934 price list of the 'Spiritus Refinery, Factory of Vodkas and Liqueurs', belonging to Count Zdzisław Tarnowski in Dzików, 40% proof cornelian cherry liqueurs feature among the fruit vodkas and distillates. On the eastern territories of the old Polish Republic cornelian cherry was found in the wild (Makowiecki 1937). Unfortunately the 1940s and the following decades saw the cornelian cherry forgotten. Only at the end of the 1970s did Jerzy Piórecki, the founder and first director of the Arboretum and Department of Physiography at Bolestraszyce, and Professor at Rzeszów University, revive the memory of the cornelian cherry, launching its first post-war planting. Even though Bolestraszyce Arboretum had two examples of cornelian cherry which were both over 100 years old, having been planted in the second half of the 19th century (Figs 1, 2), the Professor began the large-scale collection of different *Cornus mas* genotypes.

While cataloguing the manor-house parks within the current borders of the Podkarpackie voivodeship, Piórecki noticed not only the destruction of said parks, but also even greater changes caused by the destruction of the manor-house system, their orchards and utility plants (cut down, cut out) (Piórecki 1989, 1992, 1996, 1998). As part of the Central Programme of Basic Research by the Polish Academy of Sciences, entitled 'The collection and preservation of species of national threatened plant collections and initial forms of utility plants', in 1989 a cornelian cherry collection was established, including the cornelian cherry avenue (Jerzy Piórecki's Orchard) (Fig. 3) and part of the cornelian cherry collection in Albigowa, which was in those days part of the experimental department of the Institute of Pomology and Floriculture in Skierniewice.

The employees of Bolestraszyce Arboretum were the first in post-war Poland to appreciate the fruits of the cornelian cherry. From 2002, the next director of the Arboretum, Dr Narcyz Piórecki, continued the research into the cornelian cherry. He led observations of the plant and morphological studies of the fruits together with Dagmara Lib, while the processing of the cornelian cherry and other fruits has, since 2008, been led by Anna Łocha. The cultivation

and grafting of cultivars of cornelian cherry grown at Bolestraszyce, has been run by Elżbieta Żygała and her team, and the person responsible for the nurseries has been Marta Trzeciak.

Fig. 1. Cornelian cherry — a more than 100 year old example at the Arboretum (a monument of nature). The fruits are registered as the 'Podolski variety/cultivar', 2020, photo N. Piórecki

HISTORICAL OUTLINE OF THE CORNELIAN CHERRY COLLECTION

Bolestraszyce Arboretum holds **the largest collection of varieties/cultivars and ecotypes of cornelian cherry in Poland**. The collection has 117 varieties/cultivars and ecotypes of *Cornus mas* from Austria, Bulgaria, France, Georgia, Moldavia, Germany, Poland, Slovakia, the United States of American and Ukraine. Currently the Arboretum has a collection of 770 shrubs, while at its affiliate, Cisowa Arboretum, there are a further 1700 shrubs (as of 2020). In recent years work has been done on a Polish cultivar of *C. mas* with yellow fruits, a cross between *C. officinalis* × *C. mas* and cultivars of *C. officinalis*. Since 2007 continual planting of cornelian cherry has been taking place at the Arboretum's affiliate site in Cisowa.

Fig. 2. Cornelian cherry — a more than 100 year old example in the Arboretum (monument of nature), 2020, photo N. Piórecki

Fig. 3. The cornelian cherry avenue in “Jerzy Piórecki’s Orchard), 2020, photo N. Piórecki

Below is a list of the 117 cultivars and ecotypes of *Cornus mas* in the Bolestraszyce collection. The names of the cultivars are given according to Pirc (2015, 2020).

1. *Cornus mas* ‘Alesha’
2. *Cornus mas* ‘Alex’
3. *Cornus mas* ‘Aurea’
4. *Cornus mas* ‘Basia’
5. *Cornus mas* ‘Big Red’
6. *Cornus mas* ‘Bilda’
7. *Cornus mas* ‘Bolestraszycki’
8. *Cornus mas* ‘Bukovynskyi’
9. *Cornus mas* ‘Cecylia’
10. *Cornus mas* ‘Cezar’
11. *Cornus mas* ‘Cynober’
12. *Cornus mas* ‘Cyprian’
13. *Cornus mas* ‘Cyryl’
14. *Cornus mas* ‘Czarek’
15. *Cornus mas* ‘Czarny’ (‘Violacea’)
16. *Cornus mas* ‘Devin’
17. *Cornus mas* ‘Dublany’
18. *Cornus mas* ‘Ekzotychnyi’
19. *Cornus mas* ‘Elegantissima’
20. *Cornus mas* ‘Elegantnyi’
21. *Cornus mas* ‘Etiuda’
22. *Cornus mas* ‘Expres’
23. *Cornus mas* ‘Flava’
24. *Cornus mas* ‘Florianka’
25. *Cornus mas* ‘Fruchtal’
26. *Cornus mas* ‘Galitskyi’
27. *Cornus mas* ‘Golden Glory’
28. *Cornus mas* ‘Grenader’
29. *Cornus mas* ‘Happy Face’
30. *Cornus mas* ‘Hecoma’

31. *Cornus mas* ‘Jałtski’
32. *Cornus mas* ‘Jolico’
33. *Cornus mas* ‘Juliusz’
34. *Cornus mas* ‘Kasanlak’
35. *Cornus mas* ‘Kaukasus’
36. *Cornus mas* ‘Koralovyi Marka’
37. *Cornus mas* ‘Koralovyi’
38. *Cornus mas* ‘Kostia’
39. *Cornus mas* ‘Kotula’
40. *Cornus mas* ‘Kozerog’
41. *Cornus mas* ‘Kresowiak’
42. *Cornus mas* ‘Lukianovskyi’
43. *Cornus mas* ‘Macrocarpa’
44. *Cornus mas* ‘Marceli’
45. *Cornus mas* ‘Matador’
46. *Cornus mas* ‘Minden’
47. *Cornus mas* ‘Mrija Shajdarovoi’
48. *Cornus mas* ‘Nehznyi’
49. *Cornus mas* ‘Nespodivanyi’
50. *Cornus mas* ‘Nikolka’
51. *Cornus mas* ‘Orygynalnyi’
52. *Cornus mas* ‘P5’
53. *Cornus mas* ‘Paczoski’
54. *Cornus mas* ‘Pancharewo’
55. *Cornus mas* ‘Pervenets’
56. *Cornus mas* ‘Pionier’
57. *Cornus mas* ‘Pistriavolistij’
58. *Cornus mas* ‘Podolski’
59. *Cornus mas* ‘Prezent’
60. *Cornus mas* ‘Pryorskyi’
61. *Cornus mas* ‘Raciborski’
62. *Cornus mas* ‘Radost’

63. *Cornus mas* ‘Red Star’
64. *Cornus mas* ‘Samofertylnyj’
65. *Cornus mas* ‘Sarmata’
66. *Cornus mas* ‘Schönner Gourmet-Dirndl’
67. *Cornus mas* ‘Semen’
68. *Cornus mas* ‘Shan’
69. *Cornus mas* ‘Shumen’
70. *Cornus mas* ‘Słowianin’
71. *Cornus mas* ‘Sokolyne’
72. *Cornus mas* ‘Spring Glow’
73. *Cornus mas* ‘Starokievskiy’
74. *Cornus mas* ‘Sulia’
75. *Cornus mas* ‘Sunshine’
76. *Cornus mas* ‘Svitliachok’
77. *Cornus mas* ‘Swietłana’
78. *Cornus mas* ‘Szafer’
79. *Cornus mas* ‘Titus’
80. *Cornus mas* ‘Tricolor’
81. *Cornus mas* ‘Ugolek’
82. *Cornus mas* ‘Variegata’
83. *Cornus mas* ‘Vavylovets’
84. *Cornus mas* ‘Vladimirskyi’
85. *Cornus mas* ‘Vydubetskyi’
86. *Cornus mas* ‘Vyshgorodskyi’
87. *Cornus mas* ‘Yantarnyi’
88. *Cornus mas* ‘Yelena’
89. *Cornus mas* ‘Yellow’
90. *Cornus mas* ‘Yevgeniya’
91. *Cornus mas* ‘Yuvileinyi Klymenko’
92. *Cornus mas* var. *xanthocarpa* Bean
93. *Cornus mas* Florianka – Zwierzyniec nr 1
94. *Cornus mas* Florianka – Zwierzyniec nr 2
95. *Cornus mas* Florianka – Zwierzyniec nr 6

96. *Cornus mas* Mołdawia 1
97. *Cornus mas* Mołdawia 2
98. *Cornus mas* Mołdawia 3
99. *Cornus mas* Mołdawia 4
100. *Cornus mas* Prałkowce
101. *Cornus mas* Urzejów
102. *Cornus mas* Baum II (H. Pirc)
103. *Cornus mas* 90/2 (H. Pirc)
104. *Cornus mas* 90/3 (H. Pirc)
105. *Cornus mas* 90/4 (H. Pirc)
106. *Cornus mas* 90/5 (H. Pirc)
107. *Cornus mas* 99/1B (H. Pirc)
108. *Cornus mas* 99/2B (H. Pirc)
109. *Cornus mas* 99/10B (H. Pirc)
110. *Cornus mas* 99/13 (H. Pirc)
111. *Cornus mas* 88/2 (H. Pirc)
112. *Cornus mas* 86/2 (H. Pirc)
113. *Cornus mas* Nr inw. 5495 (N. Piórecki)
114. *Cornus mas* Nr inw. 5497 (N. Piórecki)
115. *Cornus mas* Nr inw. 5753 (J. Piórecki)
116. *Cornus mas* Nr inw. 6774 (J. Piórecki)
117. *Cornus mas* Nr inw. 18741 (N. Piórecki)

Currently Bolestraszyce Arboretum has cornelian cherries growing in the pomological areas for visitors as well as in the following pomological areas: “Jerzy Piórecki’s Orchard” with its cornelian cherry avenue planted in 1989, the “Experimental Cornelian Cherry Orchard in front of the Fort”, the “Orchard Behind the Fort” and the cornelian cherry avenue from 2020. The map of the Arboretum’s orchards is shown in Fig. 24. In front of the XIIIb Fort there is an experimental cornelian cherry orchard (Figs. 4-5), where the first examples were planted in 2007 and came from the Botanical Garden – Centre for the Preservation of Biological Diversity in Powsin. In 2008 more

cornelian cherries were planted which came from Svitlana Klymenko's collection from the Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv and from nurseries from Donske in Crimea (var. S. Klymenko). Another group of cornelian cherries from Professor Klymenko were planted in October 2009, including cultivars such as 'Ugolek', 'Alesha' and 'Semen'. The next plantings were done in 2013, when the collection was expanded

Fig. 4. The cornelian cherry orchard below Fort XIIIb, aerial view, 2020, photo Ł. Malicki with new cultivars: 'Grenader', 'Koralovyi Marka', 'Mrija Shajdarovoi', 'Vavylovets', and 'Pryorskyi'.

In the upper part of this plot, closer to the fort, the cornelian cherries were planted in 2010; Ukrainian and Bolestraszyce cultivars are growing here (inter alia registered and others, recently bred) as well as cultivars purchased from nurseries, such as 'Aurea', 'Tricolor', 'Variegata', 'Happy Face', and 'Golden Glory'.

In 2015, a selection of cultivars from the Professor S. Białoboka Forestry Arboretum in Stradomia Dolna, part of Syców Forestry District were added, including 'Basia', 'Cecylia', 'Cezar', 'Cynober', 'Cyprian', and 'Cyryl'. In 2020, 'Czarek' and cultivars from Mariusz Zasępa's nursery "Cornus" were added; 'Shan', 'Shumen', 'Pancharewo', and 'Matador'. In 2016, 'Big Red' and 'Kasanlak' were added and, in 2017, 'Spring Glow', 'Alex', and 'Fruchtal'. More cornelian cherries from Mariusz Zasępa were added in 2017, but this time in the "Orchard behind the Fort", along the fence and in the "Orchard in front of the Fort", including the 'Titus' and 'Red Star' cultivars and, in 2018, 'Etiuda', 'Sarmata', 'Minden', 'Expres' and 'Pistriavolistij'.

In 2017, the Arboretum received 12 Austrian cornelian cherries bred by Helmut Pirc from the Department of Dendrology and Garden Plant development of the Schönbrunn Research Centre in Austria, e.g., *Cornus mas* var. *xanthocarpa* Bean, 'Hecoma', *Cornus mas* 90/2, and *Cornus mas* 99/1B, which can be found at the end of the cornelian cherry avenue, which is one of Narcyz Piórecki's new projects to mark the 45th anniversary of Bolestraszyce Arboretum. Simultaneously, for many years the Arboretum has run tests of vegetative reproduction and, since 2009, every year heavy fruiting cultivars are grafted in the Arboretum's nurseries through the T-shape budding method (Fig. 6).

THE FIRST POLISH CULTIVARS OF CORNELIAN CHERRY

Twelve cultivars were selected from Jerzy Piórecki's Bolestraszyce collection, which includes the most valuable examples gathered from south-eastern Poland. He made the selection on the basis of their morphological and utilitarian characteristics and also for their physiochemical characteristic in consultation with Professor Jerzy Piórecki and Dr. Alicja Kucharska, a professor at the University of Natural Sciences in Wrocław, as well as Stanisław Sęktas from the University of Forestry in Stradomia Dolna.

Fig. 5. The experimental cornelian cherry orchard, 2020, photo N. Piórecki

Among the first cultivars registered in Poland were ‘Bolestraszycki’, ‘Dublany’, ‘Juliusz’, ‘Florianka’, ‘Kotula’, ‘Kresowiak’, ‘Paczoski’, ‘Podolski’, ‘Raciborski’, ‘Słowianin’, ‘Swietłana’ and ‘Szafer’ (Fig 7). The Forestry Arboretum at Stradomia Dolna participated in the first registration of five cultivars. The Central Centre for Research into Crops gave the exclusive right to the following cultivars between 2008-2017:

Cornus mas ‘Podolski’ – 21.02.2008 (cultivar breeder: Arboretum and Department of Physiography, breeder’s representative: Jarosław Sęktas, Forestry Arboretum of Stradomia Dolna, Syców Forestry District).

Cornus mas ‘Słowianin’ – 21.02.2008 (cultivar breeder: Arboretum and Department of Physiography, breeder’s representative: Jarosław Sęktas, Forestry Arboretum of Stradomia Dolna, Syców Forestry District).

Cornus mas ‘Szafer’ – 21.02.2008 (cultivar breeder: Arboretum and Department of Physiography, breeder’s representative: Jarosław Sęktas, Forestry Arboretum of Stradomia Dolna, Syców Forestry District).

Cornus mas ‘Bolestraszycki’ – 4.02.2010 (cultivar breeder: Arboretum and Department of Physiography, breeder’s representative: Jarosław Sęktas, Forestry

Arboretum of Stradomia Dolna Syców Forestry District).

Cornus mas 'Florianka' – 4.02.2010 (cultivar breeder: Arboretum and Department of Physiography, breeder's representative: Jarosław Sęktas, Jarosław Sęktas, Forestry Arboretum of Stradomia Dolna, Syców Forestry District).

Cornus mas 'Dublany' – 8.02.2013 (cultivar breeder: Arboretum and Department of Physiography).

Cornus mas 'Kresowiak' – 8.02.2013 (cultivar breeder: Arboretum and Department of Physiography).

Cornus mas 'Paczoski' – 8.02.2013 (cultivar breeder: Arboretum and Department of Physiography).

Cornus mas 'Juliusz' – 10.02.2014 (cultivar breeder: Arboretum and Department of Physiography).

Cornus mas 'Kotula' – 17.02.2017 (cultivar breeder: Arboretum and Department of Physiography).

Cornus mas 'Raciborski' – 17.02.2017 (cultivar breeder: Arboretum and Department of Physiography).

Cornus mas 'Swietłana' – 17.02.2017 (cultivar breeder: Arboretum and Department of Physiography).

The names of the cultivars of the Bolestraszyce collection are taken from the surname or first name of the botanists Władysław **Szafer** (1886–1970), Bolesław **Kotula** (1849–1898), Józef **Paczoski** (1864–1942), and Marian **Raciborski** (1863–1917) and other people involved with cornelian cherries, either directly (Svitlana Klymenko; cultivar **Swietłana**) or indirectly (**Juliusz** Słowacki). Cultivar names also come from place names (**Bolestraszyce**, **Dublany**, **Florianka**), historical and geographical lands (Podole; the **Podolski** cultivar), ethnic groups (people from the *kresy* or eastern borderlands; **Kresowiak**) or from the Slavonic speaking peoples (**Słowianin**).

Below we present a short biography of the people, places, historical and geographical lands, ethnic groups and population group names.

Botanists and other people connected, directly or indirectly, with cornelian cherry:

- Władysław **Szafer** (1886–1970) – a professor of the Jagiellonian University, Director of Kraków Botanical Garden and the Jagiellonian University Botanical Institute.
- Bolesław **Kotula** (1849–1898) – lecturer, researcher of the flora from the regions around Przemyśl and Lviv in the first half of the 19th century as well as the mountain flora of the Tatras and Tyrol.
- Józef **Paczoski** (1864–1942) – a professor at Poznań University, member of the Polish Academy of Arts and Sciences, researcher into the flora of the *Puszcza Białowieska,* and creator of the foundations of phytosociology.
- Marian **Raciborski** (1863–1917) – a lecturer at, ia., the Agricultural University in Dublany, the Jagiellonian University, Director of the Botanical Garden in Kraków, one of the first palaeobotanists in Poland, and a pioneer of the environmental protection movement in Poland.
- **Svitlana** Klymenko – a botanist, a breeder of Ukrainian cultivars of cornelian cherry at the Botanical Garden of the Ukrainian Academy of Sciences in Kyiv, who works closely with breeders and scientists from Poland.
- **Juliusz** Słowacki (1809–1849) – poet, a great Polish romantic, born in Krzemieniec, where there were many cornelian cherries in the landscape and the fruits were well-known. The heyday of Krzemieniec didn't last long, but he considered the place his little homeland.

Fig. 6. The cornelian cherry nursery at the Arboretum, 2020, photo. N. Piórecki

Cornus mas 'Podolski'

Cornus mas 'Słowianin'

Cornus mas 'Szafer'

Cornus mas 'Bolestraszycki'

Cornus mas 'Florianka'

Cornus mas 'Dubliany'

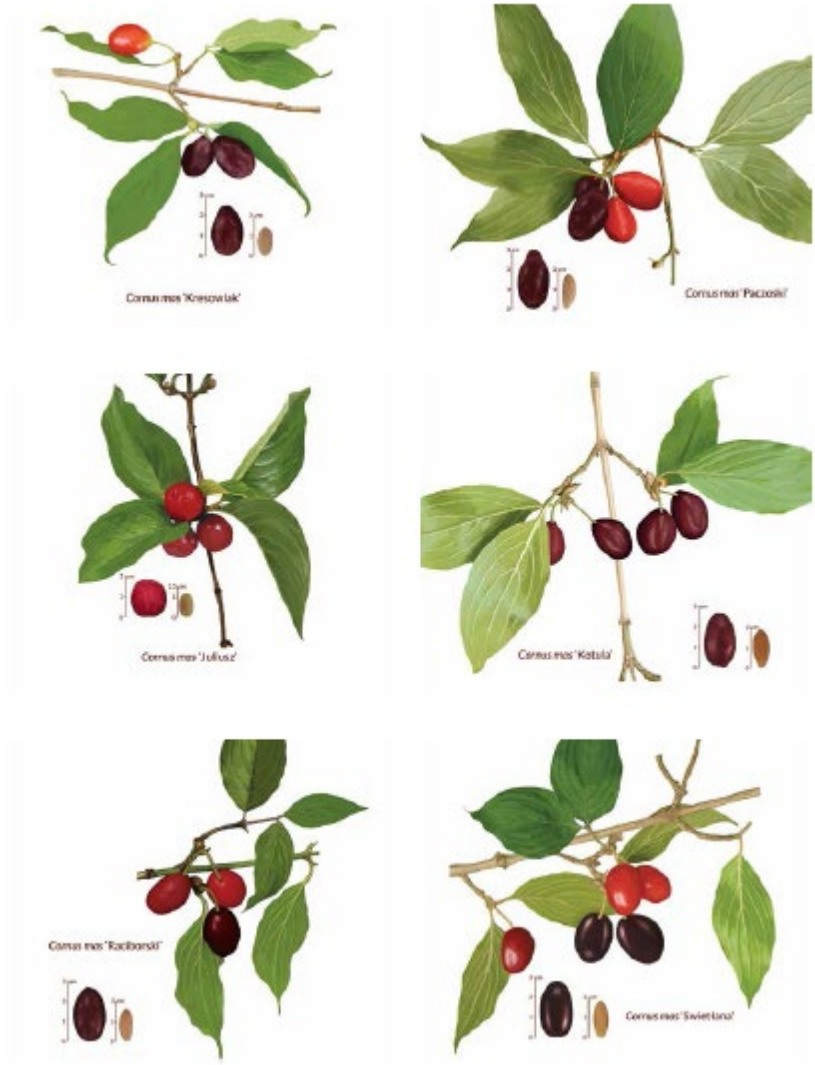

Fig. 7. The first cultivars of cornelian cherry *Cornus mas* L. from the Bolestraszyce collection registered in Poland. Illustration J. Rylke

Places, historical and geographical areas, ethnic group and name of a population group:

– **Dublany** – 8km north east of Lviv. In 1856 the Dublany Agricultural School was established, which later became the Agricultural University. In 1919 it was incorporated into Lviv Polytechnic as the Faculty of Agriculture and Forestry. This formed the foundation for newly established universities in western Poland after WWII. The school in Dublany is a significant part of the history and scientific

tradition of the University of Life Sciences in Wrocław, and for the entire Wrocław academic community.

- **Bolestraszyce** – In 1975, the Arboretum and Department of Physiography, and along with it the first Polish collection of cornelian cherries, was established on the sight of an old manor house, owned in the 19th century by the exceptional painter, Piotr Michałowski.
- **Florianka** – a village near Zwierzyniec, a former forest settlement of the Zamoyski Family trust, located on the edge of the Zwierzyniec forests at the former road leading from Zwierzyniec to Górecko Stary. In 1830, the first forestry buildings were built here, including a forester's lodge and two shelters, and a few years later a farm, and then orchards and a garden nursery were established, of which single cornelian cherry bushes have survived to this day. Currently, the Roztocze National Park runs a conservation breeding programme for Polish horses '*Konik Polski*' here.
- **Podole** – the name of the historical and geographical region (currently in the territory of Ukraine and Moldova). Podolia has an important place in Polish history and culture. In pre-partition Poland, it was a region of key strategic importance due to the fertile soil and the network of fortresses that defended the Republic of Poland against the invasions of Tatars and Turks. The most important and famous of them was located in the capital of the region - Kamieniec Podolski. The description of the tenement fortress was popularized by Henryk Sienkiewicz in the novel Pan Wołodyjowski. The last owners of Bolestraszyce - the Zajączkowski family - came from Podolia.
- **Kresowiak** - name of the ethnic group of Polish population resulting from Polish colonization of the eastern territories (the *Kresy*). Colloquially, the name for people from the former eastern territories of the Republic of Poland before the border changes after World War II.
- **Słowianie** – Slavs - a group of people speaking the Slavic language with common cultural sources, origin, similar customs, rituals and beliefs.
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NATIONAL COOPERATION

Bolestraszyce Arboretum's cornelian cherries have attracted the interest of many botanical gardens and scientific institutions in Poland, incl. the already mentioned **Forest Arboretum** in Stradomia Dolna, Syców Forest District,

which in 2004 received seeds from the first cornelian cherry orchard established by Jerzy Piórecki. This material was used to create a seven-hectare cornelian cherry orchard in the Arboretum near Syców. Stanisław Sęktas, the then head of the Arboretum, bred other Polish cultivars of cornelian cherry from it, such as ‘Basia’, ‘Cecylia’, ‘Cezar’, ‘Cyryl’, ‘Czarek’, ‘Cynober’ and ‘Cyprian’. In 2010, meanwhile, Konrad Forysiak started work on the reproduction of cornelian cherry in *in vitro* cultures. Micro-propagation of the 'Juliusz' and 'Słowianin' cultivars has been successfully completed and both are already on sale. In 2008, Bolestraszyce Arboretum donated its first cultivars (including 'Juliusz', 'Paczoski', 'Podolski', and 'Szafer') to Wojsławice Arboretum; a branch of the Botanical Garden of the University of Wrocław (50 km from Wrocław). The remaining Polish cultivars of cornelian cherry were added in later years (2010 and 2013). From 2017–2019 at Wojsławice Arboretum, as part of the EU project "Increasing the existing biological diversity of the Arboretum with cultivars of Polish breeding", led by Hanna Grzeszczak-Nowak, the Polish Millennium Garden was established according to the concept of prof. Tomasz Nowak and H. Grzeszczak-Nowak. The name of this establishment refers to the 1000th anniversary of the Battle of Germany and the dynamically developing Polish plant breeding programme. In the Millennium Garden, among Polish fruiting plants, cultivars of cornelian cherry from the Bolestraszyce collection selection were displayed (Fig. 8–9). The study "Catalogue of 1000 Polish Varieties of Plants" (Nowak and Grzeszczak-Nowak 2018), inspired by the Polish Millennium Garden, contains descriptions of 17 Polish cultivars of cornelian cherry, including 12 bred at Bolestraszyce and five at the Forestry Arboretum in Stradomia Dolna.

The Arboretum also cooperates with many **nurseries** , which has led to the development of various cultivars of cornelian cherry and their introduction to Polish and European markets.

In 2004, the Arboretum started cooperating with the Agricultural University in Wrocław (currently Wrocław University of Environmental and Life Sciences, UPWr), and specifically with the Department of Fruit and Vegetable Processing Technology (currently the Department of Fruit, Vegetable and Plant

Nutraceutical Technology - KTOWiNR). Professor Alicja Kucharska, (UPWr) and Professor Anna Sokół-Łętowska (UPWr) are responsible for contacts and cooperation with the Arboretum (Fig. 10).

For 16 years, this department has studied the basic composition (content of water, sugars, organic acids, pectic compounds, ash) of fruits (including seeds, flowers, leaves) of various cultivars and ecotypes of cornelian cherries from the Arboretum. Bioactive compounds such as vitamin C, polyphenols, (including red anthocyanin pigments), as well as iridoid compounds, including loganic acid, which is dominant in cornelian cherry, are also determined. The latter compounds were first noted in cornelian cherry by UPWr professors Alicja Kucharska and Antoni Szumny (Department of Chemistry UPWr), and the method of obtaining loganic acid was submitted to the Patent Office of the Republic of Poland as a patent application on 27.07.2009 (Kucharska et al. 2009b).

Fig. 8. Bolestraszyce cultivars of cornelian cherry at the Polish Millenium Garden in Wojsławice Arboretum, 2019, photo A. Kucharska.

Fig. 9. Wojsławice Arboretum with a sign indicating where the Polish cultivars of cornelian cherry bred in Bolestraszyce can be found, 2020, photo Wojsławice Arboretum

It is interesting because, before that date there was no information in the available world literature about the content of loganic acid in cornelian cherry *Cornus mas* L. Iridoids show biological activity, including anti-inflammatory properties. This is important in the context of inhibiting the inflammation that causes many diseases. Iridoid compounds are rarely found in fruits. They are not found in well-known and popular fruits such as apples, pears, strawberries, cherries, or plums. This makes cornelian cherry unique among Polish fruits. Apart from research on the qualitative and quantitative identification of the basic and bioactive components of cornelian cherry, KTOWiNR also investigated the antiradical properties *in vitro* and showed the high antioxidant potential of cornelian cherry. Therefore, in 2010, scientists from UPWr, together with the Director of Bolestraszyce Arboretum, established cooperation with the Medical Academy in Wrocław (now the **Medical University of Wrocław** - UMW), and more precisely with the Department of Pharmacology, where Professor Tomasz Sozański works. As part of joint research, a cornelian cherry lyophilizate (dried cornelian cherry obtained using the best drying method, i.e., freeze-drying), a purified and equally concentrated fruit extract (iridoid-polyphenolic extract) and fractionated active compounds from cornelian cherry

fruit (anthocyanins and loganic acid) were prepared and *in vivo* biological studies were performed. The anti-inflammatory and antioxidant effects of cornelian cherry compounds have been confirmed. It has been shown that the compounds of cornelian cherry fruit *Cornus mas* can be used to prevent and support the treatment of cardiovascular diseases, such as ischemic heart disease, hypertension, myocardial infarction, atherosclerosis, and stroke (Sozański et al. 2011, 2012, 2013, 2014a, 2014b, 2015, 2016a, 2016b, 2017, 2018, 2019a, 2019b). It has also been shown that cornelian cherry fruit compounds do not have any great side effects on the body, as is the case with, for example, statins.

Fig. 10. Cornelian cherry products in the UPWr laboratory, made by Professor A. Kucharska, 2020, photo M. Gibała

Research was also conducted on the use of cornelian cherry compounds in the treatment and prevention of osteoporosis. The research was led by Dr. Beata Nowak from the Department of Pharmacology at the Medical University of Warsaw. A beneficial effect of cornelian cherry compounds on disturbances in bone mineralization and structure was observed. In studies with a diet rich in

cholesterol, lowering bone mineral density, iridoid-polyphenol extract from cornelian cherry inhibited the loss of bone mineral density, which was the subject of a patent application in 2017 (Nowak et al. 2017) and presentation at international conferences (Nowak et al. 2018, 2019) and a scientific publication (Nowak et al. 2020). Research in this direction will be continued in the future on other research models.

The Arboretum took part in further medical research, led by Dr. Dorota Szumny, also from the Department of Pharmacology of the Medical University of Warsaw, towards the external use of a 0.7% loganic acid solution in the adjunctive **treatment of glaucoma**. The studies showed that loganic acid decreased the intraocular pressure (at 1, 2, 3 and 5 hours after administration) and increased the mean value of blood flow in the iris (at 1 and 2 hours after administration). At the same time, no irritating or sensitizing effects of the test preparation of loganic acid were observed at the application site, which gives hope for its potential use, like eyebright (*Euphrasia oficinalis*) for eye diseases. The research ended with a patent (Szumny et al. 2012), presentation at an international conference (Szumny et al. 2015a) and a scientific publication (Szumny et al. 2015b).

Patented medical solutions were presented at the following invention fairs:

- 61st World Exhibition on Inventions, Research and New Technologies "Brussels Innova", 15–17.11.2012
- International Innovation and New Technology Fair, Inno-Tech Expo 2013, Kielce 17–19.10.2013
- Innovation and Business Fair 4 FUTURE, Wrocław 23–24.10.2013

The research project on the preparation of cornelian cherry and how it is used to produce compositions for the prevention and treatment of cardiovascular diseases, as claimed in the patent (Sozański et al. 2012), received the Silver Medal in the competition at the 61st International Trade Fair Invention, Research and New Techniques BRUSSELS INNOVA, Brussels, November 15–17, 2012

(Fig. 11). The research described in this project also secured a Diploma from the Minister of Science and Higher Education.

At the University of Life Sciences in Wrocław, in addition to research on the physicochemical and antioxidant properties of the raw material, research is also being conducted on the possibility of **using cornelian cherry fruit for the production of j**uices, compotes, wine, jams, tinctures, and pickled cornelian cherry (Kucharska et al. 2011a, 2011b , 2012, 2013b, 2014b, 2019, Piórecki et al. 2012, Czyżowska et al. 2014, 2015, 2017, Sokół-Łętówska et al. 2014) and innovative products based on cornelian cherry juice, such as vinegars, beer, meads or apple ciders enriched with cornelian cherry juice (Adamenko et al. 2018, 2019, Kawa-Rygielska et al. 2018, 2019).

The Department of Fermentation and Grain Technology of the UPWr participated in the research on innovative fermented products (Prof. Joanna Kawa-Rygielska and Dr. Kinga Adamenko), while Dr. Agata Czyżowska from the Institute of Fermentation Technology and Microbiology of the Lodz University of Technology was invited to conduct research on the fermentation of green cornelian cherry (Czyżowska et al. 2015, 2017) and the production and evaluation of the properties of cornelian cherry wine (Czyżowska et al. 2014). Part of the research conducted at the University of Life Sciences in Wrocław in cooperation with Bolestraszyce Arboretum from 2007–2010 was carried out as part of the Scientific Research Committee (KBN) project no: N N312 2864 33, entitled "Determination of the chemical composition, antiradical properties and processing possibilities of cornelian cherry (*Cornus mas* L.) fruits", financed by the Ministry of Science and Higher Education.

The KTOWiNR laboratory also tests **products based on pre-war recipes** and traditionally made in the Arboretum (Fig. 12).

Since 2002, the pickling of cornelian cherry has been dealt with by Dr. N. Piórecki, who has managed to recreate the recipe for this product. As a result, on 26th February 2008, pickled cornelian cherry was entered on the List of Traditional Products of the Ministry of Agriculture and Rural Development

(Fig. 13).

Cornelian cherry, pickled at the Arboretum, is much appreciated. For example, in 2017 it won a prize in the "Wild, we know and ... eat" competition organized as part of the Klub Gaja project (an environmental organization), "Tree Day - among the fields". In the following years, the recipes of other cornelian cherry products were recreated, including cornelian cherry vinegar, jellies, compotes and preserves. Since 2008, cornelian cherry products have been prepared by Anna Łocha, who has received awards and distinctions in many competitions. In the Arboretum, fruit is harvested using the traditional method. Mats are placed under the bushes, and the ripe fallen fruits are picked by hand (Fig. 14).

Fully mature fruits, which are still green, are harvested at the stage of incomplete maturity and are used for pickling.

Fig. 11. A diploma for Silver Medal (2nd place) at the 61st International Fair of Invention, Research and NewTechnology, BRUSSELS INNOVA.

Fig. 12. Traditional cornelian cherry products prepared at the Arboretum, 2020, photo N. Piórecki

Fig. 13. Pickled cornelian cherry prepared at Bolestraszyce Arboretum, 2020, photo N. Piórecki

Fig. 14. Harvesting the fruits at Bolestraszyce Arboretum, 2020, photo N. Piórecki

Fig. 15. Traditional cornelian cherry products prepared at Bolestraszyce Arboretum, 2020, photo N. Piórecki

For training and educational purposes, as well as for outdoor exhibitions and events, the following products are made with cornelian cherry alone or as an ingredient (Fig. 15):

- Bolestraszyce cornelian cherry compote
- Bolestraszyce cornelian cherry drink
- Bolestraszyce cornelian cherry jelly
- Bolestraszyce cornelian cherry jam
- Pickled cornelian cherry
- Cornelian cherry apple marmalade
- Cornelian cherry and wild garlic pesto
- Pickled cornelian cherry pesto
- Cornelian cherry vinegar
- Cornelian cherry jellies
- Apples baked with cornelian cherry filling
- Cornelian cherry and Kousa cornelian cherry jam

The Bolestraszyce Arboretum also cooperates with the **University of Rzeszów**. As part of this cooperation, a research project has been running since 2017 on the impact of consuming a cornelian cherry product and physical activity on the values of selected physiological

parameters of athletes (Fig. 16). The project is coordinated by Dr. Bartłomiej Czarnota.

In 2013, the Arboretum established cooperation with the molecular biologist, Dr. Iwona Szyp-Borowska, from the Department of Silviculture and Genetics of Forest Trees of the Forest Research Institute in Raszyn. The result of this cooperation is a scientific article, published in 2014, on the origin of the Polish cornelian cherry population (Wadl et al. 2014).

INTERNATIONAL COOPERATION

Bolestraszyce Arboretum has also established international cooperation with scientific departments around the world that deal with cornelian cherry, including. with the **Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv** [work on new cultivars, consultations and joint scientific publications and conference reports (Klymenko et al. 2016, 2019, Kucharska et al. 2011c, 2013c, 2015a, 2015b, Włoszczyńska et al.. 2019)], **Lviv University** [research expeditions, conference report (Prokopiv et al. 2017)], **Tauri University in Simferopol** to 2014 (research trips in Crimea, joint scientific publications - Zhaldak et al. 2014) and conference reports (Kucharska et al. 2013a, 2013b, 2014b), **University of Life Sciences in Nitra**, Slovakia - conference organization, participation in the "Farmers Educa - neglected and underused species in socio-economic development rural areas" project of the International Visegrad Fund, joint scientific publications (Klymenko et al. 2019), **Schönbrunn Higher Federal Institute of Horticulture in Vienna, Austria** - exchange of genetic material and experience in the cultivation and selection of cornelian cherry cultivars, citing Bolestraszyce cultivars in an encyclopaedia (Pirc 2015) and articles (Pirc 2020), and the **University of Tennessee** (Institute of Entomology of Agriculture and Plant Pathology) in Knoxville in the United States (cornelian cherry genetic research, joint scientific publication - Wadl et al. 2014).

Collaboration with Prof. Svitlana Klymenko from the Botanical Garden in Kyiv was launched in the early 1990s by Professor Jerzy Piórecki. This cooperation was tightened at the beginning of the 21st century on the

initiative of Dr. Narcyz Piórecki (Fig. 17). There was an exchange of plant material between the institutions, as well as extensive consultations on the cultivation of cornelian cherry and other plant species; there were also joint field trips.

The cooperation of Bolestraszyce Arboretum with Polish and foreign scientific research institutions working on cornelian cherry resulted in several **patent applications** (one application - Nowak et al. 2017) and subsequent patents (3 patents), (Sozański et al. 2011, 2012, Szumny et al. 2012), **scientific publications** in renowned world journals (20 articles and monographs were published) - (Kucharska et al. 2011b, 2011d, 2012, 2015a, 2015b, Sozański et al. 2014b, 2016b, 2017, 2018, 2019b, Zhaldak et al. 2014, Szumny et al. 2015b, Klymenko et al. 2016, Czyżowska et al. 2017, Adamenko et al. 2018, 2019, Kawa-Rygielska et al. 2018, 2019, Nowak et al. 2020, Szandruk-Bender et al. 2020), **reports and posters** at national (11 works), (Kucharska et al. 2009a, 2011a, 2011c, 2012, 2013c, 2013e, 2014a, 2017, 2019, Piórecki et al. 2010, 2014) and international (26 works), (Kucharska et al. 2007, 2010, 2013a, 2013b, 2013d, 2014b, 2015a, Piórecki et al. 2012, 2013, Sozański et al. 2013, 2014a, 2015, 2016a, 2019a, Czyżowska et al. 2014, 2015, Mizgier et al. 2014a, 2014b, Sokół-Łętowska et al. 2014, Szumny et al. 2015a, Klymenko et al. 2016, 2019, Prokopiv et al. 2017, Nowak et al. 2018, 2019, Wloszczyńska et al., 2019) conferences, implementation of research project no. N N312 2864 33 financed by the Ministry of Science and Higher Education, as well as scientific promotions (defended: two professorial theses, one doctorate, 21 Master's theses, 10 engineering theses and in progress: one professorial, five doctorates, one MA thesis, and one engineering thesis), (as of 2020).

Fig. 16. The competitor after performing a progressive test on the treadmill with the use of Cosmed K5 under the supervision of Profesor Emilian Zadarkow, of Rzeszów University, in the Diagnostics Laboratory in Sports and Health Training, 2019, photo B. Czarnota

Fig. 17. From left to right: Helmut Pirc (Austria), Svitlana Klymenko (Ukraine), Jerzy Piórecki, Marzena Kluz, Narcyz Piórecki; Second row: Piotr Markut, 2016, photo Bolestraszyce Arboretum

THE INTERNATIONAL CORNELIAN CHERRY FESTIVAL AND PROMOTION OF CORNELIAN CHERRY

Since 2012, every year on the second Sunday of September, Bolestraszyce Arboretum has organized the International Cornelian cherry Festival, where the main emphasis is on popularizing knowledge about cornelian cherry, its cultivation, reproduction, and breeding requirements as well as its properties and application (Fig. 18). The event is organized under the patronage of the Marshal of the Podkarpackie Province.

The Festival promotes cornelian cherry varieties grown in the Bolestraszyce Arboretum and promotes fruit and fruit preserves that can be bought or tasted during the Festival (Fig. 19). On this day, the pomological collections are open to visitors.

During the Festival, a scientific conference is organized, where the **employees of the Arboretum** (Narcyz Piórecki, Elżbieta Żygała, Ewa Antoniewska), **enthusiasts / nurserymen** (Tadeusz Kusibab, Mariusz Zasępa, Krzysztof Zieliński and Hans Weiss, promoting the Austrian Cornelian Cherry Valley in the Pielach river valley and cornelian cherry products) and **scientists from domestic and foreign institutions** deliver lectures on cornelian cherry or other fruit species (Figs. 20–22). Among the scientists at the Festival were various specialists, such as gardeners, botanists (Prof. Svitlana Klymenko, Dr. Olga Grygorieva, Dr. Svitlana Zhaldak, Dr. Helmut Pirc, Piotr Banaszczak, MSc), who presented the cultivation of cornelian cherry and other plants, food technologists (Professors Alicja Kucharska and Anna Sokół-Łętowska from UPWr) presenting the chemical composition of fruit and the possibilities of its production in the past and today, Dr. Tomasz Sozański, MD, Professor of the Medical University of Warsaw and Dr. Danuta Mył, MD, PhD, indicating the healing properties of cornelian cherry and other plants, and landscape architect (André Gayraud) describing ornamental cornelian cherries, but also Polish philologist (Dr. Jarosław Malicki) presenting the cornelian cherry in language and culture.

Fig. 18. 1st Podkarpackie Cornelian cherry Festival, 2012, photo N. Piórecki

The detailed programmes of the nine festivals held so far are presented below:

1st Podkarpackie Cornelian Cherry Festival, 23rd September 2012

– Scientific conference *Cornelian cherry - the forgotten heritage.*

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *Ukrainian cultivars of cornelian cherry.*

Professor Alicja Kucharska (University of Life Sciences in Wroclaw). *Tradition and modernity in the management of the cornelian cherry.*

Dr. Narcyz Piórecki (Arboretum and Department of Physiography, University of Rzeszów). *The origin of the Bolestraszyce Cornelian cherry Collection.*

Dr. Svitlana Zhaldak (Tavri National University in Simferopol). *Ecological and biological properties of some representatives of the genus Cornus L. in the environment of the foothills of Crimea.*

2nd Cornelian Cherry Festival – 15th September 2013

– Scientific conference *Cornelian cherry - the forgotten heritage.*

Fig. 19. Cornelian cherry products on display during the Cornelian Cherry Festival, 2013, photo N. Piórecki

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *Cornelian cherry species in Ukraine: current state and prospects for use.*

Professor Alicja Kucharska (University of Life Sciences in Wroclaw). *Cornelian cherry - a valuable raw material for processing and pharmacy.*

Dr. Narcyz Piórecki (Arboretum and Department of Physiography, University of Rzeszów). *Cornelian cherry Cornus mas L. in Bolestraszyce Arboretum and in south eastern Poland*

Dr. Svitlana Zhaldak (Tavri National University in Simferopol). *Intra-species diversity of cornelian cherry (Cornus mas L.) growing wild in the Crimean Peninsula.*

3rd Cornelian Cherry Festival, 14th September 2014

– Scientific conference *Cornelian cherry and other lesser known edible plants*

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *Little known edible plants.*

Tadeusz Kusibab, MSc. (Horticultural Farm - *in vitro* Krakow). *Advances in the micro-reproduction of cornelian cherry (Cornus mas).*

Dr. Jarosław Malicki (University of Wrocław. Faculty of Philology. Institute of Slavic Philology. Department of Bohemian Studies). *Cornelian cherry in language and culture.*

Dr. Narcyz Piórecki (Arboretum and Department of Physiography, University of Rzeszów). *New Polish cornelian cherry varieties reported in 2014.*

Dr. Tomasz Sozański (Medical University of Wrocław). *Medicinal properties of cornelian cherry.*

Fig. 20. The opening of the scientific conference as part of the 1st Podkarpackie Cornelian cherry Festival (from left to right: Alicja Kucharska, Svitlana Zhaldak, Svitlana Klymenko, Narcyz Piórecki), 2012, photo Bolestraszyce Arboretum

4th Cornelian Cherry Festival, 13th September 2015

– Scientific conference *Cornelian cherry and other lesser known edible plants*

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *Little known edible plants.*

Professor Alicja Kucharska (University of Life Sciences in Wroclaw). *Wild-growing and forgotten fruiting plants.*

Krzysztof Zieliński, MA (Association for the Development and Promotion of Podkarpackie "Pro Carpathia" *Local and regional product as an element of healthy eating.*

Dr. Narcyz Piórecki (Arboretum and Department of Physiography, University of Rzeszów). *New Polish cornelian cherry varieties reported in 2014.*

Dr. Tomasz Sozański (Medical University of Wrocław). *Medicinal properties of cornelian cherry.*

5th Cornelian Cherry Festival, 11th September 2016

Scientific conference *Kamchatka berry - a plant worthy of note*

Dr. Olga Grygorieva (Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *The cultivation of Diospyros virginiana* L

Dr. Danuta Myłek ('PROGRES' Allergy Centre in Stalowa Wola). *You are what you eat, drink and know. You can prevent developing cancer yourself.*

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *New cultivars of cornelian cherry, peculiarities of breeding.*

Professor Alicja Kucharska, Dr. Narcyz Piórecki (Wrocław University of Environmental and Life Sciences, Arboretum and Department of Physiography, University of Rzeszów). *Kamchatka berry - a plant worth recommending.*

A concert by "Galicjazz".

Gaja Club - Tree Day educational workshops – in the fields.

Fig. 21. The scientific conference held during the 6th International Cornelian cherry Festival, held in the 100 year old building from Kalwaria Pacławska, 2017, photo N. Piórecki

6th International Cornelian cherry Festival, 10th September 2017

Scientific conference *Decorative cornelian cherries – little known plants.*

Landscape architect André Gayraud (Jardins d'Exception, Hautecourt, Francja). *Decorative cornelian cherries* and promotion of a book about *Cornus.*

Dr. Danuta Myłek ('PROGRES' Allergy Centre in Stalowa Wola). *Obesity in children.* After the lecture, promotion of the book *From doctor to chef.*

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *Cornelian cherry. Reproduction and growing. New cultivars.*

Concert: Grzegorz Kapcia recital.

7th International Cornelian cherry Festival, 9th September 2018

Expert forum with **Professor Svitlana Klymenko** (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv), **Professor Jakub Dolatowski** (Arboretum and Department of Physiography), **Dr. Andriy Prokopiv** (Botanical Garden of Lviv

University), **Dr Maciej Oziębłowski** (University of Life Sciences in Wroclaw), **Mariusz Zasępa** ("Cornus" Nursery) and **Hans Weiss** from Austria, chaired by **Dr. Narcyza Piórecki** (Arboretum and Department of Physiography, University of Rzeszów).

Concert by "Efemeryda Jass Band".

Fig. 22. 6th Cornelian Cherry Festival. From left to right: Jan Brindza, Narcyz Piórecki, Svitlana Klymenko, André Gayraud, 2017, photo Bolestraszyce Arboretum

8th International Cornelian cherry Festival, 8th September 2019

Scientific conference:

Ewa Antoniewska (Arboretum and Department of Physiography). *Roadside plants in the past and today.*

Piotr Banaszczak (Arboretum of the Warsaw University of Life Sciences in Rogów). *Unusual and surprising edible plants.*

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *World novelties among 'wild' orchard plants.*

Elżbieta Żygała (Arboretum and Department of Physiography). *Historical apple cultivars in south-eastern Poland.*

Cookery workshops - *Discover the region through food, i.e. local culinary hits based on cornelian cherry*, led by members of "ADSUM", the Association of Residents and Supporters of Ostrów and Przemyśl Land.

Open air concert – *Cornelian cherry with a song,* sung by soloists and the choir of the 5th Podhale Rifle Battalion in Przemyśl

9th International Cornelian Cherry Festival, virtual edition, September 2020

Films from the series – Virtual Cornelian Cherry Festival of Bolestraszyce Arboretum 2020.

Professor Svitlana Klymenko (The Botanical Garden of the National Academy of Sciences of Ukraine in Kyiv). *New cultivars of cornelian cherry developed in Ukraine: the basics of cultivation.*

Professor Alicja Kucharska (University of Life Sciences in Wroclaw). *Cornelian cherry on the plate and in the laboratory.*

Dr. Tomasz Sozański (Medical University of Wrocław). *Biological properties of cornelian cherry.*

Mariusz Zasępa ("Cornus" nursery). *Cornelian cherry as an orchard plant.*

Elżbieta Żygała (Arboretum and Department of Physiography). *Historical apple cultivars in south-eastern Poland, Part 2.*

Presentation:

Professor Anna Sokół-Łętowska (University of Life Sciences in Wroclaw). *Fruit liqueurs past and present.*

Each Festival sees many exhibitors presenting. For example, in 2019 there were 53 exhibitors, including the owners of plant nurseries, representatives of various associations, foundations, housewives' circles, the Podkarpackie Agricultural Advisory Centre in Boguchwał and owners of various types of organic farms where cornelian cherry products are produced (Fig. 23).

The Festival is very popular; on this day the Arboretum is visited by over 4,000 people.

The Arboretum widely promotes the cornelian cherry tradition and traditional and regional creations with many different partners, incl. with the Marshal's Office of the Podkarpackie Voivodeship in Rzeszów (Department of Agriculture, Geodesy and Property Management, Department of Multifunctional Rural Development and High-Quality Food), Polish Dendrology Society (organization of conferences, lectures, publications), the 'Pro Carpathia' Association for the Development and Promotion of Podkarpackie - animator of the Podkarpackie Tastes Cluster, which includes the Bolestraszyce Arboretum, or with the Central European Heritage Association.

The Bolestraszyce Arboretum popularizes cornelian cherry via **lectures**, e.g., at the Nikitsky Botanical Garden in Crimea (2008), at the Fruit Growing Conference in Kraśnik (2017, 2018), during the Dzikowski Nalewek Festival in Tarnobrzeg (2014, 2015, 2018), at the Poviat Starosty in Przemyśl (2015) and at the GARDENIA International Garden and Landscape Architecture Fair in Poznań (2020), (Piórecki 2008a, 2014, 2015a, 2015b, 2017, 2018a, 2018c, 2018d, 2020), **posters**, e.g., at the meetings of the Dendrology Section of the Polish Botanical Society [Zielona Góra in 2006, Szklarska Poręba (Poland) and Pruhonice (Czech Republic) in 2008] and other popular science events and conferences (Piórecki 2006, 2007, 2008b, 2013b), **consultations** (as part of the conference 'High quality food - traditional and regional products - new possibilities and solutions', and as part of the '1st Podkarpackie Festival of Traditional and Regional Borderland Tastes', organized by the Marshal's Office of the Podkarpackie Voivodeship in Rzeszów), (Piórecki 2019a, 2019b), **workshops and presentations** of cornelian cherry products made at the Arboretum and **debates** organized at conferences, e.g., at the 14th Fruit Conference - Blueberry trends, where the expert discussion concerned the practical aspects of cultivation, management and the possibility of selling cornelian cherry fruits and other lesser known species (Piórecki 2018b, 2018e, 2018f, 2019c).

As shown above, the research on cornelian cherry carried out at the Arboretum in Bolestraszyce was pioneering in many aspects of the exploration of this unusual plant. It is worth emphasizing the pioneering activities in the field of securing the Polish genetic pool and in the selection of cornelian cherry varieties, as well as in recreating old recipes for pickled cornelian cherry, cornelian cherry vinegar, jelly and liqueurs.

Currently, work is ongoing into selecting a Polish variety with yellow fruits and on cross-breeds of *C. mas* × *C. officinalis*, which will be more useful in horticulture and for obtaining

iridoid compounds, or for the production of lyophilizates and products with a higher content of bioactive compounds, used in the pharmaceutical industry. By establishing cooperation with Wrocław research units, the arboretum contributed to the initiation of pioneering research in Poland on the physicochemical and biological properties of fruit (for heart disease, osteoporosis or glaucoma) and the production of innovative cornelian cherry products (vinegar, beer, non-alcoholic beers, cider with the addition of cornelian cherry juice). In recent years, there has been an increased scientific interest in cornelian cherry also in other units in Poland, such as: Skierniewice, Poznań or Warsaw, as well as in other countries. The high activity of Arboretum Bolestraszyce also aroused the interest of nurserymen (Bolestraszyce varieties are introduced to trade) and the food and pharmaceutical industry, which, developing evenly, may contribute to the appearance of a greater number of attractive cornelian cherry products on store shelves or effective and bio-valuable supplements cornelian cherry-based diets in pharmacies and promoting healthy eating habits in Polish society and in Europe.

"Cornelian cherry - tasty and healthy" - is the slogan sponsored by Bolestraszyce Arboretum.

Fig. 23. Exhibitors at the 7th Cornelian cherry Festival, 2018, photo N. Piórecki

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