

Purification and Partial Characteristics of Polysaccharides from *Rosa Laevigata* Michx Fruits

Xuejiao Zhang, Chenzhong Jin, Yihong Hu, Yunyun Zhou, Shuanghui Wang

Hunan University of Humanities, Science and Technology

Dixing road487, Loudi, China

380711974@qq.com; 532479626@qq.com; 33379121@qq.com; 67547204@qq.com; 125904806@qq.com

Extended Abstract

Extraction optimization, purification and partial characteristics of polysaccharides from the traditional Chinese herb *Rosae Laevigatae* Michx were investigated. *R. Laevigata* belongs to the Rosa genus and Rosaceae family, and its fruits are widely used as health food in China, Japan and the other Asian countries [1]. In this study, the response surface methodology was used to optimize the extraction conditions of water-soluble polysaccharides from *R. Laevigatae* fruits. The central composite design was used to optimize the extraction processing parameters. The optimum extraction conditions were extraction temperature 95°C, extraction time 2.5 h, water to raw material ratio 22:1, and extraction frequency 3. Under the optimum conditions, the experimental yield was 9.55±0.1%, which is in good agreement with the predicted yield. Six major fractions (RLP-I-1, RLP-I-2, RLP-I-3, RLP-II-1, RLP-II-2 and RLP-II-3) were successfully obtained by purifying the crude polysaccharides extracted from the fruits by using diethylaminoethanol-Sepharose column chromatography and Sepharose CL-4B column chromatography respectively. The molecular weights of major fractions were determined by the high performance gel permeation chromatography with a differential refractive index detector (Waters2410, USA) and a G5000 PWxl column (7.8 mm×300 mm, TOSOH, Japan) connected in series with a G3000 PWxl column (7.8 mm×300 mm, TOSOH, Japan). The average molecular weight of the RLP-I-1, RLP-I-2, RLP-I-3, RLP-II-1, RLP-II-2, RLP-II-3 were estimated to be 8930 Da, 9498 Da, 9662 Da, 7673 Da, 8558 Da and 8323 Da, respectively. The fourier transform infrared spectra of the six polysaccharides were identical, and the broad stretching intense characteristic peak was shown at 3400 cm⁻¹ for the -OH group, whereas a weak C-H stretching band was observed from 2935-2939 cm⁻¹. The peaks at 1616 cm⁻¹ were from the bending vibration absorption of -OH group. Absorption peaks ranged from 1460-1200 cm⁻¹ were the variable angle vibrations of C-H. The peaks from 1285 cm⁻¹ to 1020 cm⁻¹ corresponded to C-O stretching vibrations. The absorption band round 880 cm⁻¹ was due to the α-type glycosidic bond. Peaks ranged from 3600-3200 cm⁻¹ and 1655-1615 cm⁻¹ revealed that these compounds were carbohydrates. Moreover, no peaks were detected near 1715 cm⁻¹ suggesting that the fructan had no uronic acid [2]. In the present study, the anti-oxidative activities of the six polysaccharides toward super-oxide anion, hydroxyl, and 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radicals *in vitro* were evaluated in terms of scavenging rate. The assays suggested that RLP-II-1, RLP-II-2 and RLP-II-3 presented higher scavenging activity toward superoxide anions, hydroxyl and DPPH radicals. The results indicated that the response surface methodology was an effective method for the extraction of polysaccharides from the *R. Laevigatae* fruits, and the polysaccharides could be explored as a potential antioxidant agent for use in functional foods.

References

- [1] C. Yu, X. Dai, Q. Chen, J. Zai, L. Deng, Y. Liu, H. Ying, "Hypolipidemic and antioxidant activities of polysaccharides from *Rosae Laevigatae* Fructus in rats," *J. Carbohydrate Polymers*, vol. 94, no. 1, pp. 56-62, 2013.
- [2] C. Nie, P. Zhu, S. Ma, M. Wang, Y. Hu, "Purification, characterization and immunomodulatory activity of polysaccharides from stem lettuce," *J. Carbohydrate Polymers*, vol. 188, pp. 236-242, 2018.