Editorial

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# Study on High Value Application of *Perilla* Seed Oil and Meal

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## Editorial

*Perilla* seed has high oil yield and rich protein content [1]. At present, *perilla* seed is mainly used for *perilla* seed oil development. *Perilla* seed oil is rich in α-linolenic acid [1]. Alpha linolenic acid is metabolized in human body and can transform into EPA and DHA. It is the ideal resource to supplement human ω-3 polyunsaturated fatty acids. It is known as "plant deep sea fish oil" [2]. Numerous studies have shown that *perilla* oil is rich in polyunsaturated fatty acids (PUFA), which has the function of lowering blood lipids, lowering serum cholesterol, preventing atherosclerosis, preventing cancer, enhancing immunity and improving memory [3-5]. *Perilla* oil has been widely used in the world to increase the functionality of the food because of its good health care effect. The US and South Korea use *perilla* oil as a functional health edible oil, Japanese manufacturers have added to the children's heart dot biscuits and production of new health food, and China has also successfully developed a high-concentration basil seed oil slow release tablets, *perilla* oil capsules and other products [6]. However, further studies on the conversion of *Perilla* oil to high value one have not been reported yet.

1,3-diglyceride (1,3-DG) is a healthy natural lipid, which is extensively used in food processing and utilized as pharmaceutical intermediate [7]. 1,3-DG has numerous advantages [8-10], due to low concentration in natural grease, so preparation of 1,3-DG is preferred. Enzymatic approaches to prepare 1,3-DG have been attached importance to by academics owing to their mild conditions, regioselectivity, safety, and environmental friendliness [11-13].

In our previous work, we screened a new *Aspergillus niger* GZUF36 strain which produced just one intracellular lipase with highly selective synthesis of 1,3-DG by its whole cell-catalyzed glycerolysis [14,15]. Moreover, the strain also produce an extracellular sn-lipase which may selectively hydrolyze triglyceride to 1,3-DG [16].

Considering the interest of the conversion of *Perilla* oil to high value of 1,3-DG by enzyme, 1,3-DG rich in alpha linolenic acid will be prepared by whole-cell lipase from *A. niger* CCTCC No.M2012538 (GZUF36) catalyzed glycerolysis of *Perilla* oil or by Sn-2 CCTCC No.M2012538 of *Aspergillus niger* lipase hydrolysis of *Perilla* oil.

At the same time, the main reports on the development of *perilla* seed protein are mainly the isolation of *Perilla* protein and preparation of *Perilla* concentrated protein [17,18]. However, the high value transformation of *Perilla* protein has not been reported yet. The project team screened a new strain of Bacillus Velez SN14 producing high yield of Nattokinase and β-glucosidase in the early stage. So, the strain may be used to fermentation of protein-rich meals from after oil extraction of *Perilla* seeds, which may realize high value utilization of protein from *Perilla* meal.

## Project Content

1. Transformation of *Perilla* oil to 1,3-DG by *A. niger* CCTCCNo. M2012538 lipase(s)

   (1) High density fermentation of *A. niger* CCTCCNo.M2012538 (GZUF36)

   (2) Whole-cell lipase catalyzed glycerolysis of high concentration of *Perilla* oil to prepared 1,3-DG

   (3) Purification of sn-2 lipase from *A. niger* CCTCCNo. M2012538

   (4) Immobilization of sn-2 lipase

   (5) Immobilized sn-2 CCTCCNo.M2012538 of *Aspergillus niger* lipase hydrolysis of *Perilla* oil to prepare 1,3-DG

2. Research on *perilla* jam rich in Nattokinase and β-glucosidase

   (1) Optimization of accessories formula for fermentation of *Perilla* jam

   (2) Optimization fermentation conditions of *Perilla* jam

(3) Construction of an annual output of 1 ton of *perilla* jams rich in natto kinase and β-glucosidase.

So, in this project, we aimed to achieve high value application of *Perilla* seed oil and meal by enzymatic transformation of oil and fermentation of meal.

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