

# **BioInnovations in Oils & Fats Processing: Enhancing Yields, Quality and By-Product value through Enzyme Technologies**

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The oils and fats processing industry is undergoing a significant transformation driven by price disruptions and the demand for cleaner processes, improved quality, and stringent regulatory compliance. BioSolutions can increase the profitability of businesses by improving the balance between cost, capacity, and the quality turning challenges into opportunities. The key areas include:

*Extraction:* Increase Oil Extraction Rate (OER) and clarification speed in oil palm mills.

*Refining:* Enable physical refining, improve yields, and enhance by-products' value through Enzymatic Degumming. New technologies using enzymes help mitigate 3MCPDe and GE.

*Fat Modification:* produces trans-free fats like vanaspati, bakery fats, margarine, and specialty fats like cocoa butter equivalents (CBE) and human milk fat substitutes (OPO) through a safe and sustainable Enzymatic interesterification.

*Biodiesel:* feedstock flexibility across FFA range like high FFA crude oil, FAD, and POME oil.

*Oleochemicals:* Find a sweet spot between yield, through put, energy through pre-splitting. Produce pure specialty products like medium-chain triglycerides (MCT), monoglycerides, etc. with improved yields.

This presentation describes on how the following enzyme technologies can address some challenges, turning them into opportunities for growth and sustainability.

1. **Enzymatic Degumming:** Enzymatic Degumming (EDG) has been effectively used in industry since early 1990's including tough feedstocks like rice bran oil enabling physical refining of oils. BioInnovations has now made possible the production of thermo-stable phospholipases and worldwide 12 million MT / year oil is enzymatically treated. However, many processors still prefer chemical neutralization for soft oils such as sunflower and soybean. EDG offers substantial benefits, including improved yields, reduced chemical usage, and enhanced by-product value, providing a financial advantage of over 400 INR/Ton.

2. **High FFA Acid Oil via Enzyme-Assisted Soapstock Splitting:** Acid oil is a low-value by-product obtained soapstock from chemical neutralization of soybean oil, sunflower oil, etc. The acid oil typically requires intensive pre-treatment for oleochemical & biodiesel applications. Enzyme-assisted soapstock splitting enhances the acid oil quality by increasing free fatty acid (FFA) content from 50 – 60% to >90% and reducing phosphatides (P content reduced from 500 – 550 ppm to < 150 ppm). With FFA levels exceeding 90%, high-pressure splitting can be bypassed, allowing for direct distillation. Other benefits of enzyme assisted soapstock splitting are possibility of less chemicals, less wastewater, better quality with low color, yield improvement due to better separation and in distillation. This enables a new feedstock that may be suitable for oleochemical and biodiesel production.

Enzyme technologies present a viable solution for the oils and fats processing industry to meet modern demands. By adopting these innovations, processors can enhance yields, improve product quality, lower chemical usage and increase the value of by-products, ensuring a competitive edge, and future-proofing their businesses.