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# CHEMICAL AND BIOACTIVE CHARACTERIZATION OF BLUEBERRY BIORESIDUES

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Blueberry production has increased exponentially in recent decades due to its known high nutritional characteristics, and bioresidues originating from its culture have also increased. It is critical to limit its buildup. One strategy for directing these residues is to turn them into high-value products while investigating their potential bioactivity.

The goal of this study was to produce bioactive extracts from blueberry aerial parts using environmentally friendly methods.

Different extracts, such as infusion, maceration, and decoction, were considered, as well as emerging extraction technologies, such as ultrasound-assisted extraction, in which different conditions (potency, temperature, and solvent type) were tested to achieve optimal extraction conditions (high yields and purity). The obtained extracts were studied regarding their chemical profile through phenolic compound's identification and quantification by HPLC-DAD-MS. Bioactivities were also evaluated, namely antioxidant and antimicrobial properties, through the oxidative haemolysis inhibition assay, thiobarbituric acid reactive substances, and the microdilution method against pathogenic bacteria, respectively. The cytotoxic potential of the plant extracts was achieved through the sulforhodamine B method, and the in vitro anti-inflammatory activity was evaluated by analysing the capacity to inhibit the production of NO using RAW 264.7 cells. The mushroom tyrosinase oxidation of LDOPA was also used to investigate the anti-tyrosinase activity.

According to the obtained antioxidant results, blueberry samples exhibited a similar level of activity, with decoction extracts revealing the most promising results, namely, the lowest IC<sub>50</sub> values after 60 min. Besides presenting similar antioxidant potential, these extracts revealed a higher potential than the standard Trolox. Only the infusion extract demonstrated

a lower ability to prevent the formation of TBARS *in vitro*, behaving differently than the other extracts. Ultrasound-assisted extract (UAE) has shown promising results against methicillin-resistant *Staphylococcus aureus* in the Gram-positive bacteria group with a minimum inhibitory concentration (MIC) of 1.25 mg/mL. In terms of antibacterial activity, all of the extracts inhibited the majority of the tested bacterial strains. The UAE had the lowest IC<sub>50</sub> values in the antiinflammatory test, followed by the infusion extract. The NCI-H460 cells were the most sensitive to the investigated substances, with IC<sub>50</sub> values of 118.5 g/mL in the presence of the UAE sample. Results also showed that all the extracts were safe against PLP2 and VERO cell lines. The maceration extract showed the highest ant tyrosinase potential with an IC<sub>50</sub> value of 221±3 µg/mL.

Together, these findings emphasize the sample's bioactive potential and the importance of using bioresidues as unique candidates for industrial applications by leveraging their biological features.

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### Graphical abstract:

