Blue or black bilberry: when the color matters…

Françoise Martz [1] and Päivi Merilä [2] / Luonnonvarakeskus, [1] Rovaniemi and [2] Oulu

Introduction

Bilberry (*Vaccinium myrtillus* L.) is a deciduous shrub with wide distribution in cool temperate regions and mountain areas of Europe and Asia. In addition to the common wild type blue bilberry, it is common to find a **glossy type of black mutants** ("mustamustikka", "tervamustikka" "pikimustikka" in Finnish). Berries from both types of plants are harvested. It is commonly said that black bilberry (glossy type) are mutants lacking waxes. However, a recent study showed almost **similar cuticular wax load** in blue and black berries but a clear **change in wax composition and morphology** between both types of berries [1].

In this pilot study, we addressed the question of the polyphenolic composition in both types of berries (Fig.1).

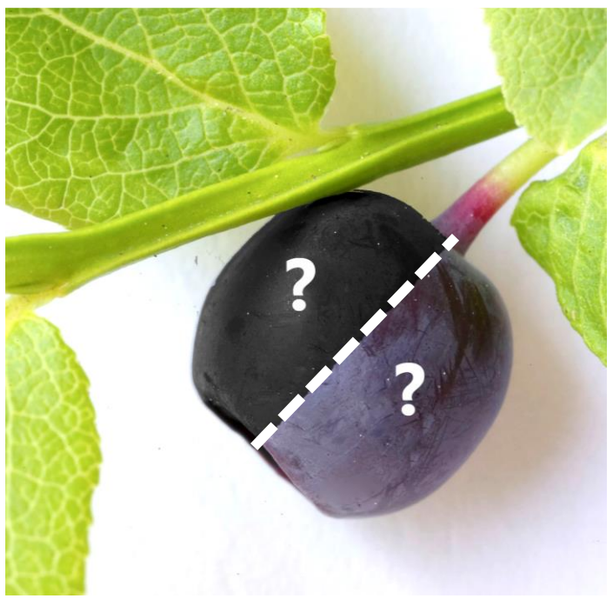

Figure 1. What is the phenolic composition of black or blue bilberries?

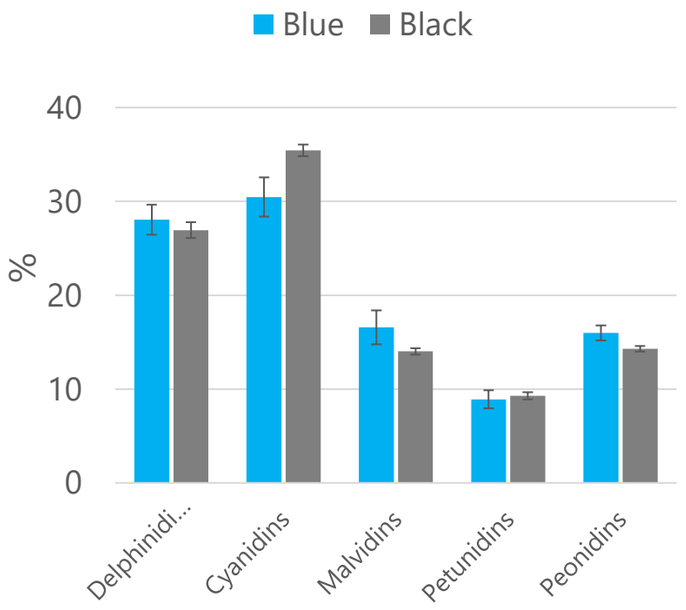

Figure 2. Anthocyanin composition in blue or black berries (weight % of all anthocyanins).

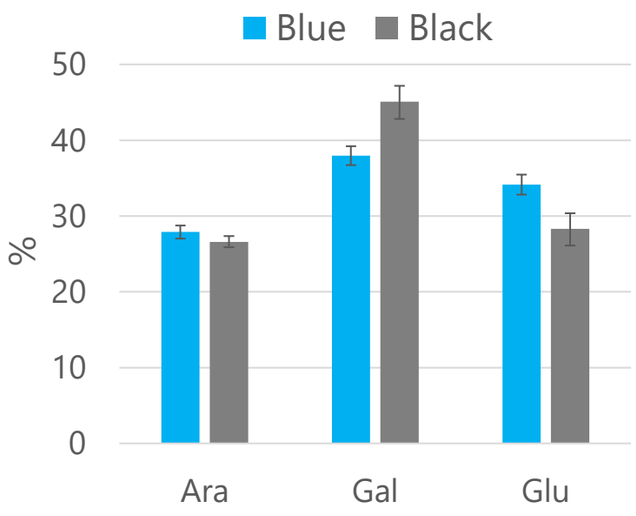

Figure 3. Glycoside composition of cyanidinsin blue and black berries (weight % of all cyanidin glycosides).

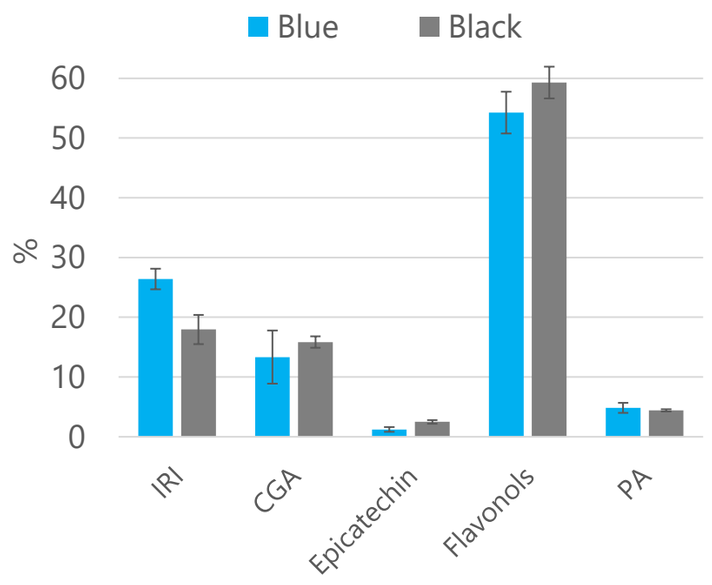

Figure 4. Composition of **non-anthocyanin** compounds in blue and black berries (weight % of all non-anthocyanin compounds)

Results

This pilot study showed some differences between in phenolic composition blue and black bilberries. Soluble phenolics of bilberry are typically composed of more than **80% of anthocyanins** and so analysis of the composition can be divided as **anthocyanins, and non-anthocyanins compounds**. The total amount of soluble phenolics did not show any significant difference between both types of berries (not shown).

Although the total amount of **anthocyanins** was similar between both types of berries, the black berries were **richer in cyanindins** (**Fig. 2**), and particularly the galactoside form (**Fig. 3**). This led to a **decrease in the delphinidin to cyanidin** ratio from **0.92 ± 0.09 to 0.76 ± 0.03** in blue and black berries, respectively.

Among the **non-anthocyanin compounds**, less iridoids but more epicatechin and, in a smaller extend, more flavonols were measured in black berries compared to blue berries (**Fig. 4**).

This pilot study suggests that the **mutation affecting the phenotype of the bilberry also has effects on its phenolic composition**.
However, this result needs additional analyses to be confirmed.

Material and methods

Mature blue and black bilberries were collected in the same site in Pöyliövaara, Rovaniemi in August 2020 (4 samples of each, ca. 10 berries/sample, each collected 2m apart). Fresh frozen berries were analyzed for their soluble phenolics as previously described [2]. Values are **means ± SD, n=4**.

Literature

[1] Trivedi P, Nguyen N, Klavins L, Kviesis J, Heinonen E, Remes J, Jokipii-Lukkari S, Klavins M, Karppinen K, Jaakola L, Häggman H(2021). Analysis of composition, morphology, and biosynthesis of cuticular wax in wild type bilberry (*Vaccinium myrtillus* L.) and its glossy mutant (2021) *Food Chemistry*, 354: 129517

[2] Nguyen MP, Lehosmaa K, Martz F, Koskimäki JJ, Pirttilä AM, Häggman H (2021) Host species shape the community structure of culturable endophytes in fruits of wild berry species (*Vaccinium myrtillus* L., *Empetrum nigrum* L. and *V. vitis-idaea* L.) *FEMS Microbiol. Ecol.* 97: fiab097

luke.fi

Contact:
francoise.martz@luke.fi, 029 532 4419
Paivi.merila@luke.fi, 029 532 4061

This work was supported by the **ECODIVE** project (Karelia CBC program, funded by the EU and Finland).

Luke
LUONNONVARAKESKUS