

# VALORIZATION OF BILBERRY POMACE FOR POTENTIAL USE IN FUNCTIONAL FOOD PRODUCTION

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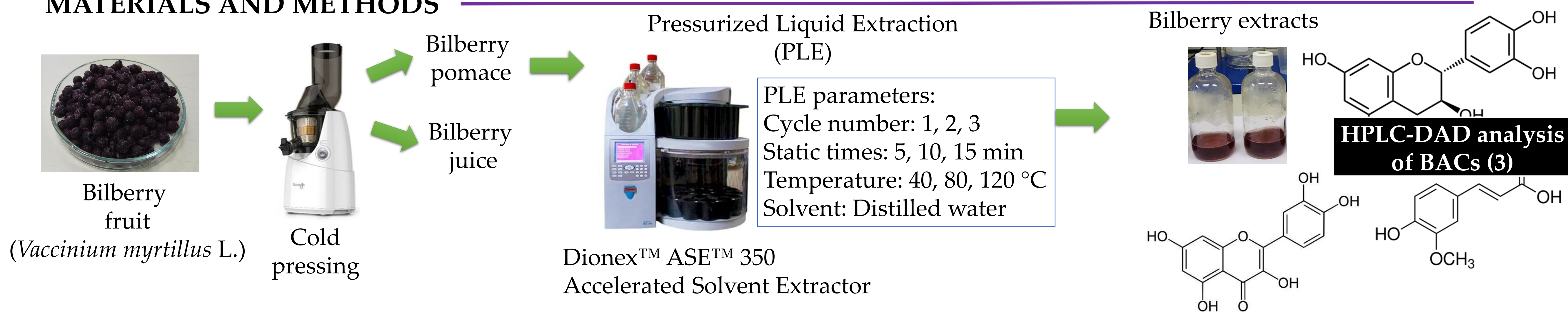
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## INTRODUCTION

The by-products of bilberries that remain after processing consist of the pericarp and seeds. Which are excellent raw materials for further use, especially for the isolation of biologically active compounds (BACs) and incorporation into functional foods. Recently, green extraction methods based on the concept of environmental sustainability have been developed to extract BACs from various fruit by-products (1). The distribution of BACs in bilberry is quite uneven with only 10% of BACs in the mesocarp, 28–35% in the epidermis, and as much as 60–70% of BACs in the seeds (2). Therefore, the bilberry pomace remaining after processing (composed of skin and seeds), can represent an excellent raw material for potential use in the form of isolation of BACs and thus for the functional food production.

**THE AIM:** To evaluate the use of green extraction methods such as pressurized liquid extraction (PLE) in the valorisation of bilberry pomace obtained from *Vaccinium myrtillus* L. after pressing into juice

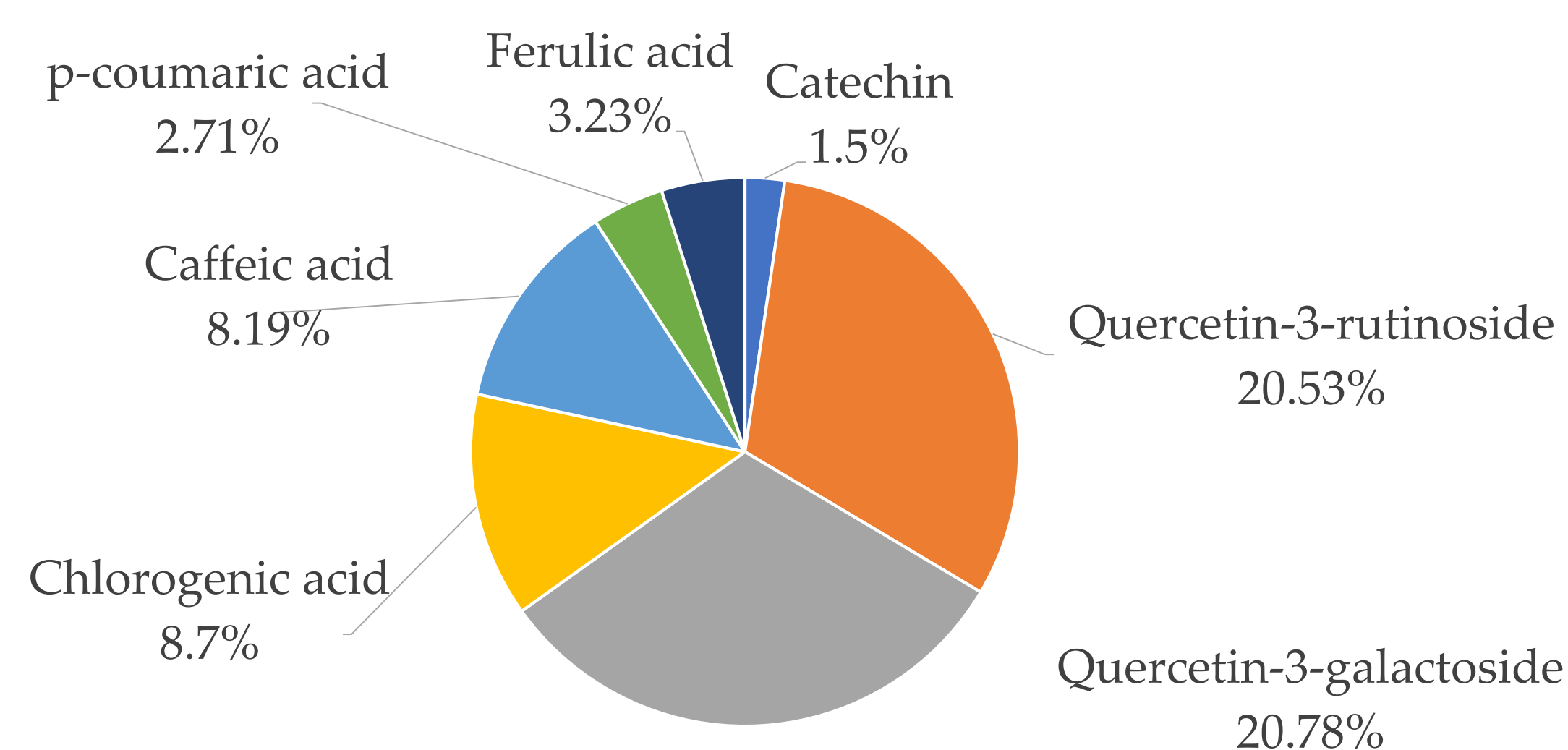
## MATERIALS AND METHODS



## RESULTS & DISCUSSION

A total of three flavonoids (catechin, quercetin-3-rutinoside and quercetin-3-galactoside) and four hydroxycinnamic acids (chlorogenic, caffeic, p-coumaric and ferulic acids) were identified and quantified by HPLC-DAD analysis in all bilberry extracts. The obtained results showed that quercetin derivatives were the predominant polyphenolic compounds found in the bilberry pomace extracts (Figure 1).

According to the results in Table 1, it can be seen that all PLE parameters significantly affected the yield of flavonoids (FL) and hydroxycinnamic acids (HCA;  $p \leq 0.01$ ). FL were determined in a range of 14.35–22.96 mg/100 g, and HCA in a range of 6.44–9.75 mg/100 g. Increased temperature and static extraction time significantly reduced the FL yield. With respect to number of cycles, the highest yield is achieved with one extraction cycle and the lowest with two extraction cycles. Similar to FL, increasing the temperature and number of cycles significantly reduces the HCA yield. At a static extraction time of 15 minutes, the highest yield was achieved, while the lowest HCA content was determined at a static time of 10 minutes. The results obtained are in agreement with the literature (4), where increasing the temperature and the number of cycles resulted in a lower content of BACs isolated from olive leaves by PLE. Finally, the results of this study show that lower temperatures, fewer cycles and shorter static extraction time are more suitable in obtaining high quality aqueous extracts from bilberry pomace.



**Figure 1.** Average content of individual flavonoids and phenolic acids determined in bilberry pomace extracts

**Table 1.** The influence of PLE parameters on the concentrations of total flavonoids\* and total hydroxycinnamic acids\*\* (mg/100 g)

| PLE extraction parameters | n  | Total flavonoids   | Total hydroxycinnamic acids |
|---------------------------|----|--------------------|-----------------------------|
| Temperature (°C)          |    | $p \leq 0.01^+$    | $p \leq 0.01^+$             |
| 40                        | 18 | $22.96 \pm 0.10^a$ | $9.75 \pm 0.07^a$           |
| 80                        | 18 | $18.16 \pm 0.10^b$ | $8.32 \pm 0.07^b$           |
| 120                       | 18 | $14.70 \pm 0.10^c$ | $6.44 \pm 0.07^c$           |
| Static time (min)         |    | $p \leq 0.01^+$    | $p \leq 0.01^+$             |
| 5                         | 18 | $19.23 \pm 0.10^a$ | $7.58 \pm 0.07^a$           |
| 10                        | 18 | $18.52 \pm 0.10^b$ | $7.06 \pm 0.07^b$           |
| 15                        | 18 | $14.35 \pm 0.10^c$ | $7.82 \pm 0.07^a$           |
| Nuber of cycles           |    | $p \leq 0.01^+$    | $p \leq 0.01^+$             |
| 1                         | 18 | $16.68 \pm 0.10^a$ | $8.68 \pm 0.07^a$           |
| 2                         | 18 | $15.53 \pm 0.10^b$ | $8.46 \pm 0.07^b$           |
| 3                         | 18 | $16.17 \pm 0.10^c$ | $7.26 \pm 0.07^c$           |

## CONCLUSIONS

**PLE could be considered as an advanced and promising green approach that could overcome current limitations of conventional extraction and provide valuable bilberry pomace extracts that could find their application in functional food production and in emerging global markets.**

### REFERENCES

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