3.1: Edible Oil Extraction — Traditional and Modern Methods

Edible oils are an essential component of the Indian diet, used for cooking, flavouring, and, in some regions, ritual purposes. India has a long tradition of oil extraction from oilseeds such as mustard, groundnut, sesame, coconut, and til, using mechanical pressing methods that predate industrial solvent-based extraction. This chapter examines both traditional and modern oil extraction methods and their comparative characteristics.

3.2 Common Oilseeds Used in India

- Mustard/rapeseed (sarson) — widely used in North and East India

- Groundnut (peanut) — common in Western and parts of Southern India

- Sesame (til) — used across India, especially in the South and East

- Coconut — dominant in coastal and Southern India

- Sunflower, safflower, and others — regionally significant

3.3 Traditional Method: The Ghani (Kolhu)

The ghani, also known as kolhu, is the traditional Indian oil-extraction device, historically powered by bullocks (animal-powered ghani) and later adapted to motorized versions (power ghani/motorized ghani), while retaining the same basic mechanical crushing principle.

Structure and process:

- A large wooden or stone mortar (fixed vessel) holds the oilseeds.

- A wooden pestle, rotated within the mortar (traditionally by a bullock walking in a circular path, or by motor in later adaptations), crushes the seeds through continuous pressure and grinding action.

- The mechanical pressure ruptures oil-bearing cells in the seed, releasing oil, which is collected as it seeps out; the leftover solid residue is called **oil cake** (or ghani cake).

- The process is slow, generating relatively low heat compared to high-speed industrial expellers.

Characteristics of ghani-extracted oil:

- Often referred to as "cold-pressed" or "kachi ghani" oil (particularly for mustard oil), reflecting the low-heat extraction process.

- Retains more of the natural flavour, aroma, and colour of the source seed.

- Retains a higher proportion of natural antioxidants and micronutrients that can be degraded by heat in high-temperature extraction processes.

- Lower oil yield per unit of seed compared to modern expeller or solvent extraction, as some oil remains in the cake.

3.4 Modern Method 1: Mechanical Expeller Pressing

Modern expeller mills use motor-driven screw presses to mechanically extract oil at a larger scale and higher throughput than traditional ghanis.

Process:

- Cleaned, sometimes pre-heated or cooked seeds are fed into a screw press (expeller), which applies continuous, high mechanical pressure.

- Oil is expelled and collected; the remaining solid material forms oil cake, used as animal feed or, in some cases, further processed for residual oil recovery.

- Higher speed and pressure generate more heat than traditional ghani pressing, which can affect the oil's flavour profile and heat-sensitive nutrient content, though modern expeller designs vary in the degree of heat generated.

3.5 Modern Method 2: Solvent Extraction

Solvent extraction is used industrially to maximize oil yield, particularly from oil cake left after mechanical pressing, or directly from the oilseed.

Process:

- Seeds (or pre-pressed oil cake) are treated with a chemical solvent (commonly hexane), which dissolves the residual oil.

- The oil-solvent mixture (miscella) is separated, and the solvent is recovered through distillation/evaporation for reuse, leaving crude oil behind.

- The crude oil then typically undergoes **refining** — degumming, neutralization, bleaching, and deodorization — to produce refined edible oil.

Characteristics:

- Maximizes oil yield (very little residual oil left in the meal/cake).

- Produces a more neutral-tasting, longer-shelf-life refined oil, but the refining process removes much of the natural colour, flavour, and some heat/chemical-sensitive micronutrients present in less-processed oils.

- Requires industrial infrastructure and is not feasible at a small/household scale.

3.6 Comparison: Traditional (Ghani) vs. Modern (Expeller/Solvent) Oil Extraction

Aspect	Traditional (Ghani)	Modern (Expeller)	Modern (Solvent Extraction)
Oil yield	Lower	Moderate to high	Highest
Heat generated	Low	Moderate	Variable (process-dependent, refining involves heat)
Flavour/aroma retention	High (characteristic of source seed)	Moderate	Low (neutral after refining)
Nutrient/antioxidant retention	Higher	Moderate	Lower (post-refining)
Scale	Small/household, village-level	Medium to large industrial	Large industrial
Shelf life of oil	Shorter (unrefined, more natural components present)	Moderate	Longer (refined)
Cost of production	Lower capital, higher labour	Moderate	High capital, but efficient at scale

3.7 Significance in the Indian Context

- Traditional ghani-pressed oils (e.g., kachi ghani mustard oil, cold-pressed groundnut/sesame oil) continue to be valued and marketed, including in premium/health-conscious segments of the modern Indian market, for their flavour and perceived nutritional benefits.

- Modern refined oils dominate large-scale commercial and institutional use due to cost-efficiency, consistency, and shelf stability.

- The choice between traditional and modern extraction methods reflects a broader trade-off—also seen in milling .