

Ailanthus altissima (tree of heaven) seed oil: Characterisation and optimisation of ultrasonication-assisted biodiesel production

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ABSTRACT

The non-edible oil from *Ailanthus altissima* (tree of heaven) seeds has potential as a novel feedstock for biodiesel production in Iran. In this study, *Ailanthus altissima* seed oil (AAO) has been investigated as a novel feedstock for biodiesel production. Ripe *Ailanthus altissima* seeds were collected from the Tarbiat Modares University campus and, after drying, their oil was extracted using a Soxhlet extraction system. The maximum oil content of the seeds was found to be ~38%. The physical and chemical characteristics of the AAO were investigated. Biodiesel was prepared using an ultrasonic setup. In order to obtain the highest yield of biodiesel, the production process was optimised using a response surface methodology (RSM) model. Reaction parameters such as the molar ratio of methanol to oil, reaction time, and catalyst loading were studied. The biodiesel yield was 92.26% under the optimised conditions, i.e., a methanol-to-oil molar ratio of 8.50:1, a catalyst loading of 1.01 wt%, and a reaction time of 4.71 min. The biodiesel prepared from *Ailanthus altissima* oil complies with the criteria dictated by ASTM D6751 standards. Thus, this seed oil can be introduced as a new feedstock for biodiesel production in Iran.

KEYWORDS:

Ailanthus altissima oil; Biodiesel; Ultrasonic; Response surface methodology