Ministry of Food Processing Industries
Government of India

NIFTEM
KNOWLEDGE • INNOVATION • OUTREACH

Oil Seeds Processing

AATMANIRBHAR BHARAT

PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)

INTRODUCTION

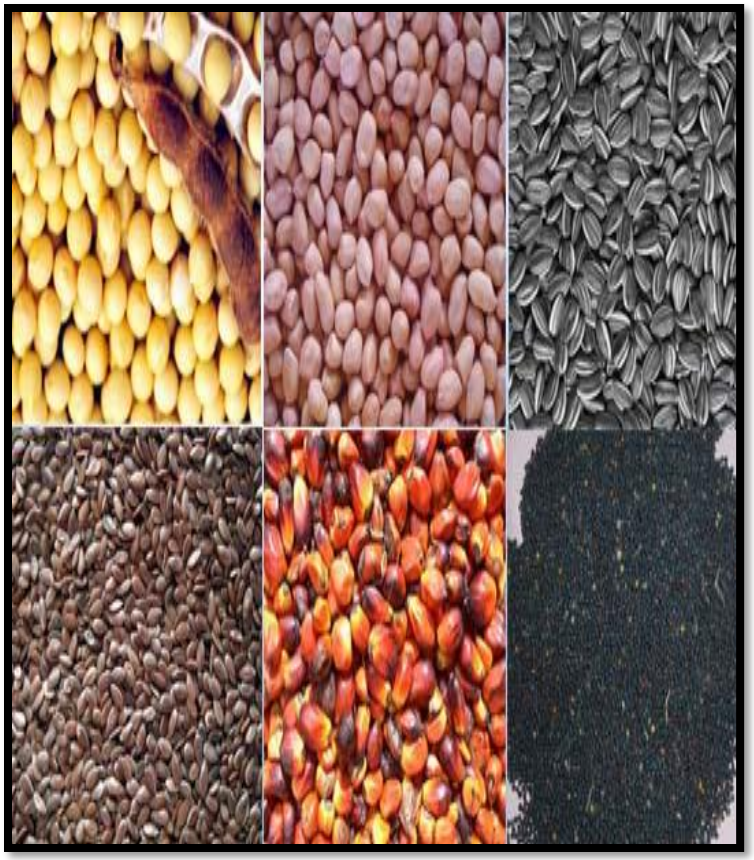
- The Oilseeds sector has been one of the most dynamic components of world agriculture in the past three decades growing at 4.1% per annum surpassing the growth of agriculture and live stock products.
- The performance of oilseeds on the domestic front during the last two decades has been commendable braving the vagaries of weather conditions, the global price aberrations and the ever increasing domestic demand.
- The self-sufficiency in oilseeds attained through “Yellow Revolution” during early 1990’s, could not be sustained beyond a short period.

INTRODUCTION

- Despite being the fifth largest oilseed crop producing country in the world, India is also one of the largest importers of vegetable oils today.
- There is a spurt in the vegetable oil consumption in recent years in respect of both edible as well as industrial usages.

VARIETIES OF OIL SEEDS

- Nine oilseeds are the primary source of vegetable oils in the country, which are largely grown under rain fed conditions over an area of about 26 million ha. Among these, soybean (34%), groundnut (27%), rapeseed & mustard (27%) contributes to more than 88% of total oilseeds production and more than 80% of vegetable oil with a major share of mustard (35%), soybean (23%) and groundnut (25%).



SOYBEAN SEEDS

- Soybean (*Glycine max*) is the world's most important seed legumes which contributes 25% to the global edible oil, about two third of the world protein concentrate for livestock feeding and is a valuable ingredient in formulated feeds for poultry and fish.
- The commercial cultivation of soybean crop in India commenced in late sixties. Starting from 0.32 lakh ha in 1970, soybean has reached to 101.1 lakh ha in 2011.
- Soybean is predominantly grown as rainfed crop in Vertisols and associated soils with an average crop season rainfall of 900 mm.

SOYBEAN SEEDS

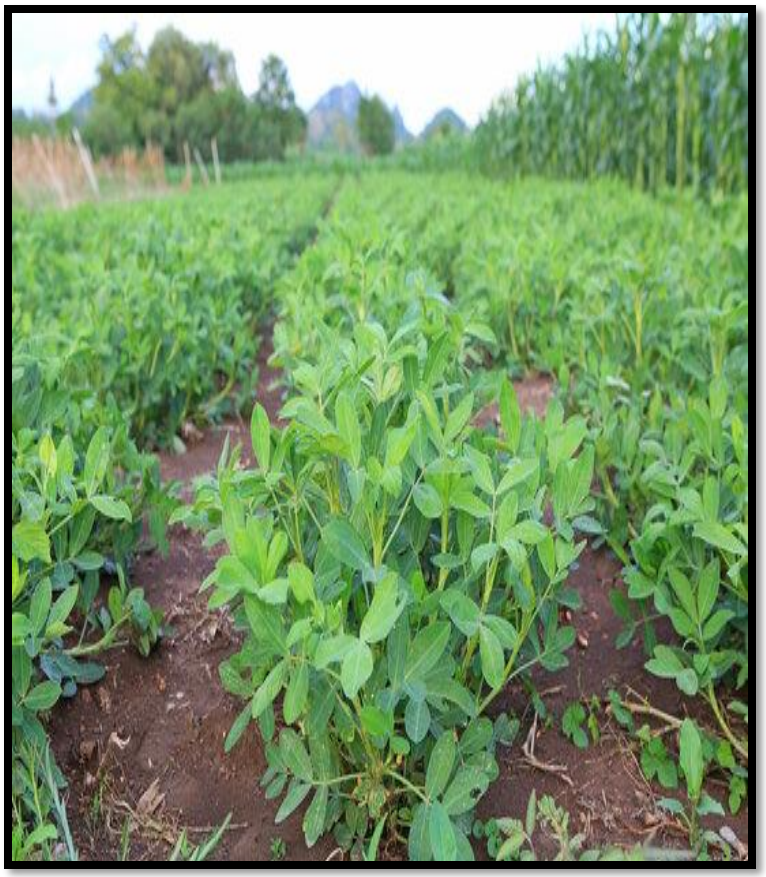
- Soybean is a short day plant and is highly sensitive to day length. It has emerged as one of the most resilient rain fed Kharif season crops, as despite aberrant weather conditions in recent past, the crop has maintained a considerably good level of productivity.
- The area under soybean is mainly spread in latitudinal belt of about 15 to 250N comprising the states of Madhya Pradesh, Maharashtra, Rajasthan, Chhattisgarh, Andhra Pradesh and Karnataka.

GROUNDNUT SEEDS

- Groundnut (*Arachis hypogaea L*.) is an important oilseed and ancillary food crop of the world. A native of South America, groundnut is cultivated in tropical, sub-tropical, and warm temperate regions of the world.
- The commercial cultivation of groundnut, however, is confined to areas between 40°N and 40°S latitudes.
- Developing countries account for more than 80% of groundnut area in the world. The production is confined mainly to Asian and African countries. Asia accounts for about 50% of the global area and 60% of production.

GROUNDNUT SEEDS

- In India, groundnut is cultivated largely in kharif season (June to October) usually under rainfed conditions with low input use. In kharif, the pressure of insect pests and diseases including weeds is high and hence, the productivity is low.
- In rabi season (October to March), the crop is grown on residual moisture in Rice Fallow Lands or river beds under minimal irrigation situations and also in summer season (January-February to April-May) as an irrigated crop.

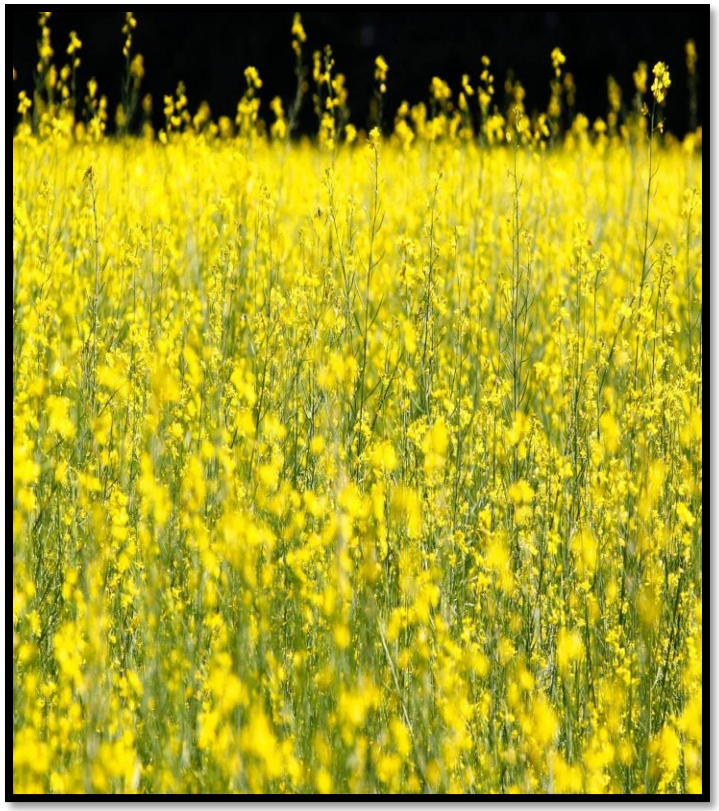


MUSTARD SEEDS

- The mustard seed ranks fourth among the major oilseeds of the world. India is an important rape seed mustard growing country in the world, occupying largest area and has second position in production after China.
- The cultivation of the plant for oilseed production is almost entirely confined to the temperate and warm temperate zone of Asia and Europe. Rapeseed thrives best in rich soil in a cool and moist climate.
- Indian mustard (Brassica juncea L.) is predominantly cultivated in Rajasthan, UP, Haryana, Madhya Pradesh, and Gujarat. It is also grown under some nontraditional areas of South India including Karnataka, Tamil Nadu, and Andhra Pradesh.

MUSTARD SEEDS

- The crop can be raised well under both irrigated and rainfed conditions. Being more responsive to fertilizers, it gives a better return under irrigated conditions.
- Brown sarson (B. Rapa ssp. sarson) has 2 ecotypes lotni and toria. Yellow sarson (B. Rapa var. trilocular) is cultivated in Assam, Bihar, Orissa, and West Bengal as a rabi crop. In Punjab, Haryana, UP, Himachal Pradesh, and Madhya Pradesh, it is grown mainly as a catch crop.



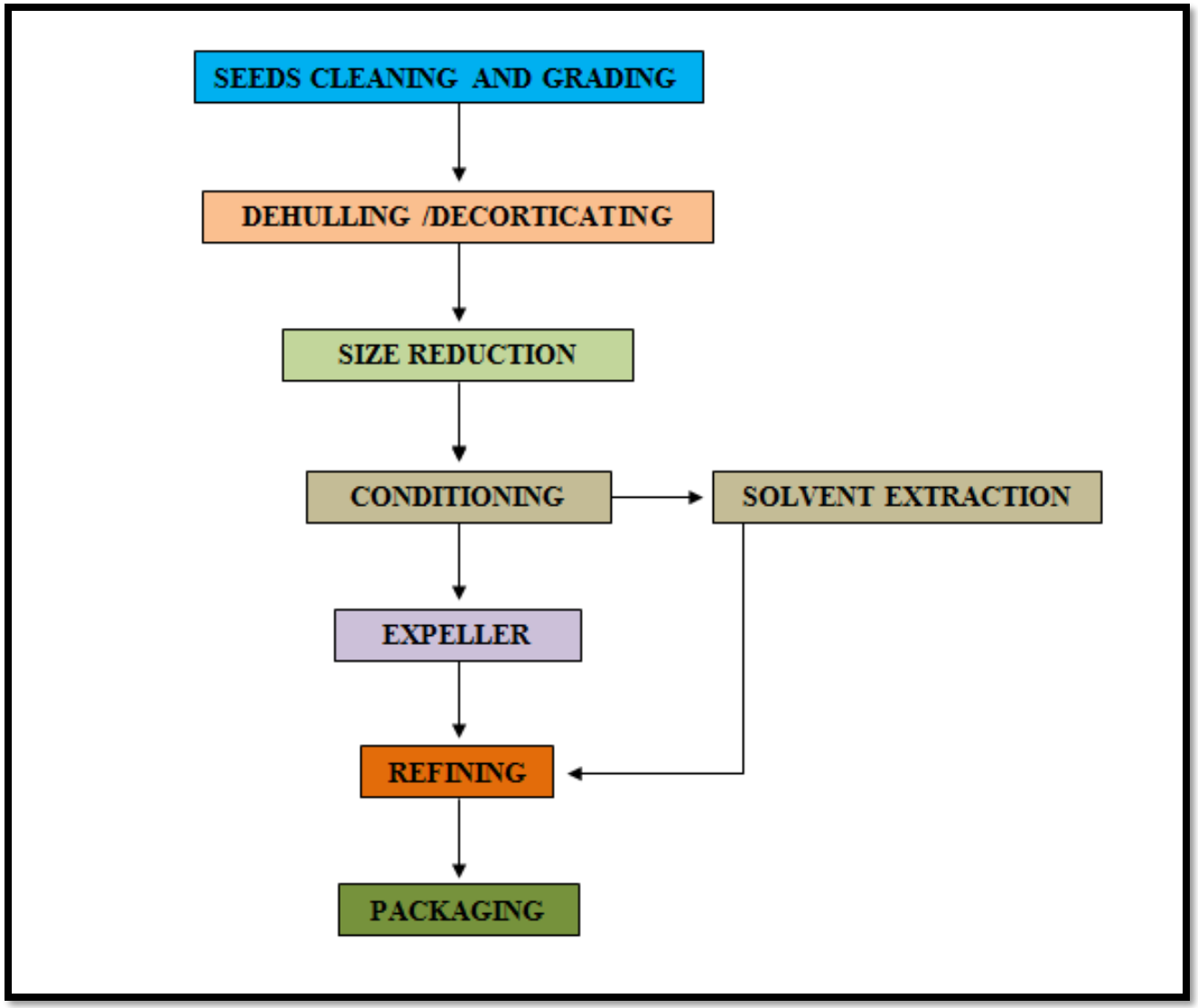
SUNFLOWER SEEDS

- The cultivated sunflower (*Helianthus annus L.*) is native of southern United States and Mexico, during later part of 20th century, the crop was introduced to India.
- Seed contains the oil varying from 35-43%. The unsaturated fatty acids such as oleic and linoleic, comprise about 90% of the total.
- High oleic sunflower seeds are used for confectionary purposes and oil has good keeping quality. Sunflower hulls are used in animal feeds as a source of roughage, as a fuel to generate steam or electricity and in production of furfural and ethyl alcohol.

SUNFLOWER SEEDS

- Karnataka, Andhra Pradesh and Maharashtra are the major sunflower growing states contributing about 91% and 82% of the country's area and production respectively.
- Sunflower contribution to Indian oilseed production is about 3.85% and major growing areas in the world are Russia, Ukraine, Argentina, China, France, USA, Spain and India.

PROCESSING OF OIL SEEDS



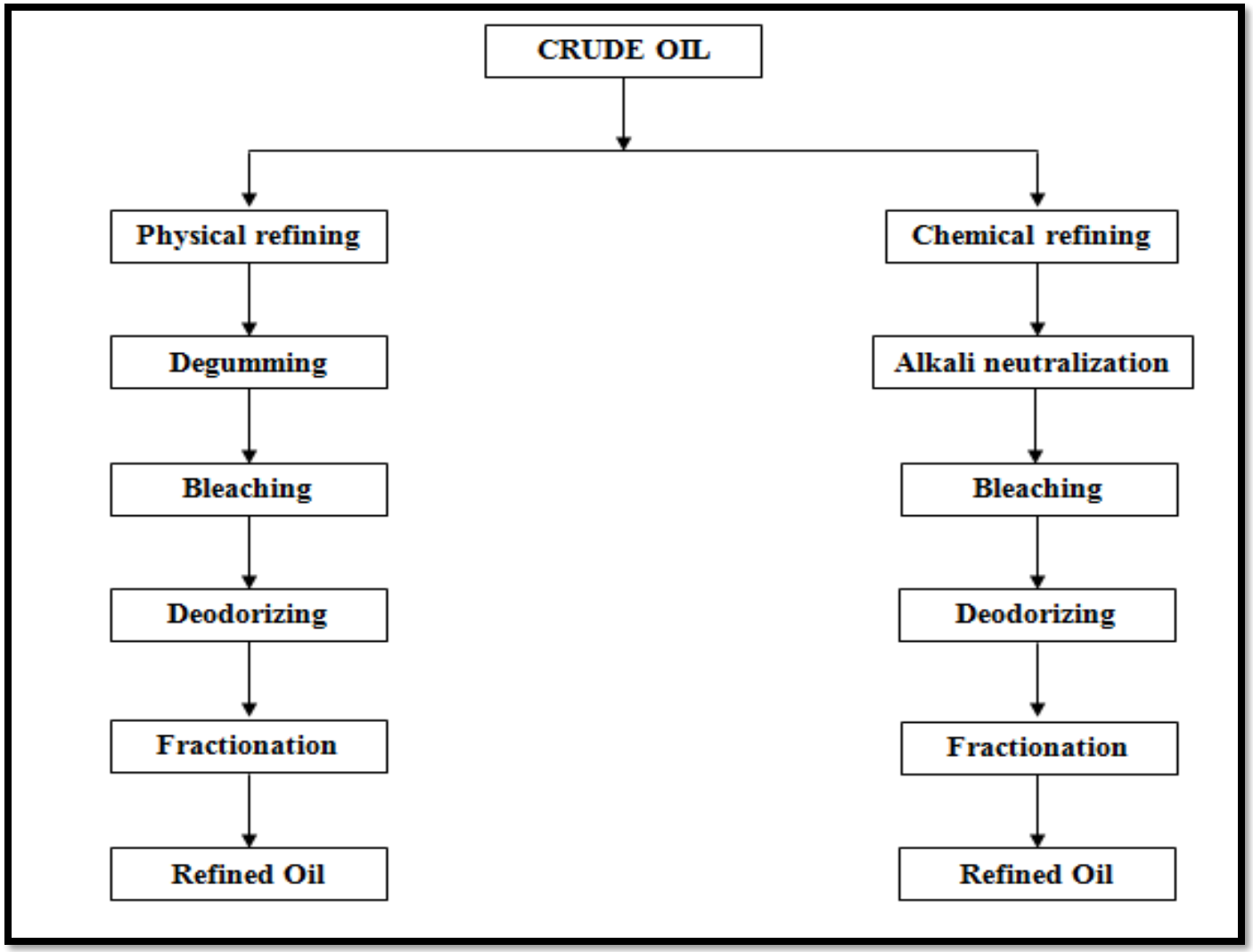
PROCESSING OF OIL SEEDS

- **CLEANING :** The first preparation step is cleaning to remove foreign materials from the oil seeds. This includes the separation of plant tissues, pebbles, dust, etc. to protect the processing equipment and enable the production of high quality soy products. Some weed seeds have been shown to reduce the oxidative stability of the extracted oil if they are not removed.
- **DRYING :** To remove the hull effectively a moisture content of 10% is needed, which requires a drying process prior to dehulling. Heated air is distributed through the oil seeds to achieve some loss of water, followed by cooler air, which removes the residual moisture laden air.

PROCESSING OF OIL SEEDS

- **DEHULLING :** De-hulling operation is performed for the removal of seed coat which also helps in reducing the anti-nutritional factors.
- **CONDITIONING :** Conditioning is done with the help of heat and moisture to obtain the optimum plasticity necessary for flake production, prior to oil extraction.
- **EXTRACTION :** Extraction of oil from the mash is done with the help of screw, hydraulic, or centrifugal presses, this method is known as dry method. Extraction of oil can also be done through wet method, where hot water as a liquid is used to extract oil from ruptured cell of oil seeds.

PROCESS OF OIL REFINING



PROCESS OF OIL REFINING

- **ALKALI NEUTRALIZATION :** To reduce free fatty acids and polar lipids in crude oil, it is treated with solution called sodium hydroxide or sodium carbonate and the process is called as alkali neutralization or alkali refining.
- **DEGUMMING :** Alkali neutralization is not alone sufficient for removal of all the impurities thus the process of degumming is performed in both i.e. physical refining and chemical refining. Degumming is mainly done to target impurities like phospholipids and other polar lipids (gums). Removal of gums are done with the help of centrifugation.

PROCESS OF OIL REFINING

- **BLEACHING :** Like degumming, bleaching also an important steps of physical refining and chemical refining. The process of bleaching is performed for the removal of pigment by using charcoal or clay.

- **DEODORIZING :** Deodorizing is done by steam distillation and used for removing those products which are volatile in nature. The process of deodorizing is carried out at 230ºC for 2 hours followed by cooling of oil and passing it through filter.

PROCESS OF OIL REFINING

- **FRACTIONATION :** Allowing the oil to stand for a time at low temperatures so that glycerides, which naturally occur in the oil, with higher melting points solidify and can then be removed from the oil by filtering. Over time glycerides can degrade releasing fatty acids into the oil increasing the acidity levels and reducing the quality.

EQUIPMENTS FOR OIL SEEDS PROCESSING

- **THRESHER :** The seeds are detached with the help of thresher or stripper. There are two types of thresher one is rotating drum and other is fixed drum which are used for stripping seeds.

EQUIPMENTS FOR OIL SEEDS PROCESSING

- **OIL EXTRACTOR :** Extraction of oil is done either by wet method or dry method. Dry method includes use of screw pressure for extraction oil

EQUIPMENTS FOR OIL SEEDS PROCESSING

- **FILTER PRESS:** A filter press is a batch operation, fixed volume machine that separates liquids and solids using pressure filtration. The extracted oil has some impurities. These oils are sent into the filter press for further filtration.

EQUIPMENTS FOR OIL SEEDS PROCESSING

- **CLARIFICATION MACHINE:** Clarification of oil is done to remove non oily solids dirt by passing oil through hot water at 95ºC. Oil and dirt separated from each other where dirt settled down at the lower part while clear oil presents at upper part.

SOME MAJOR PLAYER IN OIL INDUSTRIES

MOFPI
MINISTRY OF FOOD PROCESSING INDUSTRIES
GOVERNMENT OF INDIA

PM FORMALISATION OF MICRO FOOD PROCESSING ENTERPRISES SCHEME (PMFME)

TOTAL OUTLAY: RS.10,000 CRORE

- **2,00,000** FPOs/SHGs/Cooperatives and working micro enterprises to be directly benefitted
- Expected to generate **9 lakh** skilled and semi-skilled jobs
- To be implemented over a **5-yr period from 2020-21 to 2024-25**
- Cluster approach
- Focus on Perishables.

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