From Seed to Oil: A Deeper Look at Processing

The most common method for expelling oil from seeds such as soybeans, rapeseed, sunflower and corn, is to use pressure or solvents (such as hexane). Refinement of the resulting crude oil is designed to eliminate undesirable and potentially toxic components while maintaining the inherent fatty acid composition of the oil and that has desirable functional and orosensory properties (neutral taste and odor, good appearance, is resistant to oxidation and has a long shelf-life). Compounds known for their negative effect on the quality and stability of oils include free fatty acids, unsaponifiable matters, waxes, pigments, solid impurities (mainly fibers) and oxidation products. Seed oils can also contain some contaminants: pesticides, trace metals, mineral oil aromatic hydrocarbons, aflatoxins, dioxins and polycyclic aromatic hydrocarbons. Each processing step removes one or more of these compounds. The processing steps involved in manufacture of seed oils result in a product that according to an impressive amount of clinical and observational data benefits overall health. The information below provides an overview of each of the steps involved in processing.

Oil extraction

Effective oil extraction and post extraction solvent removal are key considerations when using solvent extraction. The most common solvent used for extraction is hexane, a nonpolar chemical which matches the nonpolar character of seed oil, making for effective and efficient oil extraction. Because of hexane's low boiling point compared with the high boiling point of seed oils, hexane is efficiently evaporated when the oil is heated under vacuum following extraction prior to further processing.

Hexane exposure from seed oil consumption is dramatically below safety limits. In fact, to hit even the most conservative safety limit for hexane, you would need to drink 158 times more oil than average—about 4,900 grams. That's like drinking a gallon of salad dressing every day.

Degumming

The primary goal is to eliminate phospholipids and mucilaginous gums but also compounds such as carbohydrates, proteins, and trace metals. There are four types of degumming processes: water degumming, acid degumming, dry degumming, and enzymatic degumming, although the first two are most common. Water degumming is used to remove hydratable phospholipids, while acid degumming is used to remove nonhydratable phospholipids.

Neutralization

Seed oils containing a high percentage of free fatty acids (by hydrolysis and/or oxidation) must be refined to be edible. Free fatty acids influence the chemical quality and the organoleptic instability of oil. The most common method for neutralizing edible oil involves using an alkali, such as sodium hydroxide, to convert the free fatty acids into soap (a salt of a fatty acid, typically sodium or potassium salts), which is then separated from the oil.

Washing and Drying

Designed to eliminate alkaline substances present in the oil as well as any last metallic and phospholipid traces and other impurities. Washing water should be quite hot (~85–90°C, 185-194°F). After this treatment, the water-washed oil is dried with a vacuum dryer until the moisture level of the oil falls below 0.1%.

Bleaching

Bleaching (or decolorizing) reduces levels of colored pigments (carotenoids and chlorophylls). It also further removes residue traces of phosphatide, soap, phospholipid contaminants, lipid peroxidation products, and other impurities. To perform bleaching, adsorption bleaching clays, activated carbon, special silica, or a combination of these are used.

Dewaxing or Winterization

Waxes are esters of long-chain primary alcohols and long chain fatty acids. These acids have low solubility in oils, are high melting, and usually crystalline at low temperatures. The wax generally does not negatively affect the functionality of the vegetable oil. However, the presence of wax gives the oil a cloudy appearance. Its hazy appearance is due to the precipitation of dissolved waxes. The dewaxing process begins with heating the decolorized oil to make sure it is completely liquid, then slowly cooling it, and then pumping the cooled oil through a filter to separate the wax from vegetable oil.

Deodorization

Deodorized oil is devoid of any taste, even pleasant ones. Deodorization is a simple vacuum steamed distillation process. Deodorization removes undesirable odors caused by aldehydes, ketones, alcohols, short-chain fatty acids, and thermolabile pigments. It is a steam stripping of taste and odor conveying substances that are more volatile than oil.

Conclusion

After deodorization, the oil is bottled and sent to retailers to be used in home and commercial kitchens. While processing is how the seed becomes oil, the more important factor is how consuming the oil affects our health. Overwhelmingly, the evidence indicates that seed oil consumption benefits human health.

To learn more about seed oils, visit www.SNIGlobal.org/seedoils.

Source:
Health implications of linoleic acid and seed oil intake. K. S. Petersen, M. Messina and B. Flickinger. Nutrition Today 2025

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