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A Short Note on Polysaccharide Extraction

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Description

Polysaccharides are polymeric carbohydrates made up of mono-saccharides joined together by glycosidic linkages. Polysaccharides have functional qualities that are different from those of their constituent mono-saccharides, and as a result, they perform a variety of vital roles in nature. Plant-derived polysaccharides have anti-oxidant, anti-viral, and anti-complementary characteristics, among others. Polysaccharides have evolved into essential raw materials for health foods, pharmaceuticals, and cosmetics. *Rhizoma Polygonati Odorati* (Fragrant Solomonseal Rhizome) is the dried rhizome of *Polygonatum odoratum* (Mill.), which has been utilised as a source of medicine and a base for a valuable nourishing tonic for millennia in traditional herbal medicine.

P. odoratum is classified as an affinal medication and a diet component by the People's Republic of China's Ministry of Health. *P. odoratum* is used to nourish and stimulate fluid production to relieve thirst in traditional Chinese medicine. Diabetes, palpitations, lung ailments, and disturbed stomachs are all treated with this therapeutic plant. Given that long-term ingestion of this plant does not harm the stomach, *P. odoratum* is now generally utilized as a functional food. Polysaccharides, flavonoids, steroidal saponins, and alkaloids are among the chemical components found in *P. odoratum*. *P. Odoratum* Polysaccharides (POP) has been demonstrated to have immunological, anti-tumor, and anti-aging properties in studies. However, there are few investigations on POP extraction. The microwave aids in the extraction of bioactive components from herbs in a solvent.

By adopting a three-level, four variable Box-Behnken experimental designs in a single-factor inquiry, response surface approach was utilized to optimize microwave-assisted extraction parameters (extraction temperature, water-to-raw material ratio, microwave power, and extraction duration). Design-Expert projected three-dimensional response surfaces, and the results revealed that there were no interaction effects between extraction temperature and microwave power. Under the following optimal conditions, a polysaccharide yield of approximately 17.49 percent was obtained: Temperature of 57°C, microwave power of 300 W, extraction period of 10 minutes, and water-to-raw material ratio of 23:1. Polysaccharides produced from *P. odoratum* inhibited the development of A549 cells in a dose-dependent manner, according to preliminary *in vitro* anticancer activity studies. Furthermore, Panc-1 cells were not harmed by polysaccharides at concentrations of 4-400 g/mL.

Microwave extraction has a number of advantages, including lower organic solvent use and faster extraction times. As a result, microwave extraction outperforms traditional extraction methods. Response Surface Methodology (RSM), which was first outlined by Box and Wilson, is an effective approach for improving the process when multiple factors and interactions affect the desired response. RSM is a set of statistical and mathematical tools for determining the impact of several variables and optimizing different processes. RSM has been used to improve conditions in food and pharmaceutical research with great success. RSM's key benefit is that it requires fewer experimental trials to examine many variables and their interactions.

As a result, it is less time consuming and labor intensive than other techniques to process optimization. Typically, it uses a least squares technique to fit a second-order polynomial using an experimental design such as Box-Behnken Design (BBD), Central Composite Design (CCD), or Doehlert Designs (DDD).

Using RSM and a three-level, four-variable BBD, this work explored significant variables (ratio of water to raw material, extraction temperature, extraction duration, microwave power) to further optimize the extraction process of polysaccharides from *P. odoratum*. POP extraction was tested for its inhibitory effect on A549 and Panc-1 months.

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