Comparison of Techniques for the Extraction of Paclitaxel, 10-deacetylbaccatin III and Cephalomannine from Taxus mairei

許文光、楊博文

E-mail: 9708318@mail.dyu.edu.tw

ABSTRACT

Taxus mairei which also names “ the Chinese yew of Nan Yang “ or ” the southern Chinese yew “ . It belongs to the Taxus Linn. in the department of Taxaceae. Taxus mairei is the gymnosperm, one of the five valuable wood of conifer leaf and the national treasures varieties in Taiwan. The five valuable wood of conifer leaf in Taiwan includes “ Chinese juniper wood ”, “ Taiwania cryptomerioides Hayata “ , “ Cunninghamia konishii ”, “ Calocedrus formosana ” and “ Taxus mairei ”. They are all the most precious varieties of trees in Taiwan. The quality of Timber in Taxus mairei is excellent and classified at the first class wood of conifer leaf. Most of them are belong to the tall and big arbors. Especially the position at the conifer leaf in Taxus mairei contains the effective anticancer composition, Paclitaxel. Therefore, Taxus mairei is the most worth, developing and utilizing of plant. The among of Paclitaxel in the dry leave of Taxus mairei contented 0.05~0.07% kgw/w probably, but in the dry leave of Northeastern Chinese yew, the among of Paclitaxel was only 0.04%. And the materials of half-synthetic, 10-deacetylbaccatin III (10-DAB), in the dry leave of Taxus mairei contented probably 1gw/w be extracted from 1kgw/w of Taxus mairei dry leave (about 0.1%). As regards economic worth, the price of Paclitaxel at each kilogram was up to 250,000 dollars at present, 2 billion dollar volume sell in the whole world probably, and the price of the materials, 10-DAB, was under 90 dollar each kilogram. So, to extract Paclitaxel from Taxus mairei dry leave and to treat as the materials of thimble of anti-cancer drugs, or to extract the materials of half-synthetic, 10-DAB, and try to raise extracting rate and purity, there will be the worth developing the business opportunity and studied in the future. Also the structure of Cephalomannine is similar to paclitaxel, if we take the Cephalomanine as the materials of half-synthetic of Paclitaxel in the future, it is businesses opportunity that is worth developing. The method to extract Paclitaxel has only using organic solvent at present. So, how to product the highest yield of Paclitaxel, 10-DAB and Cephalomannine, the solvent we use is a quite important way in the processes of extraction. Therefore, in this study, we would use five different kinds of organic solvents to go for the extraction testing experiment. And then to use traditional extraction (Include rotating extraction and solvent extraction return to heat), ultrasonic extraction, and microwave-assisted extraction. Those extractions would combine the design of Taguchi ’ s experiment to extract Paclitaxel, 10-DAB, and Cephalomannine. Later underwent HPLC analysis, respectively. During the processes of extraction by adopting design of Taguchi ’ s experiment to confer a most proper one, accord with economic cost, and the lowest environmental pollution degree which the organic solvent cause, and to find out the best and the most profitable extraction method for improve the rate of extraction of Paclitaxel, 10-DAB and Cephalomannine.

Keywords : Taxus mairei、Paclitaxel、10-deacetylbaccatin III、microwave-assisted extraction、design of Taguchi ’ s experiment 、HPLC

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