

## **Impact of water added to seeds and the speed of shaft rotation upon the yield and temperature of sesame oil extracted in a domestic screw expeller**

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Sesame seeds used for oil extraction in Sri Lanka are solar-dried under direct sun to equilibrium moisture content (MC). At the commencement of oil extraction a certain amount of water is sprinkled onto the seeds. In this study, the combined impact of water added to solar-dried seeds and rotational speed of the screw shaft of a domestic screw-type oil expeller (DL-ZYJ02, Dulong, China) upon the yield and the temperature of sesame oil being extracted was investigated.

Sesame oil was extracted from washed, solar-dried, whole, commercial white sesame seeds using a domestic oil expeller. The rotational speed of the shaft was varied by varying the machine frequency to 30, 40 and 50 Hz. Water contents of seeds used were as follows: wet seeds solar-dried to 4.5%db (dry basis) MC; seeds with equivalent 7.0%db MC prepared by sprinkling water on 4.5%db MC seeds two minutes before oil extraction followed by thorough mixing of water with seeds; seeds with equivalent 9.5%db MC prepared by sprinkling water on 4.5%db MC seeds 24 hours before the commencement of oil extraction followed by thorough mixing, refrigerating and thawing during the last hour. A full factorial experimental design was carried out in triplicate and results were analysed by studying main and interaction effects.

A significant reduction in oil yield was observed with increase of added water whereas machine frequency had an insignificant impact upon the yield. A lower machine frequency resulted in longer residence time and lower equivalent seed water content. The resultant relative absence of water to absorb frictional heat produced caused higher temperatures of oil being extracted.

To produce cold pressed sesame oil (below 50°C) using this domestic oil expeller, we recommend the following: sesame seeds with 4.5%db inherent moisture content be used; 23.5 g of water per kg of seeds be sprinkled on the seeds just before commencement of oil extraction; and the expeller be rotated at 40 Hz frequency. This combination resulted in 45.2±0.1% oil yield and 48.1±1.6°C oil temperature. Other oil extraction machines could also be optimised for cold-pressed oil production using a procedure similar to the one outlined in this study.

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