

Used Cooking Oil: Impact and Solutions



Sponsored by:

Ministry of Environment, Forest and Climate Change, Government of India
Environmental Information, Awareness, Capacity Building and Livelihood
Programme (EIACP) Programme Centre, Resource Partner on:
Environment Literacy - Eco-labelling and Eco-friendly Products

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Contents

- Foreword 2
- Introduction on Burnt Oil 3
- The Impact of Consumable Oil 4
- Burnt Oil in Biofuel: schemes 6
- Events (Oct - Dec 2023) 7



Foreword

Edible oils like Groundnut, Sunflower, Cottonseed, and Olive oil are essential in global cuisine. However, the remarkable surge in palm oil dominance over the past few decades is alarming. Nearly everyone now consumes around 8 kilograms of palm oil yearly, and this widespread usage exacts a heavy toll on the environment and health. The extensive global footprint of palm oil production leads to substantial environmental damage, notably in climate instability caused by deforestation. Rainforests are cleared to accommodate palm cultivation, impacting the environment significantly. This oil is utilized by major food manufacturers in numerous products, from chocolates to body lotions. Consumers hold a crucial role in addressing this issue. By actively seeking alternatives to palm oil-containing products, individuals can influence the demand and supply dynamics. Thoughtful consumer choices can prompt companies to produce in alignment with more sustainable practices.

The prudent use of oil extends beyond its procurement. Prolonged cooking leads to oil degradation, rendering it unfit for consumption and potentially hazardous to health. This degradation contributes to escalating health concerns such as obesity, diabetes, and heart-related ailments. Recognizing this issue, FSSAI (Food safety and standards authority of India) India's apex food control authority introduced a new policy to monitor burnt oil usage. This policy aims to address the risks associated with deteriorated oil. This newsletter delves into global issues concerning edible oils, emphasizing the importance of making informed choices. It encourages readers to exercise caution and wisdom in utilizing edible oils. By highlighting the health hazards linked to degraded oils and advocating for prudent consumption, the article underscores the significance of mindful oil usage for personal well-being and health management. The used cooking oil can further be used as a raw material in the production of biodiesel which can be used in vehicles to lessen toxic emissions.

Introduction on Burnt Oil



In the fiscal year 2022, India utilized approximately 22 million metric tons of vegetable oils, encompassing varieties such as coconut, cottonseed, olive, palm, peanut, rapeseed, soybean, and sunflower oils. Meanwhile, the market for used cooking oil (UCO) reached 3.2 million tons in 2022. It is recommended to discard vegetable oil after four uses or when its Total Polar Compound (TPC) levels reach 25, as exceeding this threshold makes it unsuitable for human consumption. The FSSAI rules, effective from July 1, 2018, stipulate that the TPC limit should not exceed 25%, beyond which the vegetable oil is considered unfit for use.

Despite these regulations, many Food Business Operators (FBOs) are not disposing of used cooking oil. Instead, they repack and sell UCO to roadside food vendors and small-town markets. An illicit market has emerged where spurious oil businesses pay FBOs 30-40rs per litre for UCO, which is then sold to roadside food joints. This practice deviates from regulations, as UCO was previously provided to UCO-based biodiesel manufacturers for free. However, these manufacturers are now facing closure due to a shortage of raw materials. Stricter actions and penalties are necessary to curb the operations of these illicit oil businesses that have been active for an extended period.

According to FSSAI estimates, India generates around 3 million metric tons of UCO annually, with 60% of it re-entering the food chain, posing health risks. Subsequent chapters elaborate on the adverse effects of UCO on human and environmental health. The Government of India has introduced the Repurposing Used Cooking Oil (RUCO) initiative, presenting a sustainable solution by utilizing UCO in the production of biodiesel.

This initiative could address India's energy needs, considering that the Ministry of Petroleum and Natural Gas (MoP&NG) asserts the annual usage of approximately 27 billion litres of cooking oil, of which 1.4 billion litres of UCO can be collected from bulk food operators to produce 1.1 billion litres of biodiesel.

India currently hosts 33 UCO-based biodiesel units, established between 2017 and 2018 with government support. Their objectives include eliminating unhealthy oils from the food chain, converting them into clean energy, and gradually substituting fossil fuels with biofuels. Effective coordination between FSSAI, FDCA, and Pollution Control Boards is crucial in ensuring that UCO from FBOs serves as feedstock for biodiesel manufacturers. Rigorous monitoring, certification for proper UCO disposal, market development incentives, and consumer awareness regarding the detrimental effects of UCO in food can collectively contribute to the effective management of UCO for biodiesel production.

Source:

1. India Used Cooking Oil Market: Industry Trends, Share, Size, Growth, Opportunity and Forecast 2023-2028
Report Format: PDF+Excel | Report ID: SR112023A5078
(<https://www.imarcgroup.com/india-used-cooking-oil-market>)
2. 'Used Cooking Oil' in India Diverted to Food Chain; Public Health and Biodiesel Sectors Suffer Kanchan Srivastava | 12 August 2021 (<https://earthjournalism.net/stories/>)

The Impact of Consumable Oil on Health and the Environment, with Emphasis on the Consequences of Burnt Oil

The fondness for fried foods is widespread globally, whether it's the universally loved French fries, local snacks like gathiya, or a simple bag of potato chips—all fried in oil. Fried dishes often boast a satisfyingly crunchy texture on the outside while retaining the flavors and moisture within, providing a fulfilling and heightened food experience. The adverse health impact of excessive consumption of oily or fried foods is widely recognized among the general public.

Moreover, the repercussions extend beyond personal health. The demand for edible oil also leads to irreversible damage to centuries-old rainforests in various countries such as Brazil, Colombia, Ecuador, and the Southeast Asian rainforests of the Indo-Malayan region. You might wonder, how do fried foods connect to rainforest damage?

The Palm oil is consistently singled out as the main

culprit for rainforest deforestation and biodiversity loss in the newsletters, articles, and social media updates of prominent NGOs and environmental conservation organizations. The rainforests mentioned above are cleared up to make space for palm tree plantations. Palm oil is present in over half of the items found at your nearby supermarket. Be it a packet of biscuits, a chocolate bar, as well as body creams, soaps, candles, detergents, etc., all contain palm oil.

So why should we care about the rainforests? Rainforests are incredibly rich in biodiversity as they are home to thousands of species of different life forms, be it trees, birds, insects, fungi, mammals, reptiles, amphibians, etc. Clearing rainforests poses a great threat to life in them. Apart from the biodiversity, the rainforests are also known as the lungs of the planet as they produce a significant

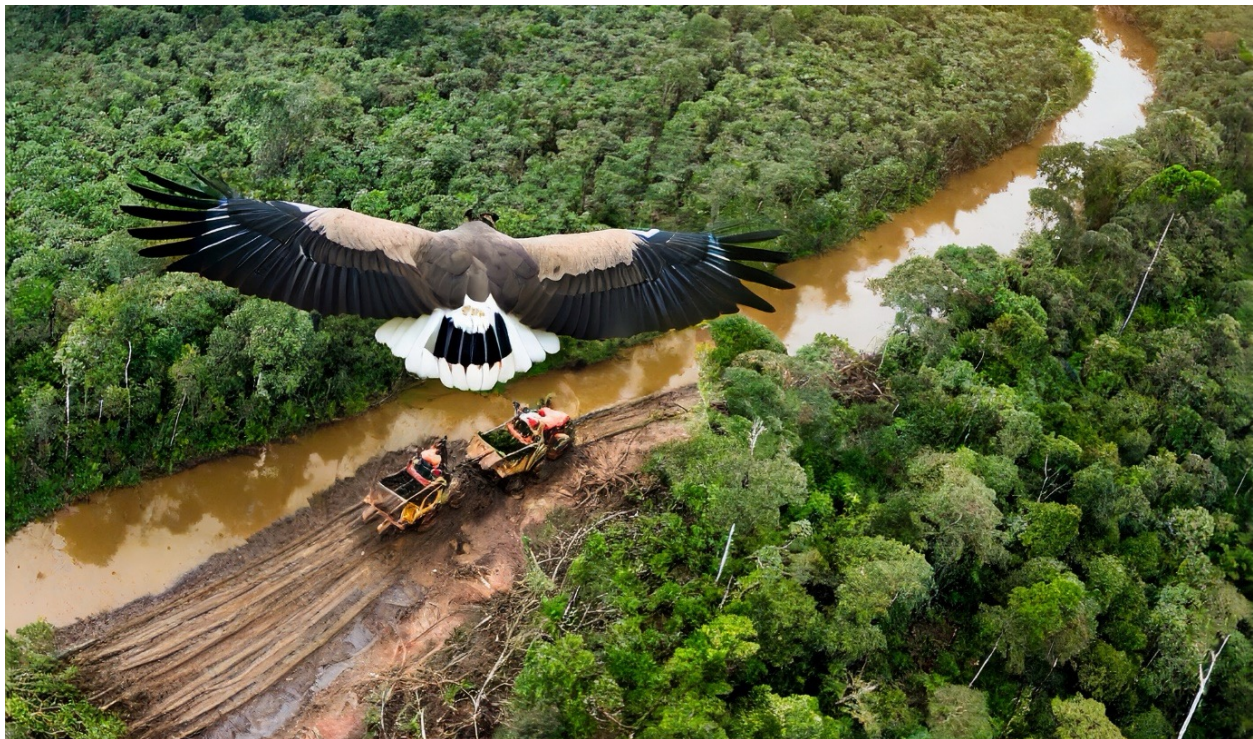


Figure 1 AI generated image: An endangered Harpy eagle of Amazon Rainforest soaring on its destroyed habitat

amount of oxygen through photosynthesis. Hence, it is important to conserve the rainforests. Rainforests also provide food, shelter and medicines to numerous people across the globe.

To be able to discuss the issues caused by the consumption of burnt oil, it was necessary to understand the problems caused by the production of oil, in this case, palm oil.

Let us move on to the issues with burnt edible oil. The oil heated at high temperatures for a prolonged period is known to undergo chemical changes, leading to the formation of undesirable compounds. In edible oils, the desirable beneficial compounds for food purposes undergo chemical reactions when burnt at the smoke point (Temperature at which oil begins to produce a continuous bluish smoke that becomes clearly visible). This leads to the breakdown of desirable compounds and generates harmful compounds such as acrolein, advanced glycation end products (AGEs), polycyclic aromatic hydrocarbons (PAHs), and trans fats. Acrolein is primarily used as a biocide to control plants, algae, fungi, microorganisms, etc. It is also used as a warning agent in gases, as a test gas for gas masks, in military poison gases, in the manufacturing of colloidal metals, in leather tanning, etc. Acrolein is produced when the glycerol in the oil breaks down.



Figure 2 a common street food scene across India where puri is fried in burnt oil (source: <https://pin.it/67dNdEx>)

A compelling research conducted by the CSIR-Central Food Technological Research Institute (CSIR-CFTRI) in 2013 examines the impact of continuous versus intermittent frying using groundnut oil. The study demonstrates that the conventional method of repeatedly heating and reusing cooking oil leads to greater degradation of the oil compared to the practice of continuous frying. To put it differently, oil that undergoes shorter heating periods, is subsequently cooled, and stored for later use experiences more deterioration than oil that is continuously heated for longer durations during the frying process. Deterioration is evident from

increased levels of free fatty acids in both oils after some time. However, it is higher in the oil that is used intermittently compared to the one used continuously. The Anisidine value (AV) of the oil also increases, indicating the presence of breakdown products during degradation, affecting the quality and safety of the oil. Oils with high AV lead the oil to go rancid (tasting or smelling unpleasant because of not being fresh), causing it to have an unpleasant taste, odor, and lower nutrition. It also poses health risks if consumed, such as contributing to oxidative stress in the body, which may lead to cell damage and inflammation. Additionally, the peroxide value, diene value, and triene value of the oil increase with time, collectively leading to the oil becoming rancid and posing threats to health if consumed.

Consuming rancid oil can cause inflammation which can lead to diseases such as diabetes, obesity, and heart diseases. Reheating increases trans-fat which, in turn, raises bad cholesterol and decreases good cholesterol. The increase in bad cholesterol can cause Parkinson's disease, cardiovascular diseases, stroke, and various liver-associated diseases. The use of repeatedly heated oil may cause hypertension, promote atherosclerosis, osteoporosis, and may affect liver and kidney structure and function.

So, opting not to consume burnt oil is a positive decision for your health! However, where you dispose of the used oil matters significantly. Pouring used oil down the drain can lead to pipe blockages and attract pests such as cockroaches and drain flies. Disposing of it in open ground can harm soil fertility, impeding plant growth. Additionally, it might contaminate groundwater as it leaches through the soil, upsetting the local ecosystem by disrupting soil-dwelling microorganisms.

Considering the rising global interest in renewable and clean energy sources, governments worldwide are advocating for electric vehicles (EVs) and also promoting biofuels like bio-ethanol and bio-diesel. Biodiesel production from burnt oil is achievable using a process called transesterification. Hence, instead of discarding the used cooking oil, it is now possible to use it for the preparation of bio-diesel.

Source:

1. https://www.fssai.gov.in/upload/media/FSSAI_NEWS_Oil_Insider_30_09_2019.pdf
2. <https://www.atsdr.cdc.gov/MHMI/mmg124-handout.pdf#page=1>
3. Das, A. K., Babylatha, R., Pavithra, A. S., & Khatoon, S. (2013). Thermal degradation of groundnut oil during continuous and intermittent frying. *Journal of Food Science and Technology*, 50(6), 1186–1192. <https://doi.org/10.1007/s13197-011-0452-7>

Burnt oil in Biofuel: Schemes



Source: <https://uranusoil.com/about-the-company/>

As mentioned earlier, used cooking oil or burnt oil can be used to make bio-fuel, specifically biodiesel. The food safety and standards authority of India (FSSAI) launched RUCO (Repurpose used cooking oil) initiative, to check the usage of used cooking oil. On 6th May 2019, FSSAI released guidelines for the collection of UCO by biodiesel manufacturers from Food Business Operators. Through this effort, an attempt was made to formalize a process of procurement of UCO, which can further be used in the preparation of Biodiesel. A byproduct of biodiesel production is glycerol which can be used in the soap industry.



About RUCO

During frying, several properties of oil are altered. Total Polar Compounds (TPC) are formed on repeated frying. The toxicity of these compounds is associated with several diseases such as hypertension, atherosclerosis, Alzheimer's disease, liver diseases. Therefore, it is essential to monitor the quality of vegetable oils during frying in order to safeguard consumer health. FSSAI has fixed a limit for Total Polar Compounds at 25 percent beyond which the vegetable oil shall not be used. From 1st July 2018 onwards, all Food Business Operators (FBOs) are required to monitor the quality of oil during frying by complying with the said regulations. FSSAI is implementing an EEE Strategy.

Figure 2 Web portal of RUCO developed by FSSAI

Industrialized nations such as the USA, UK, Germany, Australia, among others, have stringent regulations in place to prevent the improper disposal of used cooking oil (UCO), which could harm the environment and sewage systems. They have established collection centers in cities to gather UCO, which is then transported to biodiesel

manufacturers. India is now adopting a similar system, but there remains insufficient awareness about this initiative. To address this gap, relevant institutions and non-governmental organizations (NGOs) could take the lead in organizing awareness programs. These programs would educate the public on the proper utilization of edible oil and highlight the negative consequences of using burnt oil. The recent formation of the Global Bio-fuel Alliance during the G-20 summit in India suggests a potential increase in the collection of used cooking oil for biodiesel production.

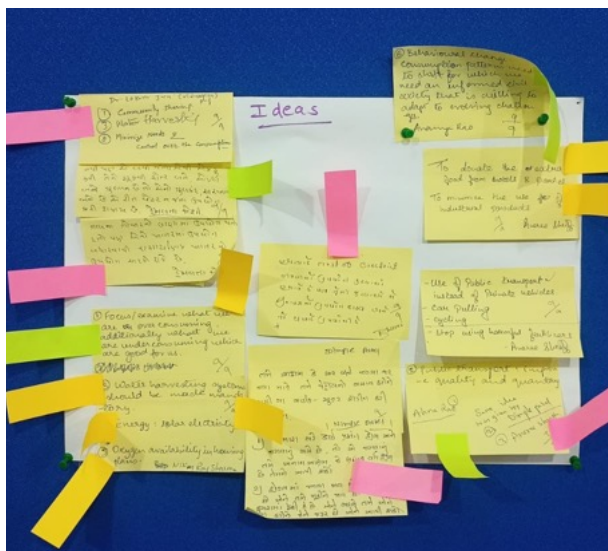
According to the latest update from RUCO, there are 48 Nonfood production units (NFP) units for the collection of used cooking oil from food business operators of India. The list of collection units with addresses and contact details can be found [here](#). Currently India has about 32 biodiesel plants across the country which produce over 4000 tonnes per day. However, used cooking oil (UCO) as of now is underutilized as a biodiesel feedstock, accounting for a mere 0.133% contribution compared to the established goal of 5% in conventional diesel fuel.

Source:

1. <https://eatrightindia.gov.in/ruco/index.php>
2. Manikandan G, Kanna PR, Taler D, Sobota T. Review of Waste Cooking Oil (WCO) as a Feedstock for Biofuel—Indian Perspective. *Energies*. 2023; 16(4):1739. <https://doi.org/10.3390/en16041739>

Events (October - December 2023)

1. CERC-EIACP PC RP on the occasion of Green Action Week conducted a workshop on “Envisioning Sustainable Consumption Futures”



2. Workshop on “Envisioning Sustainable Consumption Futures” conducted by CERC EIACP PC RP, covered by the Young Leader newspaper on 04.10.2023



ग्राहक शिक्षण एवं संशोधन केन्द्र द्वारा सम्पोषित उपभोग विषय पर कार्यशाला आयोजित

गांधीनगर। संपोषित कार्यक्रम के तहत वैश्विक स्तर पर तिवनशैली के आदर्श एवं प्रेरक शोषण केन्द्र द्वारा सम्पोषित पभोग विषय पर कार्यशाला का आयोजन किया गया जिसमें जरात विद्यापीठ के ग्रामीण बंधन विभाग, व्यावसायिक तक्षण तथा माइक्रोबायलोजी भाग, गुजरात यूनिवर्सिटी के वार्धार्थियों के साथ साथ मोटे नाज से विविधतापूर्ण वानगी यार करने के क्षेत्र से जुड़ी हिलाओ, संपोषित आवास ववस्था से जुड़े प्रतिनिधियों के 114 40 प्रतिभागियों ने सक्रिय भागीदारी की। ग्रामीण विकास के लक्ष्य को प्राप्त करने के लिए नीतिगत कदम उठाए जा सकते हैं, हमारा संयुक्त कार्यकारी विजन क्या होना चाहिए इस मुद्दे पर प्रतिभागियों ने समूह चर्चा के माध्यम से विचार मंथन किया। कार्यक्रम के आरंभ में सीईआरसी की कार्यक्रम अधिकारी दिव्या बहन ने इस कार्यशाला की भूमिका को प्रतिभागियों के समक्ष रखा। संपोषित विकास से जुड़े विरिष्ठ विषय विशेषज्ञ श्री पल्लव मोडना ने सहभागी पद्धति से कार्यशाला की सैद्धांतिक पृष्ठभूमि पर अपना उद्घोषण दिया। संपोषित आधारभूत संरचना, प्राकृतिक संसाधनों का उपयोग संरक्षण त वेस्ट वाटर मैनेजमेंट, संपोषित विकास को पोषित करती पारंपरिक ज्ञान विज्ञान व्यवस्था तथा ग्रामीण विकास की धीम पर अलग अर 4 समूहों में आईडिया जेनरेशन त विजन विकास पर सघन व गं चर्चा की गई। इस प्रक्रिया सीईआरसी के करन ठक्क मोघाबीबेन आदि सहयोगी भूमिका में रहे। ग्रामीण प्रबंध विभाग के प्रोफेसर डॉ. लोके जैन, विद्यार्थी वंशिता बेन त नितिन, मिलेट उद्योगसाहि निपिन बेन पटेल आदि ने सार प्रस्तुती देकर कार्यक्रम को साथ बनाया।

3. Began our Sharing Activity of pre-loved items with full vigor. We received sharing items like Books, Clothes, Toys etc. We are excited to act as a bridge between the privileged and the marginalized community.



4. Ms. Divya Namboothiri, Programme Officer, CERC EIACP held session on Mission LIFE for the 8th std of Rachna High school on 10th October 2023 at CERC, Ahmedabad.





5. The EIACP division of the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, in collaboration with the EIACP centre of the Bombay Natural History Society (BNHS), organized a one-day Regional Evaluation Workshop of EIACP centres for western zone in Mumbai, Maharashtra.



6. CERC-EIACP PC RP put up a stall at Durga Puja Pandal in Ahmedabad to share awareness materials like brochures and pamphlets related to Mission LIFE, kitchen gardening, importance of millets etc.



7. Mr. Karan Thakkar, Information Officer, CERC EIACP held a session on Mission LiFE for the students of 6th to 9th std at Blue Bell School on 2nd November 2023 Ahmedabad.



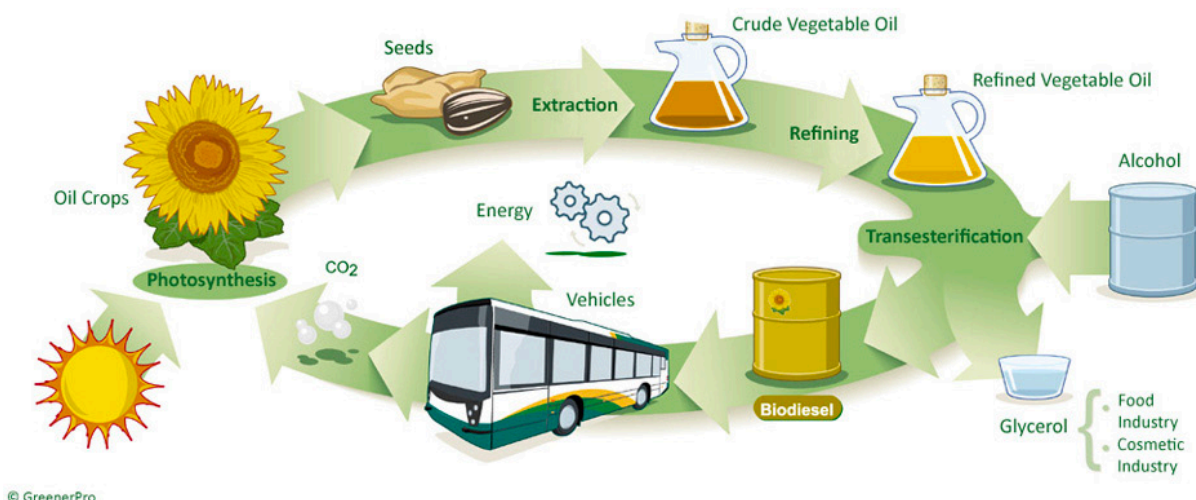
8. Ms. Divya Naboothiri, Programme Officer, CERC EIACP held a session on Mission LiFE, Sustainable Food Systems with representatives of various food industry and Home chefs on 29th December 2023 at CERC, Ahmedabad.



9. Ms. Divya Namboothiri, Programme Officer, CERC EIACP held a session on Mission LiFE, Sustainable Food Systems with Law interns, representative of various food industry and women home chefs on 8th December 2023 at CERC, Ahmedabad.



The Biodiesel Cycle




Source: <https://www.grandnaturalinc.com/blog/stages-of-used-cooking-oil-recycling-from-restaurant-to-biodiesel.html>

Environmental Information, Awareness, Capacity Building and Livelihood Programme acronymed as EIACP erstwhile Environmental Information System (ENVIS) was implemented by the Ministry of Environment, Forest & Climate Change by end of 6th Five Year Plan as a Plan Scheme for environmental information collection, collation, storage, retrieval and dissemination to policy planners, decision makers, scientists and environmentalists, researchers, academicians and other stakeholders. MoEF&CC has identified Consumer Education and Research Centre (CERC), Ahmedabad, as one of the Resource Partner to collect and disseminate information on "Environment Literacy - Eco-labelling and Eco-friendly Products". The main objective of EIACP Programme centre- Resource Partner is to disseminate information on Environment literacy, Eco-products, International and National Eco-labelling programmes.



Periodical Printed & Published By

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Disclaimer

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Printing

Print Express, Ahmedabad.