Validation and application of the UPLC-PDA method for authenticity control and fingerprinting of anthocyans in *Vaccinium* L. berries

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Background

Public interest in beneficial effects of anthocyans considerably enhanced the demand for commercially available anthocyans rich food products and dietary supplements. On account of the prevention of mislabelled origin of *Vaccinium* L. berry's derived natural products, it is critically important to analyze the accumulation of anthocyans among these berries and implement a valuable tool for authentication purposes [1, 2].

Materials and methods

The UPLC-PDA method was developed and validated using bilberries, cranberries, and lingonberries matrixes. The best resolution and sensitivity values, within the shortest time, were achieved by using 10% formic acid (A) and acetonitrile (B) as mobile phase components, with the flow rate of 0.5 mL/min, gradient elution (0–2 min, 95%; 2–7 min, 91%; 7– 9 min, 88%; 9–10 min, 75%; 10–10.5 min, 20%; 10.5–11 min, 20%; 11–12 min, 95% of A), injection volume of 1 µL, and column (ACE C18; ACT, Aberdeen, UK; 100 × 2.1 mm, 1.7 µm) temperature maintained at 30 °C.

Results

Satisfactory UPLC-PDA method system suitability, linearity, precision, trueness, and specificity for the analysis of anthocyans in tested berries extracts were achieved after the development of the experimental conditions. The proposed method ensured the separation of 20 anthocyans in bilberries, 15 in cranberries, and 9 in lingonberries, during 12 min analysis (Fig.1). In comparison with other techniques, our validated method has the advantage of rapidness, accuracy, and detection of aglycones—anthocyanidins or minor anthocyanins. To the best of our knowledge some of them—cyanidin, peonidin, malvidin in cranberries, cyanidin, and 3-glucosides of malvidin and petunidin in lingonberries, have been reported for the first time.

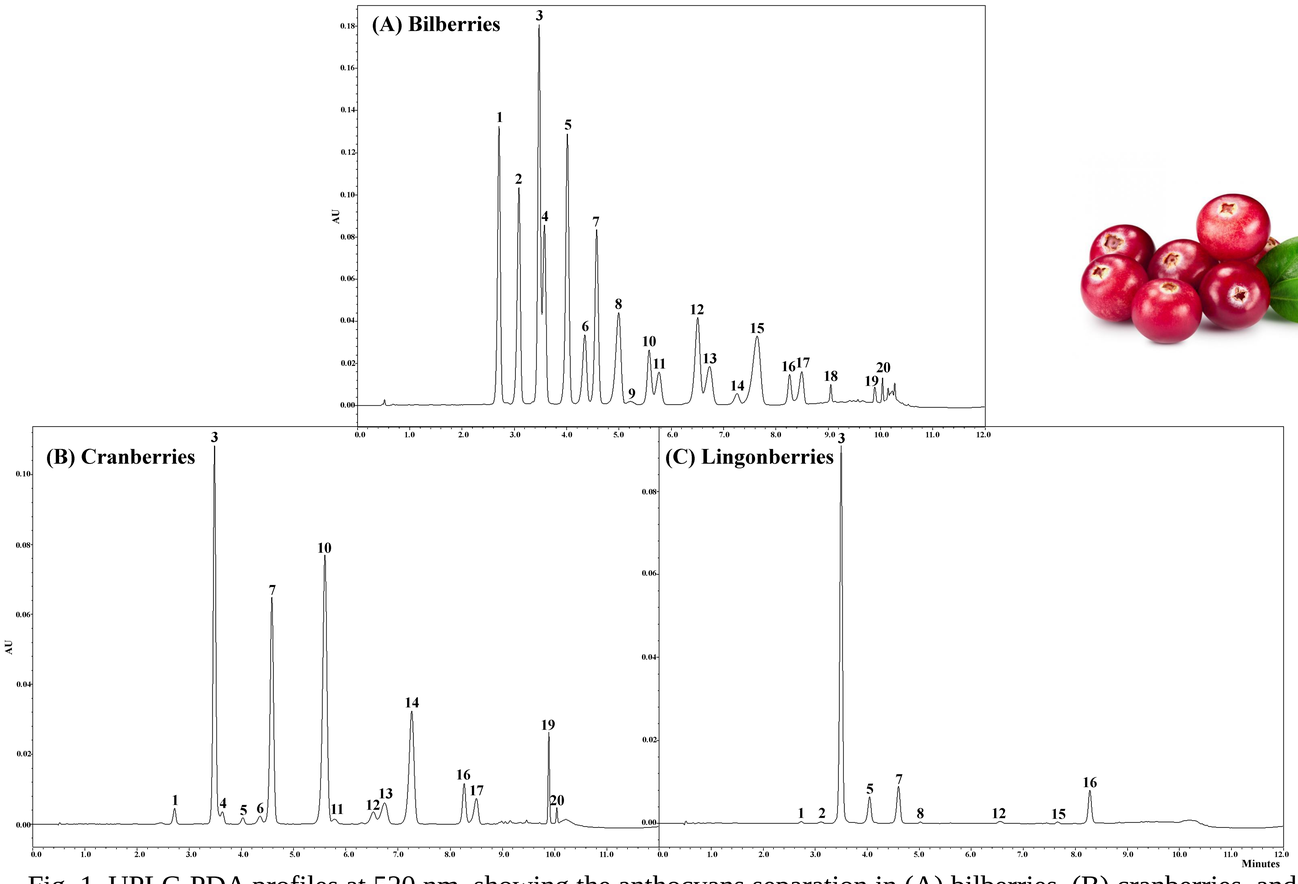
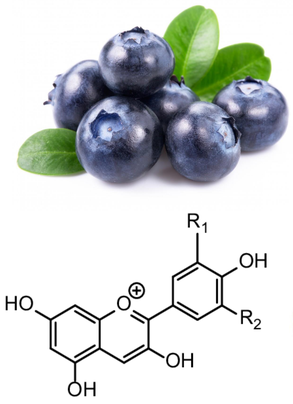


Fig. 1. UPLC-PDA profiles at 520 nm, showing the anthocyans separation in (A) bilberries, (B) cranberries, and (C) lingonberries. Peak assignments: (1) delphinidin 3-galactoside, (2) delphinidin 3-glucoside, (3) cyanidin 3-galactoside, (4) delphinidin 3-arabinoside, (5) cyanidin 3-glucoside, (6) petunidin 3-galactoside, (7) cyanidin 3-arabinoside, (8) petunidin 3-glucoside, (9) delphinidin, (10) peonidin 3-galactoside, (11) petunidin 3-arabinoside, (12) peonidin 3-glucoside, (13) malvidin 3-galactoside, (14) peonidin 3-arabinoside, (15) malvidin 3-glucoside, (16) cyanidin, (17) malvidin 3-arabinoside, (18) petunidin, (19) peonidin, (20) malvidin.



Conclusions

This reliable method is suitable for the routine screening and quantification of anthocyans in berries of *Vaccinium* genus or related food products to assess their diversity or assure their quality and authenticity.

References

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