**Revisit of Yellow Mustard Gum: Large Scale/Solvent Free Processing, Characterizations and Applications**

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**Abstract**

Canada is a world leader in producing and exporting condiment mustard seeds. The kernels of yellow mustard seeds are grounded as food ingredients, while the outer husk is left as a by-product, which is named yellow mustard bran. Yellow mustard bran has been investigated as a value-added ingredient due to it contained both soluble and insoluble fibres1. The soluble fraction from the mucilaginous part of the yellow mustard bran has been considered a hydrocolloid gum that shows shear-thinning flow behaviour and excellent emulsifying and stabilising abilities in both oil/water and water/oil systems. In addition, these properties behave stable to pH, temperature and solutes, which increases its potential for wider applications1, 2. Yellow mustard gum (YMG) has been included in the newest version of Handbook of Hydrocolloids (2021) as an emerging natural hydrocolloid gum for clean labelling but lacks commercial practice 3. This study aims to promote commercial utilization of yellow mustard gum. The objectives are to develop a pilot-scale YMG production protocol in an economic and environmental-friendly way to produce a clean-label YMG product; to characterize the pilot-scale produced YMG to establish its structure-function relationship; to compare the characteristics of the pilot-scale produced YMG with the ones of purified YMG through EtOH precipitation (YME) described in our patented technology4; to apply YMG in a vegetarian mayonnaise and a non-dairy whipping cream.

The developed pilot-scale YMG production protocol demonstrated a great quasi-industrial potential. The protocol has been able to process up to 100 L materials in each batch with minimal processing steps (water extraction, filtration, drying and grinding) and zero solvent. The yield of yellow mustard gums at each batch can be up to 3% (w/w) from seeds and up to 30% (w/w) from bran. Both YMG and YME showed similar chemical composition, similar shear-thinning flow behaviour and weak gel structure in an aqueous system. However, YME dispersion is more viscous at the same gum concentration due to the higher concentration of effective polymers. In addition, YMG could form unpourable gels with κ-carrageenan at most blending ratios while YME barely achieved the formation of solid gels at the equivalent total gum concentration. This gelling ability of YMG could provide yellow mustard gum with wider applications because of a new potential synergistic combination. Moreover, YMG was able to formulate both egg-free mayonnaise and non-dairy whipping cream products with improved stability and texture compared with commercial counterparts.

All these findings can be of great support to promote commercial production and application of YMG as a clean-label natural gum. The eventual successful commercialization of YMG is expected to bring significant socioeconomic benefits to Canada, including increased economic returns to producers and agri-food processors while providing more healthful products to consumers.

***References:***

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