

Sustainability and future challenges of conversion from waste cooking oil to

biodiesel production: a bibliometric analysis from WOS during 2000-2020

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Background: Waste Cooking Oil (WCO) flow back to Chinese market illegally, which have become a well-known social food safety problem in China, China Youth Daily reported news of 10% of edible cooking oil from WCO since 2010, thus all Chinese residents more worried about it. WCO contains multiple damaging elements which can cause people sick such as dyspepsia, stomachache and so on. However, excess WCO may cause a severe disease like intestinal or gastric cancer. Over 10 years later, the crimes of WCO still occur, which is just the tip of the iceberg in China. Therefore, the solutions of WCO are still a food safety issue for China to solve in this decade.

Objectives: 1) To identify the direction for the research field of the conversion of WCO to biodiesel and the possible future research dynamics providing research reference for later researchers. 2) To provide Chinese researchers and Chinese governments with a general overview and strive for an early solution for China's food safety problem of waste cooking oil issues. 3) To contribute to the achievement of SDGs in 2030 with Goal 2 (Zero Hunger), Goal 3 (Good Health and Well-being), Goal 7 (Affordable and Clean Energy) and Goal 13 (Climate Action).

Methods: In this paper, bibliometric analysis methods are used to evaluate 2237 publications from Web of Science Core Collection databases (WOS) during 2000-2020 to further grasp the development processes and future trends of biodiesel production converting from WCO.

Results: It is the first time to reveal the conversion from WCO to biodiesel through bibliometric analysis methods. In this article, 2237 publications from WOS database were analyzed and evaluated (SCIE, SSCI and A&HCI) during 2000-2020 by dividing into three dimensions: publication distribution, publication patterns and research trends. The results show that the conversion from WCO to biodiesel has become a new research field around the world in the past 20 years. *Fuel* is the most significant journal for this field with the greatest number of publications (225, sharing 10.06%) and the highest citation (7050), followed by *Conversion and Management* (126) and *Renewable Energy* (118). Additionally, three highest cited literatures are Van Gerpen (2005), Zhang et al (2003), Leung and Guo (2006) respectively. As for publication patterns, Taufiq-Yap YH is the highest prolific author from Malaysia in this field with 28 publications and 444 total citation, followed by Rashid U (24) also from Malaysia and Ghobadian B (23) from Iran. Similarly, China (423), India (342), Malaysia (222) have played an important role in the number of publications over 20 productive countries/regions. The USA possesses the largest number of organizations in this field although the USA (166) is the 4th place among the countries/regions. India Institute of Technology System Iit System is in the center of the organization-enhanced among the 12 most productive organization-enhanced.

The keywords of biodiesel, waste cooking oil, transesterification, heterogeneous catalyst and biofuel will lay a solid foundation in terms of research trends in the field of converting from WCO to biodiesel. Despite the clusters of "element content", "process simulation" and "oxygenated chemical" fade the interest by the most researchers, the clusters of "transesterifications", "combustion" are still attracting extensive attention, the great growth potential with cluster of "life cycle assessment" has been increasing every year. From the research results, the revealed global research trends not only provide the comprehensive research directions for researchers and biodiesel producers worldwide, but also can help to address the food safety problem of waste cooking oil issue in China.