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Saskatoon, Canada**Background:**

Canola meal is a protein-rich product, with great potential to increase the value of agricultural by-products using diverse methods, one of which is the creation of bio-based plastics. Bio-based plastics possess many environmental advantages over synthetic plastics, such as compostability, biodegradability, and being sourced from sustainable and renewable resources. This research is related to obtaining high-quality canola protein to use in the creation of bio-based plastics.

Objectives:

- Explore the production of a bio-based plastic through the utilization of water-soluble proteins from canola meal defatted with alcohol or hexane.
- Analyse the quality of the proteins that will be used to produce the bio-based material.
- Produce a bio-based plastic using canola proteins.
- Evaluate the physicochemical and mechanical properties of the bio-based films.

Methods:

The research encompasses pressing the seed and performing extractions with ethanol and hexane to prepare the canola meal, the extraction of the proteins, and the characterization of the resultant protein as a precursor for bio-based plastics.

After the protein isolation, its quality was measured using analytical methods such as Zeta potential, particle size, solubility, the quantity of protein by Kjeldahl, and surface hydrophilicity. These tests are important to select the proteins with the best characteristics and prepare the bio-based films. Also, the protein quality will influence the mechanical and physicochemical properties, and the final cost of the bio-based plastic.

Results:

Dehulled canola seed was used to produce the canola meal and protein isolates. Two protein fractions were obtained, a cruciferin-rich fraction and a napin-rich fraction. Each fraction was characterized using standard methods and showed that some of the samples had high-quality protein with a nitrogen content higher than 90% in the case of the cruciferin portion.

The protein with the best characteristics and the higher yield is used to produce bio-based plastics. The bio-based plastics were made in the form of films using the extracted proteins, a copolymer, and a plasticizer in different proportions. In the future, the physicochemical and mechanical properties of the bio-based films will be measured, these new materials have applications as edible plastics or for food packaging.

Conclusions:

- The production of bio-based plastic is possible using the isolated canola proteins in combination with other chemical compounds that improve the mechanical and physicochemical properties of the resulting bio-based films.
- The use of whole seed or dehulled seed influences the quality and the quantity of the protein extracted from the canola meal.
- The proteins extracted from dehulled canola seed present higher quality, which affects the elaboration of bio-based plastic.
- The use of different solvents, such as ethanol and hexane, for the defatting of canola meal influences the chemical compounds present in the canola meal.

References:

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