

Parameters for Performance Review of Commodity

CRUDE PALM OIL

1. Background

a. Brief about the commodity such as sample picture, lifecycle and various varieties/grade of the commodity found in India

Palm oil is an edible vegetable oil derived from the mesocarp (reddish pulp) of the fruit of the oil palms. Palm oil has many variants as crude palm oil (CPO), refined palm oil, RBD palmolein and palm kernel oil. Crude Palm Oil is deep orange red in colour due to the high content of natural carotenes. Palm oil is rich source of carotenoids and vitamin E which confers natural stability against oxidative deterioration. Indonesia and Malaysia are the two major palm oil producing countries. Thailand and Colombia are also other two important producers. India has negligible production of palm oil and it mainly imports from Indonesia and Malaysia. It is cholesterol-free. Palm oil is a common cooking ingredient in the tropical belt of Africa, Southeast Asia and parts of Brazil. Its use in the commercial food industry in other parts of the world is buoyed by its lower cost and by the high oxidative stability (saturation) of the refined product when used for frying. Having a naturally semi solid characteristic at room temperature with a specific origin melting point between 33°C to 39°C, it does not require hydrogenation for use as a food an ingredient.



Crop Cycle

Oil palm tree will start bearing fruits after 30 months of field planting and will continue to be productive for the next 20 to 30 years; thus, ensuring a consistent supply of oils. Further, Crude Palm Oil is processed commodity, its demand/supply persists throughout the year.

life Cycle: Value Chain of the Commodity	Major Varieties of CPO and NCDEX Quality Specifications																		
<pre> graph TD A[Importer/Refining unit] --> B[Whole Seller/ Repacker] B --> C[Retailers] C --> D[Consumer] </pre>	<p>Major Varieties/Grade: Palm Oil is obtained primarily from the African oil palm <i>Elaeis guineensis</i>, and to a lesser extent from the American oil palm <i>Elaeis oleifera</i> and the maripa palm <i>Attalea maripa</i>.</p> <p>NCDEX: Quality Parameters</p> <table border="1"> <tbody> <tr> <td>Moisture & impurities</td> <td>0.25 % Max</td> </tr> <tr> <td>Refractive Index, 50°C</td> <td>1.4491-1.4552</td> </tr> <tr> <td>Specific Gravity, 42°C</td> <td>0.895-0.897</td> </tr> <tr> <td>Saponification Value</td> <td>195-205</td> </tr> <tr> <td>Iodine Value</td> <td>45-56</td> </tr> <tr> <td>Unsaponification Value</td> <td>1.2 % Max</td> </tr> <tr> <td>Melting Point, Capillary Slip Method</td> <td>37°C Max</td> </tr> <tr> <td>FFA</td> <td>5 % Max</td> </tr> <tr> <td>Acid Value</td> <td>10% Max</td> </tr> </tbody> </table>	Moisture & impurities	0.25 % Max	Refractive Index, 50°C	1.4491-1.4552	Specific Gravity, 42°C	0.895-0.897	Saponification Value	195-205	Iodine Value	45-56	Unsaponification Value	1.2 % Max	Melting Point, Capillary Slip Method	37°C Max	FFA	5 % Max	Acid Value	10% Max
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Table: Reference Years for Commodities

Sl. No.	A	B	C
Crop Season	Kharif	Kharif (Long Duration crop)	Rabi
Crops	Paddy, Maize, Bajra, Moong, Soybean, Guar seed, Kapas, Sesame Seed	Castor and Turmeric	Wheat, Barley, Chana, RM Seed, Coriander, Jeera
Relevant Processed commodities	Guar gum, Soybean meal, Soy oil, Cotton, Cotton seed Oil cake, Gur, CPO	Castor Oil	-
Sowing Time	July onwards	July onwards	October onwards
Harvesting Time	Oct onwards	Jan onwards	March onwards
Reference Year Financial Year 2021-22 (Apr-Mar) Corresponding Years			
Production Year (PY)	2021-22 (July-Sept)	2020-21(July-June)	2020-21(July-June)
Marketing Year (MY)	2021-22 (Oct-Sept)	2021-22 (Jan/Feb-Dec/Jan)	2021-22 (Mar/Apr - Feb/Mar)
Calendar Year (CY)	2021 (Jan-Dec)	2021 (Jan-Dec)	2021 (Jan-Dec)
Relationship b/w Various Years	Current Financial Year = Current Production Year = Current Marketing Year = Calendar Year	Current Financial Year = Previous Production Year = Current Marketing Year = Current Calendar Year	Current Financial Year = Previous Production Year = Current Marketing Year = Current Calendar Year
Example	FY 2021-22 = PY 2021-22 = MY 2021-22 = CY 2021	FY 2021-22 = PY 2020-21 = MY 2021-22 = CY 2021	FY 2021-22 = PY 2020-21 = MY 2021-22 = CY 2021

Explanatory Notes:

- India is a vast country and various crops are sown and harvested at different point of time. However, two major crop seasons, are there i.e. Kharif & Rabi. Apart from it, Zaid/Summer season is also there.
- Crop seasons are classified based upon sowing time. Normally Kharif season sowing starts from mid-June/July and new crop arrivals begin from Oct/Nov. However, early/late sowing/harvesting also takes place. Rabi season sowing usually takes place mainly from October/November and harvesting starts from March/April. Early/late sowing/harvesting also takes place. Summer crops/Zaid crops are short duration crops mainly sown during January-March and harvested during April-June.
- “Production Year” is considered as “July to June”. With the start of monsoon rains during June/July the sowing of Kharif season starts and they are harvested during Sept/Oct. From Oct onwards the sowing of Rabi season crops starts and harvesting usually takes place during March/April. Thus, a single production cycle completes between July-Sept period covering Kharif, Rabi and Zaid crops. Thus production year remains same for all season crops and the period corresponds to July-Sept.
- “Marketing Year” for each crops starts from beginning of the harvest time i.e. from start of new crop produce arrivals in the market. Thus, for Kharif crops Marketing Year is generally considered as “October to September”, while for Rabi crops Marketing Year is considered as “April to March”. However, Marketing Year may vary slightly for some of the crops depending upon early/late maturity/harvesting.
- For processed commodities, their production starts after the start of new season crop arrivals of their underlying crop.

b. Commodity fundamentals and balance sheet as per the following format (to be prepared based on publicly available information on best effort basis):

Table - Fundamentals & Balance sheet (quantity)

(In Lakh Tonnes)

Global Scenario	Previous FY (2020-21)	Current FY (2021-22) (P)
Opening Stocks	148	139
Production	731	770
Imports	475	482
Total Supply	1,353	1,392
Exports	482	496
Domestic Consumption	732	749
Closing Stocks	139	146

Source: USDA (May 2022); P= Provisional,

Please refer to Table entitled "Reference Years for Commodities" to know type of years corresponding to financial year.

(In Lakh Tonnes)

Indian Scenario	Previous FY (2020-21)	Current FY (2021-22) (P)
Opening Stocks	13.46	8.15
Production	2.73	2.91
Imports	84.11	77.50
Total Supply	100.30	88.56
Exports	0.01	-
Domestic Consumption	92.14	82.46
Closing Stocks	8.15	6.10

Source: USDA (May 2022); P= Provisional,

Please refer to Table entitled "Reference Years for Commodities" to know type of years corresponding to financial year.

(In Lakh Tonnes)

Rank	Top 10 Major Producing Countries			Top 10 Major Consuming Countries		
	Country	Previous FY (2020-21)	Current FY (2021-22) (P)	Country	Previous FY (2020-21)	Current FY (2021-22) (P)
1	Indonesia	435	455	Indonesia	153	165
2	Malaysia	179	190	India	92	82
3	Thailand	30	31	China	68	74
4	Colombia	16	17	European Union	65	63
5	Nigeria	13	14	Pakistan	35	36
6	Guatemala	9	9	Malaysia	34	35
7	Papua New Guinea	6	6	Thailand	24	25
8	Brazil	5	6	Nigeria	17	18
9	Ecuador	5	6	United States	16	16
10	Honduras	5	6	Bangladesh	14	14
	Others	30	31	Others	214	223
	World Total	731	770	World Total	732	749

Source: USDA (May 2022), P= Provisional,

Countries are arranged in descending order based on the figure in Current FY

Please refer to Table entitled "Reference Years for Commodities" to know type of years corresponding to financial year.

(In Lakh Tonnes)

Rank	Top 10 Major Exporting Countries			Top 10 Major Importing Countries		
	Country	Previous FY (2020-21)	Current FY (2021-22) (P)	Country	Previous FY (2020-21)	Current FY (2021-22) (P)
1	Indonesia	269	280	India	84	78
2	Malaysia	159	162	China	68	71
3	Guatemala	8	8	European Union	60	62
4	Papua New Guinea	6	6	Pakistan	35	35
5	Thailand	6	6	United States	16	16
6	Colombia	5	7	Bangladesh	13	14
7	Honduras	4	4	Philippines	12	12
8	Cote d'Ivoire	3	2	Egypt	11	12
9	Costa Rica	2	2	Russia	11	10
10	Benin	2	2	Kenya	8	11
	Others	18	18	Others	157	162
	World Total	482	496	World Total	475	482

Source: USDA (May 2022), P= Provisional,

Countries are arranged in descending order based on the figure in Current FY

Please refer to Table entitled "Reference Years for Commodities" to know type of years corresponding to financial year.

(In Lakh Tonnes)

Top 10 Major producing states in India			
Rank	States	Previous FY	Current FY

It is a processed commodity. Further, more than 90% of the India's supply is met through imports.

Thus, no such categorization is applicable for this commodity.

c. Major changes in the policies governing trade in the spot markets of the commodity (FY 2021-22)

Date	Major Policies governing trade and related changes
19-May-21	The central government has directed states and UTs to monitor prices of 22 essential commodities, especially pulses, oilseeds, vegetables and milk in order to discourage hoarding activities and taking undue advantage of Covid-19 situation.
09-Jun-21	Government increased the MSP of Soybean for marketing season 2021-22 by 1.80% to 3950 Rs/qlt. from 3880 Rs/qlt. last year.
23-Jul-21	The Solvent Extractors' Association (SEA) of India asked the government to allow the import of soyabean meal to help the domestic poultry industry to cool down the increased prices of Soy meal.
11-Aug-21	The Department of Animal Husbandry (DHAD) notified the Customs department that soymeal and oil cake from GM soy would be permitted for import.
16-Aug-21	The Ministry of Commerce in an Office Memorandum directed to facilitate import of 12 lakh tonnes of GM Soya de-oiled cake with immediate effect.
24-Aug-21	The govt. relaxed the import policy rules to allow imports of 12 lakhs metric tonne of crushed and de-oiled GM soya cake (only non-living organism) from Nhava Sheva port and LCS Petrapole, till 31st October, 2021 or until further orders, whichever is earlier.
03-Sep-21	The Govt. allowed GM soya cake imports via Mumbai, Tuticorin and Vishakhapatnam Sea Ports in addition to Nhava Sheva Port.
13-Sep-21	The Govt. extended import window for Soymeal

08-Oct-21	The central govt. imposed stock limits on all Edible oils and oilseeds for the period Oct 08, 2021 till Mar 31, 2022. The stock limit will be decided by the respective States/UT on the basis of available stock and consumption pattern of the State/UT.
12-Oct-21	UP Govt. imposed stock limits on edible oil and oilseeds
25-Oct-21	The central govt. directed States and UTs to speed up the process of issuing stock limit notification before the festive season and ensure that the consumers get the benefit of the same.
23-Nov-21	Fisheries Ministry writes a letter to Commerce Minister to consider request of Poultry Breeder Association demand
24-Nov-21	Fisheries Ministry writes a letter to DGFT to consider request of Poultry breeder Association demand
26-Nov-21	The state govt. of Rajasthan imposed stock limits on Edible oils and oilseeds w.e.f. Nov 26, 2021 till Mar 31, 2022.
07-Dec-21	Maharashtra Deputy Chief Minister Mr. Ajit Pawar Letter to Mr. Piyush Goel-Commerce Minister regarding imposition of ban on import of soybean meal as it is hurting interest of the Maharashtra soybean farmers.
10-Dec-21	Ministry of consumer affairs held a meeting with Edible Oilseeds/Oil associations about passing the benefits of duty cut to the end consumers
19-Dec-21	Ministry of Finance, Department of Economic affair wrote to SEBI to suspend futures trading in Chana, mustard seed, crude palm oil, moong, paddy (Basmati), wheat and soybean and its derivatives with immediate effect.
20-Dec-21	SEBI in its press release (PR No 36/2021) directed suspension of futures and options trading for one year in a host of agricultural commodities including chana, mustard seed, crude palm oil, moong, paddy (Basmati), wheat and soybean and its derivatives. The suspension of trading in these commodities came into effect on Monday (20-Dec) following a communication from the Department of Economic Affairs. No fresh positions (including intra-day) will be allowed in respect of Futures and Options contracts of these commodities. No new Futures and Options contracts will be launched till further notice in any of the commodities.
23-Dec-21	Maximum stock of 90 days production of Soya Meal, as per daily input production capacity of Plant/Miller/Processor, defined in its IEM (The storage location should be declared). Trading company/Trader/Private Chaupals: Only Government registered enterprise, maximum stock of 160 MT with a defined and declared storage location.
23-Dec-21	Govt. released Gazette notification on Incorporation of Soymeal under the Essential Commodities Act, 1955 with immediate effect and this shall remain in force for a period up to 30th June, 2022 from the date of its publication in the Official Gazette.
03-Feb-22	Department of Food and Public Distribution has issued a stock limit notification (S.O. 452(E)) on oilseed and edible oil. Govt. has imposed stock limit on edible oil and oil seed with specified quantity till 30th June22. However, six states, Uttar Pradesh, Karnataka, Himachal Pradesh, Telangana, Rajasthan and Bihar are exempted from the quantities specified, as they have already imposed stock limit.
30-Mar-22	Department of Food and Public Distribution has issued a stock limit notification (S.O. 1509(E)) on oilseed and edible oil. Govt. has extended stock limit period on edible oil and oil seed with specified quantity from June 30, 2022 to 31st Dec 2022. In the notification govt. has also directed that that Edible Oils and Edible Oilseeds stock to be regularly declared and updated on the portal of this Department i.e. Department of Food & Public Distribution by the participants. As per the notification stock limit will be applicable on all Edible Oils and Oilseeds put together for all States/Union Territories.

d. Geo political issues in the commodity and its impact on Indian scenario.

Date	Event	Key Details	Key Implications/Impact
23-Mar-21	Suez Canal traffic jam between 23 March to early hours of 29 March caused by stuck ship	The Suez Canal, a critical shipping artery that connects the Mediterranean and Red Seas through Egypt, was blocked after a large cargo ship ran aground while passing through it bringing traffic on the busy trade route to a halt.	Supply Chain bottleneck with container shortage and port congestion. Freight rate hike. The congestion of the Suez Canal may delay nearly 7% of seaborne U.S. major grain shipments, according to USDA and vessel data analysed by Bloomberg. More than 80% of the impacted grain shipments are corn, with close to 60% of it on six vessels headed to China. However, Moderate effect on prices were observed as this Jam was temporary in nature.
27-Jan-22	Indonesia imposed mandatory domestic sales for palm oil	In order to control the palm oil prices in the domestic market, Indonesian govt. made a policy that palm oil exporters have to sell 20% of their total export at lower prices in the domestic market. This also has affected the supply of palm oil in the market.	This Policy has affected the supply of palm oil in the global market. It was reported that sellers/exporters quoted higher rates for selling / exporting the 80% of the oil in order to compensate for the loss incurred while selling 20% of the Export quota at lower rates in the domestic market.
24-Feb-22	Russia's Invasion on Ukraine	Russian President Vladimir Putin on Feb 24, 2022 informed that he has launched a military operation in Ukraine.	Russia's invasion on Ukraine has raised supply concern for wheat, corn and edible oil supply in the Global market. Further, it is feared that it may lead to a food crisis on the global scale. Ukraine is the largest source for sunflower oil import in India. Further, Russia and Ukraine are key source of world wheat product and trade. Prices of edible oils and grains are feared to get impacted from it.
09-Mar-22	Indonesia revised quota for mandatory domestic sales for palm oil from their export obligations	In order to control palm oil prices in the local market, Indonesia revised quota from 20% to 30% for Indonesian companies to sell their planned exports of crude palm oil and olein at home under a scheme known as Domestic Market Obligation (DMO) at lower prices (fixed by Govt.).The new restriction will stay in place for at least six months.	This revised policy is expected to further squeeze the supply of palm oil in the global market adversely impacting the prices.
Ongoing since Mar 28, 2022	China imposed lockdown	China Imposes Lockdown In Largest City- Shanghai Amid Biggest Outbreak Of COVID In 2 Years	Agriculture commodity export to China has slowed down due to prevailing lockdowns

2. Trading related parameter

a. Monthly and Annual traded volume (quantity in appropriate units)

Monthly Traded Quantity

Month	year	Traded volume (MT)
Apr	2021	-
May	2021	-
Jun	2021	-
Jul	2021	790
Aug	2021	120
Sep	2021	40
Oct	2021	40
Nov	2021	40
Dec	2021	10
Jan	2022	10
Feb	2022	-
Mar	2022	-

Annual Traded Quantity

Symbol	Traded volume (MT)
CPO	1050

b. Annual traded volume as proportion of total deliverable supply (quantity in appropriate units)

Symbol	Traded volume (MT)	Deliverable supply(MT)	Proportion
CPO	1050	88,56,000	0.00%

c. Annual traded volume as proportion of total annual production (quantity in appropriate units)

Symbol	Traded volume (MT)	Production(MT)	Proportion
CPO	1050	2,91,000	0.00%

d. Annual average Open interest as proportion of total production

Symbol	Avg Open Int (MT)	Production(MT)	Proportion
CPO	20	2,91,000	0.00%

e. Annual average Open interest as proportion of total deliverable supply

Symbol	Avg Open Int (MT)	Deliverable supply (MT)	Proportion
CPO	20	88,56,000	0.00%

f. Monthly and Annual value of trade (in Rs. Crores)

Month	Years	Traded Value (in Cr.)
Apr	2021	0
May	2021	0
Jun	2021	0
Jul	2021	9
Aug	2021	1
Sep	2021	0
Oct	2021	0

Nov	2021	0
Dec	2021	0
Jan	2022	0
Feb	2022	0
Mar	2022	0

Yearly

Symbol	Traded Value (in Cr.)
CPO	12

g. Monthly and Annual quantity of delivery (in appropriate units)

Expiry Month	Years	Total Delivery(MT)
Apr	2021	Nil
May	2021	Nil
Jun	2021	Nil
Jul	2021	Nil
Aug	2021	Nil
Sep	2021	Nil
Oct	2021	Nil
Nov	2021	Nil
Dec	2021	Nil
Jan	2022	Nil
Feb	2022	Nil
Mar	2022	Nil

Annual

CPO	Nil
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h. Monthly and Annual value of delivery (in Rs. Crores)

Expiry Month	Years	Symbol	Value in Cr
Apr	2021	CPO	Nil
May	2021	CPO	Nil
Jun	2021	CPO	Nil
Jul	2021	CPO	Nil
Aug	2021	CPO	Nil
Sep	2021	CPO	Nil
Oct	2021	CPO	Nil
Nov	2021	CPO	Nil
Dec	2021	CPO	Nil
Jan	2022	CPO	Nil
Feb	2022	CPO	Nil
Mar	2022	CPO	Nil

Yearly

Symbol	Value in Cr
CPO	Nil

i. Monthly and Annual Average Open Interest (OI) (in appropriate units)

Month	Years	Avg Open Int (MT)
Apr	2021	0
May	2021	0
Jun	2021	0
Jul	2021	84
Aug	2021	21
Sep	2021	40
Oct	2021	10
Nov	2021	10
Dec	2021	10
Jan	2022	10
Feb	2022	0
Mar	2022	0

Symbol	Avg Open Int (MT)
CPO	20

j. Annual average volume to open interest ratio

Symbol	Avg., of traded volume to Open interest
CPO	66%

k. Total number of unique members and clients who have traded during the financial year

Member Count	Client Count
21	25

I. Ratio of open interest by FPOs/farmers/Hedge/VCP positions to total open interest (Annual average as well as maximum daily value)

Annual average of ratio of open interest by FPOs/farmers/Hedge/VCP positions to total open interest

Symbol	VCPs/ Hedger
CPO	0%

Maximum daily value of ratio of open interest by FPOs/farmers/Hedge/VCP positions to total open interest

Symbol	VCPs/ Hedger
CPO	0%

It is calculated on the day when commodity has highest open interest during the year.

Commodity wise client categorization is as per category details as provided by the members.

m. Number of unique FPOs / farmers and VCPs/hedgers who traded in the financial year

0

n. Algorithmic trading as percentage of total trading

0.00%

0. Delivery defaults
 - i. Number of instances

0
 - ii. Quantity involved

Nil
 - iii. Value involved

Nil

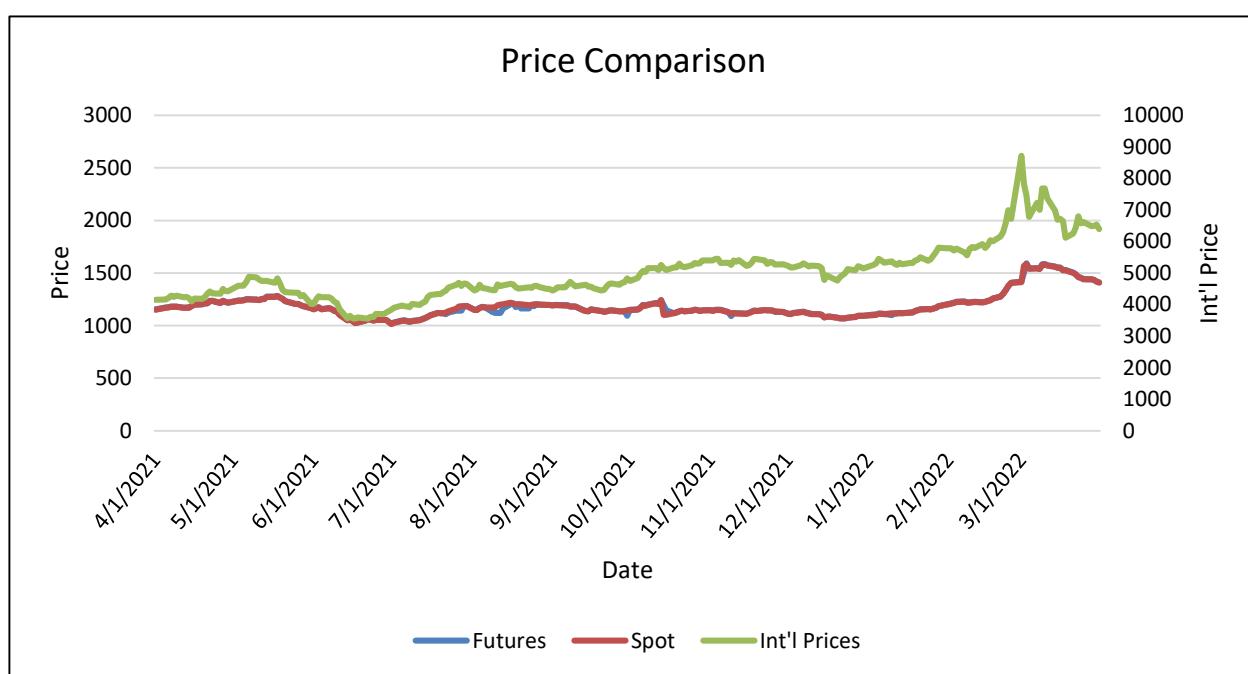
3. Price movements

- a. Comparison, correlation and ratio of standard deviation of Exchange futures price vis-à-vis international futures price (wherever relevant comparable are available).

Correlation- 0.48

Standard Deviation- 0.51

Comparison



- b. Comparison, correlation and ratio of standard deviation of Exchange futures price vis-à-vis international spot price (wherever relevant comparable are available) and domestic spot price (exchange polled price).

Not Available

- c. Correlation between exchange futures & domestic spot prices along with ratio of standard deviation.

Correlation- 0.67

Standard Deviation- 0.96

- d. Correlation between international futures & international spot prices along with ratio of standard deviation (wherever relevant comparable are available).

Not Available

- e. Comparison of Exchange polled price and mandi price (in case of agricultural commodities) / other relevant price (in case non-agricultural commodities) at basis centre.

Not Available

f. Maximum & Minimum value of daily futures price volatility and spot price volatility along with disclosure of methodology adopted for computing the volatility. (**Volatility calculated by Square root of Standard Deviation of daily returns for the period from 1 April 2021 to 31 March 2022**)

Volatility	Futures		Spot	
	Month	Value	Month	Value
Max	Aug	0.021358	Oct	0.02748
Min	Jan	0.006889	Jan	0.005621

g. Number of times the futures contract was in backwardation/contango is below:

Contango	1
Backwardation	0

4. Others parameters

a. Qualitative and quantitative measure for Hedge effectiveness ratio and basis Risk (Volatility of Basis) along with disclosure of methodology adopted for such calculations.

Not Available

The methodology for hedge efficiency ratio calculation is appended as annexure 1.

b. Details about major physical markets of the commodity vis-à-vis market reach in terms of availability of delivery centers (information to be provided state-wise and UT-wise).

Crude Palm oil is majorly gets imported in India. Major imports take place at Kandla, Mangalore, Krishnapattam, JNPT, Chennai and Haldia ports. CPO and RBD annual imports are around 65 lakh Mt and 25 Lakh MT respectively.

c. Details about major physical markets of the commodity and average Open Interest for each month generated from those regions.

NA

d. Details, such as number and target audience, of stakeholders' awareness programs carried out by the exchange.

Following list of Awareness programme, Stakeholder engagement programme has conducted for FY 2020-21.

Sr. Number	Programme	Location	Number of Participants
1	Trade Dynamics of Soy Complex	Virtual	56
2	Investors Education Programme	Virtual	17
3	Investors Education Programme	Virtual	15
4	Investors Education Programme	Virtual	5
5	Investors Education Programme	Virtual	3
6	Investors Education Programme	Virtual	6
7	Investors Education Programme	Virtual	29
8	Investors Education Programme	Virtual	25
9	Investors Education Programme	Virtual	37
10	Investors Education Programme	Virtual	19
11	Investors Education Programme	Virtual	87
12	Investors Education Programme	Virtual	13
13	Investors Education Programme	Virtual	35
14	Investors Education Programme	Virtual	46
15	Investors Education Programme	Virtual	28

16	Investors Education Programme	Virtual	39
17	Investors Education Programme	Virtual	10
18	Investors Education Programme	Virtual	11
19	Investors Education Programme	Virtual	6
20	Investors Education Programme	Physical	35
21	Investors Education Programme	Physical	23
22	Investors Education Programme	Physical	25

e. Steps taken / to be undertaken to improve hedging effectiveness of the contracts as well as to improve the performance of illiquid contracts.

- Creating awareness about hedging and targeting the major edible oil processors
- Awareness Programme in major trading centres as well as remote location
- One to one meeting with market participants and hedgers

ANNEXURE I

Hedging Efficiency Methodology

Regression analysis is carried out between near month futures returns and NCDEX polled spot prices returns of the FY2021-22.

The R-Square value of the Regression analysis represents the “**Hedging Efficiency**”.

Note: -

Date for which spot prices were not available is not used for analysis.

Weekly returns are used for performing Regression Analysis.

The method used to calculate Hedging Efficiency does not consider liquidity risk because of this reason illiquid commodities can have high hedging efficiency.

References:

Ghosh, Ph. D, Nilanjan & Dey, Debojyoti & Moulvi, Nazir & Jain, Niteen & Sinha, Neha & Rachuri, Sarika. (2013). Hedging Efficiency—Measures and Empirical Study.