

Food Oils and Fats: Chemistry & Technology
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Module 4 : Mechanical Expelling of Oils from Plant Sources
Lecture 17: Physical Methods for Oil Extraction – Concept & Mechanism



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Module 4 : Mechanical Expelling of Oils from Plant Sources

Lecture 17 : Physical Methods for Oil Extraction - Concept & Mechanism

Hello everyone. Namaskar. Now, today in the 17th lecture of this course, we will discuss about Physical Methods for Oil Extraction and basically we will talk its concept and mechanism.

Concepts Covered

- Expression
- Hot & cold pressing
- Mechanical models for oil expression
- Parameters affecting the oil yield and quality
- Advantages and disadvantages of pressing



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We will discuss about expression, then hot and cold pressing, mechanical models for oil expression and also we will talk about important parameters that affect the oil yield and quality. And finally, before summarizing we will also talk little bit about advantages and disadvantages of pressing method of oil extraction.

Extraction of oil from oil bearing materials

- Vegetable oils can be obtained from oilseeds using different systems of the press, solvent extraction, or a combination of both methods.
- **Seeds contain high amounts of oil are prepressed then solvent extracted, or direct solvent extraction could be performed on seeds with lower oil content.**
- The extraction technology can be selected depending on the production cost, material traits, availability, usage goal of the cake, and environmental factors.
- **Based on the oilseed structure and composition, some fractions of oil might remain in the meal or cake. This should be considered when comparing the press and cold press for the oil yield and meal composition.**



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So, you know that the vegetable oil can be obtained from oil seeds using different systems of the press, solvent extraction or a combination of both methods. Seeds contain

high amounts of oil and which are pre pressed by using appropriate method and then they are solvent extracted or they are direct solvent extracted that is the particularly the oil seeds which have lower oil content. So, the extraction technology can be selected depending upon the production cost, material traits, availability, uses goal of the cake and environmental factors. Based on the oil seed structure and composition, some fractions of oil might remain in the meal or the cake and this should be considered when comparing the press and cold press for the yield of the oil and the meal composition.

Mechanical extraction

- Mechanical oil extraction (expression) is a solid-liquid phase separation method which is applied to cooked seed flakes.
- It can be executed by batch, mainly hydraulic, and by continuous, mainly mechanical working presses.
- This method usually uses an expeller press to give pressure on vegetables, nuts and seeds to cause the oil to run.
- Usually the mechanical pressing method provides yields of only 65-70% of the oil; and 80% is considered very good.

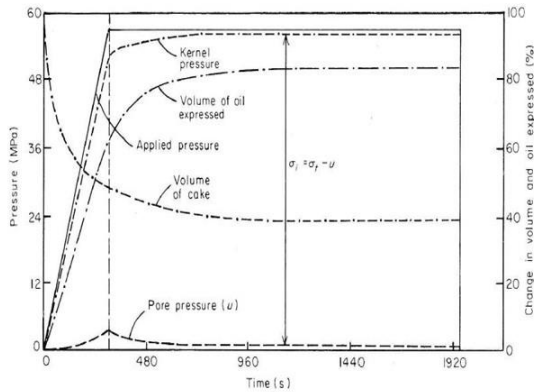
Most large commercial operations use a mild pressing operation to extract 60 to 70% of the oil, while the remainder is solvent-extracted.



Then what is mechanical extraction? That is the mechanical extraction of oil which is more commonly known as expression is a solid liquid phase separation method which is applied to cooked oil seed flakes. It can be executed by batch which is mainly hydraulic method and by continuous which is mainly mechanical working presses. This method usually uses an expeller press to give pressure on vegetables, nuts and seeds to cause the oil to run. Usually the mechanical pressing method provides yields only up to 75 to 70 percent of the oil. If you get a 80 percent yield of the oil, it can be considered a very very good process. The most large commercial operations use a mild pressing operations to extract the oil and therefore, only we can get if you increase the pressure, then oil yield may be little bit increased. But this increase in pressure will also cause

more heat generation and that will adversely affect both the quality of the oil as well as meal.

Expression



Time variation of pressure and volume during the rapeseed oil expression process in a piston-cylinder rig at 16°C using a drainage area of 0.64 cm², and an initial loading rate of 188 kPa s⁻¹ followed by a constant load of 56.6 MPa after that load had been reached

- Expression is the process of mechanically pressing liquid out of liquid-containing solids.
- Screw presses, roll presses and mills, collapsible-plate and frame-filter presses, and hydraulic presses are examples of the wide variety of equipment available for expression processing.
- The efficiency of a mechanical-expression process cannot be equal to unity and, in actual operations, it seldom exceeds 90%.



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Source: Manul & McNurrvt (1985)

The expression as a earlier also I had told is the process of mechanical pressing liquid out of the liquid containing solids, a screw presses, roller presses, mills, collapsible plate, plate and frame, filter presses, hydraulic presses these are all used for this operation. And the efficiency of a mechanical expression process cannot be equal to the unity. In actual operations, it seldom exceeds a 90 percent or even as I told you little early that even maximum if you can get 80 percent yield that itself is a very good process that can be considered. So, here you see that the variation of pressure and volume during the rapeseed oil extraction process in a piston cylindrical ring at 16 degree Celsius using a drainage area 0.64 centimeter is shown here. The curve that is time versus the pressure and you can see here that is if you increase both the time as well as pressure that is the kernel pressure increases the volume of express oil will increased ok. And the volume of cake obviously, will reduce because the oil content in the cake will reduce, but as I told you that if you have excessive more pressure. So, that is the initial you see that when you are applying the pressure initially that with the application of the pressure the oil is released, but after a certain pressure because when the oil content becomes less alright then you one has to be little apply one has to apply little more pressure to get the

remaining oil remainder of the oil and this excessive pressure causes that is excessive heat generation and which adversely affect the quality ok.

Mechanical models for oil expression

Oil flow through cell wall pores

Natural flow of liquid through cell wall pores or plasmodesmata can be calculated by Hagen Poiseuille equation for the flow of Newtonian fluids through a pipe as follows.

$$J_v = \frac{\pi r^4 (P_1 - P_2)}{8 \eta L} = L_p \Delta P$$

Where, J_v is the flow rate of fluid,
 r is the pore radius,
 $P_1 - P_2 = \Delta P$ is the pressure drop across a pore of length L ,
 η is the fluid viscosity, and
 L_p is the hydraulic conductivity.



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Mechanical models for oil expression that is the one is the oil flow through the cell wall pores that is when you are I will tell you may be little later either in this lecture or in the next lecture. What is when you apply pressure what happens that is the cell membrane that ruptures and this through this pores the oil flows ok. So, this oil flow through the cell wall pores that is the for that natural flow through pores or plasmodesmata can be calculated by Hagen Poiseuille equation for the flow of Newtonian fluids through a pipe and that is J_v is equal to $\pi r^4 (P_1 - P_2)$ by $8 \eta L$ is equal to $L_p \Delta P$ where J_v is the flow rate of the fluid r is the pore radius $P_1 - P_2$ that is ΔP is the pressure drop across a pore of length L ok, η is the fluid viscosity and L_p is the hydraulic conductivity. So, with this you can calculate the J_v .

$$J_v = \frac{\pi r^4 (P_1 - P_2)}{8 \eta L} = L_p \Delta P$$

Mrema and McNulty (1979) applied the above equation to an **assembly of cells in an oilseed kernel** and suggested the following simple model for oil expression into the inter-kernel voids.

$$J_v = L_p n_c \Delta P$$

Where, n_c is the number of cells on the shortest radius of the oilseed kernel, i.e. the shortest path for flow of oil to the inter-kernel voids.



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Then Mrema and McNulty in 1979 applied the above equation to an assembly of cells in an oil seed kernel and suggested the simple following simple model for oil expression into the inter kernel wires and that is J_v is equal to $L_p n_c \Delta P$ that is where this n_c is the number of cells on the shortest radius of the oil seed kernel that is the shortest path of for flow of the oil in the inter kernel wires ok. That is the number of number of assembly will increase then obviously, J_v will also increase.

$$J_v = L_p n_c \Delta P$$

Pressing

❑ Cold pressing

- High oil containing seeds such as sesame and peanuts and the oily pulps of olives yield free oil by the simple application of pressure.
- Oil of this type generally require no further processing.
- Sesame and peanut oils have a pleasant nutty flavor.
- Olive oil has a strong but well accepted flavor.
- However cold processing is not very efficient.



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Then let us say the what is the pressing that is the pressing first the cold pressing particularly high oil containing seeds such as sesame and peanuts and the oily pulps of olives yield free oil by the simple application of pressure. Oil of this type generally require no further processing. Sesame and peanut oils have a pleasant nutty flavor olive oil has a strong, but well accepted flavor. However, cold pressing is not very efficient

- To increase the oil yield from cold pressing, some pre-treatments could be applied to seeds before pressing, such as enzyme application, microwave treatment, steaming, and roasting.
- Cold pressed virgin oils do not require expensive refining.
- Only centrifugation or filtration is necessary to obtain high-quality CPO.
- Minor bioactive lipids that are commonly lost during refining are retained in CPO.
- The cold press machine has a simple working scheme wherein oilseeds are fed into one inlet, and two exits provide oil and a non-oiled cake.
- Oil yield depends on pre-treatment (i.e., peeling, drying, and enzymatic treatment) and process parameters applied to the oilseeds or raw materials.
- Cold pressing could be investigated under three main systems viz. **expellers, expanders, and twin-cold systems** (for pilot or laboratory scale production).



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To increase the oil yield from the cold pressing. Some pretreatments could be applied to the seeds before pressing such as enzyme application, microwave treatment, steaming, roasting etcetera and these pretreatments we have discussed in details as even including some novel pretreatment we talked about in the earlier class.

So, cold pressed virgin oil do not require normally further refining only centrifugation or filtration might be necessary to obtain high quality cold pressed oil because the cold pressing if some suspended particles etcetera fine particles etcetera might come. So, that are removed by centrifugation or filtration. Minor bioactive liquids that are commonly lost during refining are retained in the cold pressed oil. The cold pressed machines has a simple working scheme wherein oil seeds are fed into one inlet and the two exist provides oils and exists provides oil and a non-oiled cake. Oil yield depends upon the pretreatment that is peeling, drying and enzymatic treatment and the process parameters applied to the oil seeds are that the raw materials as it raw material whatever various process parameters are applied like heat, pressure etcetera that also will influence the oil yield. Cold pressing could be investigated under three main systems that is expellers, expanders, and twin cold system that is for pilot or laboratory scale production.

❑ Hot pressing

- The oil meals (seed residues from which oil has been removed) obtained after cold pressing techniques contained an excessive amount of valuable oil.
- This lead to the development of more efficient presses such as the hydraulic batch press and the continuous spiral press or expeller.
- These presses develop pressure of 1-15 tones per square inch leaving 4-5% oil in the meal.
- Unfortunately such presses also develop excessive heat causing darkening of the oil and denaturation of the oilseed proteins.

So, hot pressing let us say cold the pressing may be cold pressing as well as hot pressing I discussed briefly the cold pressing then let me talk about hot pressing ok. The oil mills seed residue from the which oil has been removed obtained after cold pressing techniques contain an excessive amount of valuable oil because as I told you cold pressing is not very efficient lot of oil remains in the cake. So, this lead to the development of more efficient presses such as hydraulic batch press or continuous spiral press or expeller. These presses develop pressure up to tune of 1 to 15 ton per square inch and they leave about 4 to 5 percent oil in the acid mill that is here in the by hot pressing method you can go up to 90 and 95 percent that is oil recovery. Unfortunately as I told you earlier also such presses also develop excessive heat causing darkening of the oil and denaturation of the oil protein and they adversely affect the acceptability of the cake particularly.

Hot pressing vs Cold pressing

- Cold-pressed oil can preserve better native properties compared to hot-pressed oil and solvent extracted oil.
- Cold-pressing is free from chemical involved in the refining steps, but cold-pressed oil is considered as good quality if there is no chemical and microbiological contamination, including mycotoxin and metals (Fe, Cu) that may act as prooxidants.
- There is an increasing demand for cold-pressed oil in the market as the high preserved nutritional quality.
- Cold pressing has a lower oil extraction yield than hot-pressing, which inhibits the development of cold-pressing to become commercially available despite the benefit of the cold-pressing.
- Thus, a new pre-treatment is recommended to overcome this disadvantage of cold-pressing.



So, if you have a comparison between hot pressing and cold pressing you can see that cold pressed oil can preserve better the native properties compared to the hot pressed oil or solvent extracted oil. Cold pressing is free from chemicals involved in the refining steps, but cold pressing oil is considered as good quality if there is no chemicals and microbiological contamination including mycotoxins and metal like a ferrous and copper etcetera that may act as a prooxidant. So, generally that is the cold pressed oil they are

used as a virgin oil they are not even subjected to refining treatments etcetera and therefore, there is no. So, if properly operated cold pressed mills they can give a better quality oil although the yield is less.

There is an increasing demand for cold pressed oil in the market as the high preserved nutritional quality because the even bioactives etcetera which are extracted or expressed by cold pressing method from the material like oleum etcetera they are retained in the oil. So, cold pressing has a lower oil extraction yield than hot pressing which inhibits the development of cold pressing to become commercially available despite the benefit of the cold pressing oil because it that is limits rather the more this oil milling that is the hot pressing is becoming commercially more applicable because the oil losses are less here in the cake. Thus a new pretreatment is recommended to overcome disadvantage of the cold disadvantage of the cold pressing that is the before cold pressing that is these oil seeds or materials fruits etcetera this should be given some sort of treatment like novel treatment like PEF, microwave treatment etcetera. So, at to increase the pores etcetera or break the cell ruptures cell. So, that just by simple application you can get a better recovery.

Stages of cold pressing

❑ Seed defatting

- It enables to obtain a better quality of oils (brighter colour, higher oxidative stability) and meal, though it is not used on an industrial scale due to some technical difficulties.
- This process improves the oil quality by reducing the content of chlorophylls and other substances such as metals, pesticides permeating through the hulls or shells into the oil.



Defatted mustard seed meals



Defatted Flaxseed meals



Defatted Soybean seed meals



So, what are the different steps of the cold pressing or stages of the cold pressing and in this we will see first thing is the seed de-fatting. It enables to obtain a better

quality of oil, brighter color, higher oxidative stability and mill though it is not used on an industrial scale due to some technical difficulties and also the yield is very very less. This process improve the oil quality by reducing the content of chlorophyll and other substances such as metals, pesticides permeating through the hulls or the seeds into the oil that is just you see that these are the de-fatted seed mills, de-fatted flax seed mills or de-fatted mustard seed oil cake. So, just this here some sort of there is a direct that is obtained by the this just simple seed or de-fatted by using appropriate methods normally either the simple pressed.

❑ Seed fragmentation (Crushing)

- It permits to extract the oil by partial destruction of the seed structure and hull, opening some cells, enlarging the oil spillage area and lowering the cell resistance.
- Crushed seeds should immediately be subjected to further processing as the quality and stability of cold-pressed oil is time-dependent.



Then seed fragmentation that is the crushing it permits to extract the oil by partial destruction of the seed structure and hull opening some cells enlarging the oil spillage area and lowering the cell resistance. Thrust seeds should immediately be subjected to further processing as the quality and stability of cold pressed oil is time dependent. If you express it for more time there may be deterioration in the quality.

□ Seed conditioning

- Roasting in the ovens by exposing the pulp to the temperature of approx. 100 °C and if necessary moisturizing it to the optimal humidity.
- This treatment positively affects oil extraction; however, it negatively influences the oil and meal quality.
- The high quality of cold-pressed oils is affected by many factors. It is utmost importance for the raw material quality i.e. purity, uniformity, integrity and ripeness. Harvest time is another key determinant.
- In addition, the raw material quality is impacted by pre-pressing activities including crop gathering, drying, storage and post-harvest handling.
- Studies conducted on cold-pressed oils extracted in the hydraulic press indicated that the only advantage of whole seed conditioning (roasting) before extrusion was a reduced level of lipid hydrolysis i.e. no significant changes in acid value in proportion to milled seeds.



Then seed conditioning, seed conditioning in the pretreatment in the last class we also discussed in details. So, this various methods for seed conditioning normally the roasting in the oven by exposing the pulp to the temperature of approximately 100 degree Celsius etcetera and if necessary moisturizing it into the to the optimal humidity. This treatment positively affects the oil extraction. However, it negatively influences the oil and mill quality. The high quality of the cold pressed oil is affected by many factors. It is at most importance for the raw material quality that is the purity, uniformity, integrity and ripeness. Even harvest time is another key determinant. In addition, the raw material quality is impacted by pre-pressing activities including crop gathering, drying, storage and post harvest handling.

Studies conducted on cold pressed oil extracted in the hydraulic press indicated that the only advantage of whole seed conditioning that is roasting before extrusion was a reduced level of lipid hydrolysis. There is no significant changes in the seed values in proportion to the milled seeds. So, that is the advantage ok.

- Seed milling and application of conditioning temperature at 60 - 80 °C in order to obtain the optimal oil quality and cause desirable changes (an increase in extraction yield and oxidative stability) while reducing the negative trends in taste deterioration, elevated acid and peroxide value and higher amount of pigments.
- Screw-type press used for cold pressing regardless of a nozzle diameter it was possible to extract oils in mild conditions without any changes in primary and secondary oxidation state (number) in fatty acid content and oxidative stability of the obtained oils.
- However, the extraction efficiency was low whereas the residual fat content in pomace (cake) high.
- Before pressing the seeds, exposing it to an elevated temperature causes a substantial increase in extraction yield in combination with an increase in colour darkening, lipid hydrolysis and pheophytin content.



Seed milling and application of conditioning temperatures at 60 to 80 degree Celsius in order to obtain the optimum quality of the oil and cause desirable changes that is an increase in the extraction yield and oxidation stability while reducing the negative trends in the trace deterioration. At elevated acid and peroxide value and higher amount of pigments etcetera are also there. So, screw type press used for cold pressing regardless of a nozzle parameter, it was possible to extract oil in mild conditions without any change in primary and secondary oxidation state in fatty acid content and oxidative stability of the obtained oil. However, the extraction efficiency was low whereas, the residual fat content in the pomace cake is high. Before pressing the seed exposing it to an elevated temperature causes a substantial increase in extraction yield in combination with an increase in color darkening, lipid hydrolysis and pheophytin content.

Cold pressing technology

- Cold-pressing is conducted using hydraulic or screw press coupled with a cooling system.
- The screw and hydraulic presses are the commonly used extrusion press with a maximum outlet temperature of 50 °C and 25 °C, respectively.
- There is an increasing trend on using the small- and medium-sized extraction plants with a capacity of 0.5–25 tons per day on the production of cold-pressed oils nowadays.
- These plants are usually using the screw press to produce cold pressed oil.
- The cold-pressed oil is then purified with physical processes such as filtration, sedimentation, or centrifugation.



So, what is the let us talk about technology of cold pressing that is cold pressing is conducted using hydraulic or a screw presses coupled with a cooling system as I told you earlier. The screw and hydraulic presses are the commonly used extrusion press with a maximum outlet temperature of 50 degree Celsius to 25 degree Celsius respectively. There is an increasing trend on using the small and medium size extraction plants with a capacity of 0.5 to 25 tons per day on the production of cold pressed oil nowadays. These plants are usually using the screw press to produce cold press oils. The cold pressed oil is then purified with physical processes such as filtration, sedimentation or centrifugation.

Process sequence for different kinds of seeds

Oil source	Clean	Delint	Dehull	Crack	Flake	Cook	Press
Cotton seed	x	x	x	x	x	x	x
Palm kernels	x			x	x	x	x
Peanuts	x		x	x	x	x	x
Flax seed	x				x	x	x
Sesame	x					x	x
Soybeans	x			x			x



Here there is the process sequence of different kinds of seeds like cleaning, de-linting, dehulling, cracking, flaking, cooking and then finally, pressing. So, for the cotton seed for their oil extraction all these process the cotton seed is subjected to all these process like it has to be cleaned, then de-linted, dehulled, then cracked and flaking, cooking and conditioning and then it is subjected to pressing for oil extraction. Palm kernels are generally they are cleaned, cracked, flaked, cooked and then pressed. Peanuts are cleaned, dehulled, cracked, flaked, cooked and pressed. Sesame that is it is a cleaned and then finally, cooked and pressed. Flax seed cleaned, flaked, cooked and pressed and soybeans are cleaned, cracked and finally, pressed. So, these are the different operations to which this various oil seeds are subjected to for the cold pressing treatment.

Parameters affecting the oil yield in hot and cold press extraction

- Pre-heating conditions, particle sizes, cold rotation speed, the moisture content of seeds and diameter of restriction dye are the key factors.
- The oil is barely separated from the seeds without pre-heating and the device is heated and facilitates the oil outlet when waiting for a certain period of time. When the effect of particle size was examined, the best result was achieved in the processing of seeds as a whole.
- Oil efficiency is found to be higher at low cold rotational speeds because of the contact time with the device is more.
- Lower diameter molds increase the oil output (with high pressure) in the seed structure.
- Moisture content negatively affects the oil yield.
- Pre-treatments have a significant effect on residual oil and press rate.



So, parameters that affect the oil yield and hot and cold press extraction particularly the preheating conditions, particle sizes, cold rotation speed, the moisture content of the seed and diameter of the restriction die are the key factors. The oil is barely separated from the seed without preheating and the device is heated and facilitate the oil outlet when waiting for a certain period of time. When the effect of particle size was examined, it was found that the best result was achieved in the processing of seeds as a whole that is when the as a whole the seed was turned, then it give the better result. Oil efficiency is found to be higher at low cold rotational speed because of the contact time with the device is more. Lower diameter molds increases the oil output in the seeds structure and particularly there is a because if the diameter is lower, it will result into the high pressure. So, that increases the oil yield. Moisture content negatively affects the oil content. Higher the moisture content, lower will be the yield of the oil. Pre-treatments obviously have a significant effect on the residual oil and pressure rate both.

Properties of cold pressed oil

- Cold-pressed oils can be valuable edible oils that do not contain harmful constituents to humans and are free from microbiological contamination. Metals (Fe, Cu) accelerating the oxidation of oils and chlorophylls are usually removed during the refining process.
- Recent technology of obtaining oils through cold-pressing using nitrogen atmosphere or supercritical carbon dioxide extraction allows retaining them almost in an intact state.
- Their chemical composition is richer in by-products with a higher level of biological and antioxidating activity.
- The cold-pressed rapeseed oil in contrast to the refined one is less resistant to oxidation, unlike olive oil.
- Cold-pressed oils have a distinct aroma and taste and are used as an additive to fresh food and as an ingredient enhancing various products (e.g. bread, mayonnaise) with specific bioactive nutrients.



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So, as regard to the properties of the cold pressed oil, this cold pressed oil can be valuable edible oil that do not contain harmful constituents to human and are free from microbiological contaminations. Metals like ferrous and copper which accelerate the oxidation of oils and chlorophylls are usually removed during the refining processes. Recent technology of obtaining oils through cold pressing using nitrogen atmosphere or supercritical carbon dioxide extraction allows retaining them almost in an intact taste that is the taste of the oil is or flavor of the oil and other things almost remains natural. Their chemical composition is richer in byproducts with a higher level of biological and antioxidant activity. The cold pressed rapeseed oil is in contrast to the refined one is less resistant to oxidation unlike olive oil. Olive oil is more resistant to oxidation cold pressed olive oil, but this cold pressed rapeseed oil is less resistant to oxidation. Cold pressed oils have a distinct aroma and taste and are used as an additive to fresh food and as an ingredient enhancing various products like mayonnaise etcetera with specific bioactive nutrients.

❑ **Following physical and chemical characteristics that should be considered when authenticating cold pressed oils**

• **Color**

- ✓ The color of refined oils is less intense than the color of unrefined sunflower oils.

• **Acidity**

- ✓ Raffination significantly affects the reduction of free fatty acids in oil.

• **Presence of stigmastadiene**

- ✓ These dienes are not present in unrefined oils, but are present in considerable quantities in refined oils.

• **Tocopherols**

- ✓ Neutralization, bleaching, and deodorization affect the loss of tocopherols.



So, the various physicochemical physical and chemical characteristics that should be considered when authenticating a cold pressed oil that is and what are those various characteristics that are listed here. That is number one is the color that is the color of the refined oil is less intense than the color of the unrefined sunflower oils. Then acidity, raffination significantly affect the reduction of free fatty acids in the oil.

Presence of that is stigmastadiene that is these dienes are not present in unrefined oil, but are present in considerable quantities in the refined oil. Even tocopherols neutralization bleaching and deodorization affects the loss of tocopherol etcetera.

- **Fatty acid composition**

- ✓ High process temperatures can cause the formation of trans fatty acids, especially trans-octadecenic (linoleic and linolenic) acids.

- **Conjugated fatty acids**

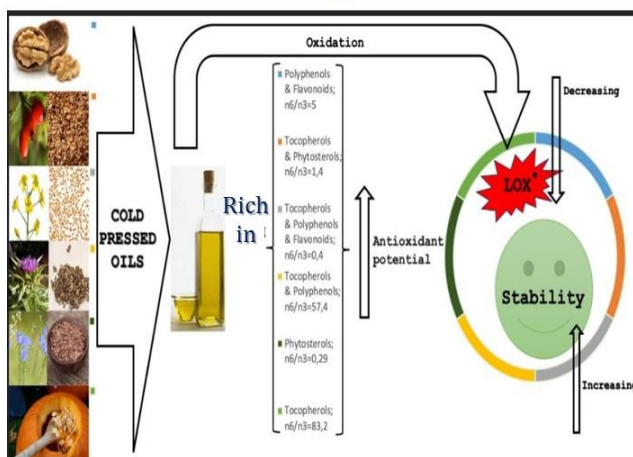
- ✓ Formed during bleaching from linoleic or linolenic acid, and their detection by UV absorption, or by HPLC. The method can only be used when large quantities (>30%) of the oil have been refined.



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Fatty acid composition high process temperatures can cause the formation of trans fatty acid especially in the trans-octadecenic like linolenic and linoleic acids even conjugated fatty acids. So, they are formed during bleaching from linoleic to linoleic or linolenic acid and their detection by UV absorption or by HPLC can be done. And the method can only be used when large quantities of the oil have been refined.

Health benefits of cold pressed oil



- Capacity to lower inflammation.
- Reduce oxidative stress.
- Lower allergic reactions.
- Reduce "bad" cholesterol.
- Improve eye health.
- Protect the skin.
- High levels of vitamin as well as limited levels of xanthins, vitamin A, and trace amounts of other antioxidant compounds can be beneficial for health.



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High levels of vitamins as well as limited levels of xanthines, vitamin A and trace amount of other antioxidant component can be beneficial for the health. These cold press dial protect the skin, they improve eye health, they reduce bad cholesterol, they lower the allergic reaction, they reduce oxidative stress and they have also capacity to lower inflammation and that is the reason why nowadays that is the cold press dial are being more and more becoming popular in among the consumers who are the health conscious consumers.

❑ Advantages of cold pressing

- Lower energy consumption.
- Lower investment cost.
- Does not use toxic solvents or thermal conditioning of the seeds.
- Does not generate waste water.
- Has a lower environmental impact in comparison with solvent extraction.
- Shows higher flexibility because processing diverse types of seeds is fast and easy.
- Are preferred to refined oils as they contain more antioxidants and bioactive substances like sterols, carotenoids, and phenolics.
- More natural biologically active substances such as phenolic compounds and tocopherols are present in CPO, which could improve oxidative stability.



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So,, the advantages cold pressing is advantages like it has lower energy consumption, there is a lower investment cost, does not it does not use toxic solvents or thermal conditioning of the seeds, does not generate waste water, it has a lower environmental impact in comparison with solvent extraction, it shows higher flexibility because processing diverse types of seed is fast and easy in this case. This cold presses are cold pressed dial are preferred to refined dials as they contain more antioxidants and bioactive substances like sterols, carotenoids and phenolics etcetera. More natural biologically active substances such as phenolic compounds, tocopherols or tocals are they are present in the significant amount in cold pressed dial which could improve oxidative stability as well as thermal stability of the oil.

❑ Disadvantages of cold pressing

- High capital or investment required compared to conventional methods.
- Most CPO contain high amounts of polyunsaturated fatty acids (PUFA), which might be disadvantageous in terms of oxidative stability.
- CPO could also contain higher amounts of pro-oxidative compounds, so their shelf life might be shorter compared to refined oils.



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So, at the same time this cold pressing has some disadvantages also like it needs high capital or investment required compared to the conventional method. Most cold pressed oil contain high amounts of polyunsaturated fatty acids which might be disadvantageous in terms of oxidative stability. Cold press oils also contain higher amounts of pro-oxidative compounds. So, their shelf life might be shorter compared to the refined oils.

Summary

- Expression is the process of mechanically pressing liquid out of liquid-containing solids.
- Cold press extraction is one of the methods of mechanical extraction; requires less energy than other oil extraction techniques and is also environmental friendly.
- High-quality oils can be obtained by performing production at low temperatures using cold press method.
- The sunflower, rapeseed, grapeseed, hemp, flaxseed, olive and pumpkin oils were obtained by cold press extraction method.
- These oils have better nutritive properties than refined oils.



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So, finally, I would like to summarize this like today's lecture and the I will say that expression is the process of mechanically pressing liquid out of the liquid containing solids. Cold press extraction is one of the methods of mechanical extraction. It requires less energy than oil other oil extraction techniques and is also environmental friendly. High quality oils can be obtained by performing production at low temperature using cold press methods. The sunflower, rapeseed, grapeseed, hemp, flaxseed, olive and pumpkin oils are obtained by cold pressing extraction method. These oils have better nutritive properties than the refined oils. Normally the cold pressing that is those soft fruits or soft seeds they are cold pressing of these are more preferred because here the pressure as I told you earlier also the pressure applied is not much just by simple application of pressure and they are at and morally there is the either palm, kernel oil or olive oil or sesame oils etcetera. These are normally even mustard also they are normally used by cold pressing methods and these cold pressed oils that is they are as such without further refining treatment at the most some clarification or centrifugation etcetera filtration etcetera can be done. May be some companies they go for double filtration instead of going for refining and because consumers prefer the valuable components natural taste, natural flavor of the cold pressed oil.

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So, with this these are the references that are used in this lecture.



Thank you very much for your patience hearing.