

Parameters for Performance Review of Commodity

CORIANDER

1. Background

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

Coriander is one of the most widely used spices in the world. It is one of those herbs whose all parts are edible; however, the commercial parts of the plant are its leaf and seed. Coriander oil is extracted from the crushed ripe coriander seeds by steam distillation, which yields 0.8 - 1.0% oil. Good quality oleoresin is also extracted from coriander seeds, which is been used for flavouring beverages, pickles, sweets, etc. Coriander Powder is also used as a flavouring agent in a number of pharmaceutical preparations, especially the digestive medicines.



Coriander is grown as a Rabi season crop in India. A dry and cold weather free from frost especially during flowering and fruit setting stage favours good grain production. The sowing period is from October to December. The crop gets ready for harvest in about 90 to 110 days depending upon the varieties and growing season. Harvesting generally takes place during February and April. Madhya Pradesh, Rajasthan and Gujarat are the important Coriander producing states in India.

Crop Cycle (India)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sowing			Harvesting								

Life Cycle: Value Chain of the Commodity	Major Varieties /Grade
<pre> graph TD F[FARMER] --> AS[AGENTS/STOCKIEST] AS --> CS[COLD STORAGE] AS --> PE[PROCESSOR/EXPORTER] CS --> PE PE --> W[WHOLESELLER] PE --> E[EXPORT] W --> R[RETAILER] R --> EC[END CONSUMER] </pre>	<p>Major Varieties</p> <p>Major varieties are Badami, Eagle, Scooter, Double Parrot, Single Parrot, and Super Green. Badami is the most prominent variety.</p> <p>NCDEX Quality Parameters</p> <p>Coriander of Indian origin with following specifications</p> <p>Coriander to be necessarily machine cleaned</p> <ul style="list-style-type: none"> • Moisture – Basis 8% and acceptable upto 9%(Max) with moisture adjusted weight 1:1 • Foreign Matter – Max 0.90% • Damaged & Discolored Seeds– Max 1.90% • Shriveled Seeds- Basis 1% Acceptable upto 1.5% with 1:1 discount • Weevil seeds – Max 0.5% • Coriander splits (Dal) – Basis 5% and acceptable up to 9.50% with 1:0.5 discount • Live infestation – Not allowed <p>(Foreign matter includes dust, dirt, stones, lumps, earth, chaff, stalk, stem/straw, edible seeds of fruits other than Coriander)</p>

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 seed 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 2022-23 (Apr-Mar)			
Corresponding Years			
Production Year (PY)	2022-23 (July-Sept)	2021-22 (July-June)	2021-22 (July-June)
Marketing Year (MY)	2022-23 (Oct-Sept)	2022-23 (Jan/Feb-Dec/Jan)	2022-23 (Mar/Apr - Feb/Mar)
Calendar Year (CY)	2022 (Jan-Dec)	2022 (Jan-Dec)	2022 (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 2022-23= PY 2022-23= MY 2022-23= CY 2022	FY 2022-23= PY 2021-22 = MY 2022-23= CY 2022	FY 2022-23= PY 2021-22 = MY 2022-23= CY 2022

Note: Coffee is a plantation crop; hence, it is not classified under either Kharif or Rabi season in the above table.

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 (2021-22)*	Current FY (2022-23)* (P)
Opening Stocks	NA	NA
Production	NA	NA
Imports	1.82	1.22
Total Supply	NA	NA
Exports	1.91	1.16
Domestic Consumption	NA	NA
Closing Stocks	NA	NA

Source: UN Comtrade (May 2022); HS codes used are 090921 and 090922

NA: Data is not available in the public domain; P: Provisional;

*Data is not available as per financial year. It is provided as per Calendar Year (CY) (Jan-Dec);

(In Lakh Tonnes)

Indian Scenario	Previous FY (2021-22)	Current FY (2022-23) (P)
Opening Stocks	0.79	0.86
Production	4.00	3.60*
Imports	0.16	0.31
Total Supply	4.95	4.77
Exports	0.49	0.45
Domestic Consumption	3.60	3.50
Closing Stocks	0.86	0.82

Source:

Production: Market Estimates

*AS per Spice Board of India the Coriander Production is 8.01 Lakh tonnes.

Import/Export: Ministry of Commerce (HS codes 090921 and 090922);

For FY 2022-23, import and export data is available only for period of Apr 2022 to Feb 2023 P: Provisional;

(In Lakh Tonnes)

Rank	Top 10 Major Producing Countries			Top 10 Major Consuming Countries		
	Country	Previous FY	Current FY	Country	Previous FY	Current FY
	NA			NA		

Data is not available in public domain. As per market feedback, India is considered as the largest producer and consumer of Coriander in the world. It contributes around 80% in the total world production. Besides India, major

coriander producers are Morocco, Canada, Pakistan, Romania and the former Soviet Union. However, official estimates are rarely available for this crop in most producing countries.

(In Lakh Tonnes)

Rank	Top 10 Major Exporting Countries			Top 10 Major Importing Countries		
	Country	Previous FY (2021-22)*	Current FY (2022-23)* (P)	Country	Previous FY (2021-22)*	Current FY (2022-23)* (P)
1	India	0.52	0.39	Pakistan	0.37	0.14
2	Russian Federation	0.50	NA	Indonesia	0.24	0.08
3	Bulgaria	0.20	0.13	Malaysia	0.15	
4	Italy	0.18	0.13	India	0.11	0.32
5	Morocco	0.13	0.04	Nepal	0.08	
6	Ukraine	0.08	0.05	Saudi Arabia	0.07	
7	Argentina	0.05	0.03	United Kingdom	0.07	0.07
8	Canada	0.04	0.02	Egypt	0.07	0.04
9	Poland	0.03	0.03	Poland	0.06	0.03
10	Spain	0.03	0.02	UAE	0.06	
	Others	0.16	0.32	Others	0.54	0.55
	World	1.91	1.16	World	1.82	1.22

Source: UN Comtrade (May 2022); HS codes used are 090921 and 090922; P: Provisional;

*Data is not available as per financial year. It is provided as per Calendar Year (CY) (Jan-Dec);

(In Lakh Tonnes)

Top 10 Major producing states in India			
Rank	States	Previous FY (2021-22)	Current FY (2022-23) (P)
1	Madhya Pradesh	4.01	3.91
2	Gujarat	2.18	1.75
3	Rajasthan	1.83	1.49
4	Assam	0.36	0.32
5	West Bengal	0.16	0.16
6	Orissa	0.11	0.14
7	Uttar Pradesh	0.05	0.05
8	Andhra Pradesh	0.01	0.01
	Others*	0.22	0.20
	Total	8.91	8.01

Source: Spices Board of India; P: Provisional

*: The share of other states (except for top 8 states) in total domestic production is negligible.

c. Major changes in the policies governing trade in the spot markets of the commodity (FY 2022-23)

Date	Major Policies Governing Trade and related Changes
NA	NA

d. Geo political issues in the commodity and its impact on Indian scenario (FY 2022-23)

Date	Event	Key Details	Key Implications/Impact
05-Nov-22	China imposed lockdown	China indicated no relaxation of restrictions to 'zero-Covid' policy. Scattered outbreaks across the country continued to prompt travel restrictions and lockdowns	Agriculture commodity export to China slowed down due to prevailing lockdowns

2. Trading Parameters

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

Monthly Traded Volume		
Month	Year	Traded Volume (MT)
April	2022	199,175
May	2022	126,230
June	2022	91,510
July	2022	115,420
August	2022	100,095
September	2022	119,440
October	2022	90,695
November	2022	80,350
December	2022	89,060
January	2023	71,780
February	2023	43,950
March	2023	78,840
Yearly Traded Volume		1,206,545

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

Traded volume (MT)	Deliverable supply(MT)	Proportion
1,206,545.00	830,414	1.45

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

Traded volume (MT)	Production(MT)	Proportion
1,206,545	800,742	1.51

d. Annual average Open interest as proportion of total production

Avg Open Int (MT)	Production(MT)	Proportion
15,017.59	800,742	0.02

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

Avg Open Int (MT)	Deliverable supply(MT)	Proportion
15,017.59	830,414	0.02

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

Monthly Traded Value		
Month	Year	Traded Value(in Cr.)
April	2022	2,475.87
May	2022	1,459.40
June	2022	1,035.89
July	2022	1,394.68
August	2022	1,153.32
September	2022	1,315.29
October	2022	1,029.94
November	2022	834.60
December	2022	777.77
January	2023	590.45
February	2023	317.33
March	2023	551.69
Yearly Value of Trade		12936.23

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

Monthly Delivery Quantity		
Month	Year	Total Delivery (MT)
April	2022	2,125
May	2022	1,205
June	2022	1,395
July	2022	595
August	2022	1,965
September	2022	1,485
October	2022	6,075

November	2022	1,450
December	2022	520
January	2023	1,530
Yearly Delivery Quantity		18,345

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

Monthly Delivery Value		
Month	Year	Value in Cr
April	2022	26.41
May	2022	13.91
June	2022	15.99
July	2022	7.28
August	2022	23.24
September	2022	16.68
October	2022	69.35
November	2022	15.66
December	2022	4.62
January	2023	12.19
Yearly Delivery Value		205.33

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

Month	Year	Avg Open Int (MT)
April	2022	21,720.53
May	2022	19,177.62
June	2022	17,700.68
July	2022	16,180.95
August	2022	16,563.50
September	2022	15,884.77
October	2022	16,597.22
November	2022	11,625.00

December	2022	12,018.41
January	2023	9,799.76
February	2023	10,753.75
March	2023	15,042.62
Yearly Average OI		15,017.59

j. Annual average volume to open interest ratio

Volume to OI Ratio
32.01%

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

Member Count	Client Count
116	2291

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

	VCPs/ Hedger
Annual Average	8.84%
Maximum Daily value*	7.68%

****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

Commodity	Count
DHANIYA	28

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

n. Algorithmic trading as percentage of total trading

Commodity	%
DHANIYA	8.68%

o. Delivery defaults

No. of Instances	1
Quantity Involved (MT)	55
Value Involved (Cr)	0.59

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).

NA

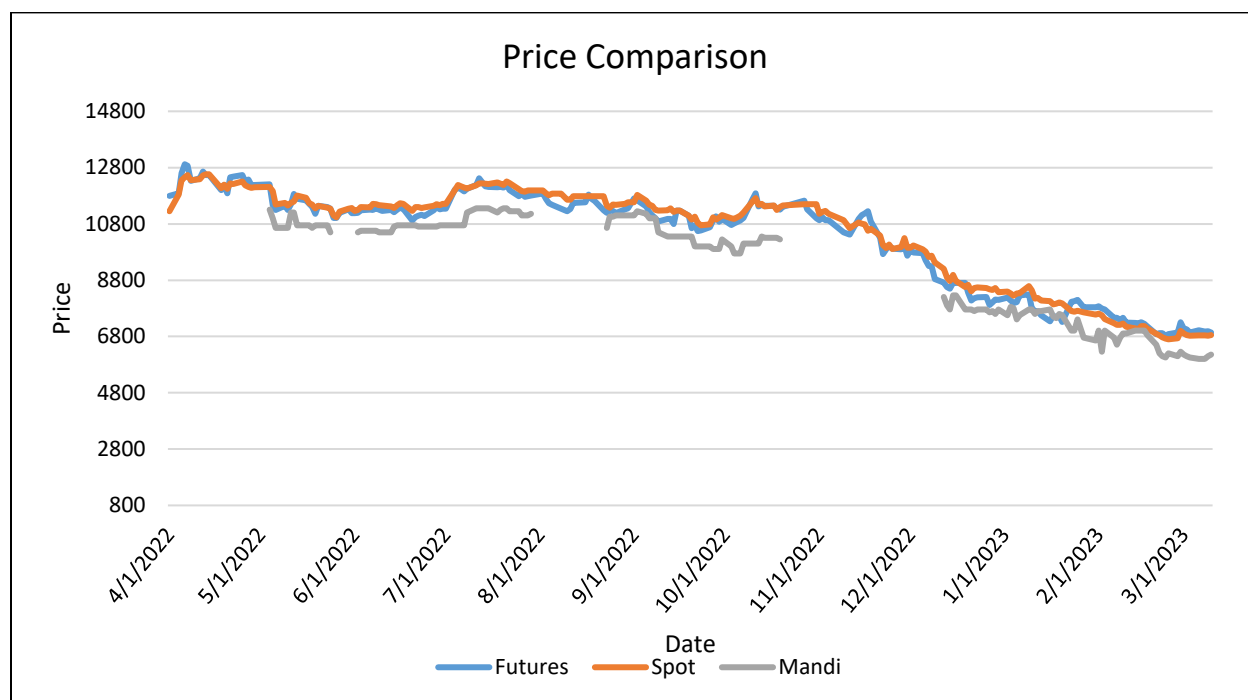
- b. Comparison, correlation and ratio of standard deviation of Exchange futures price vis-à-vis international spot price (wherever relevant comparable are available) and domestic spot price (exchange polled price).

NA

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

Correlation			
	<i>Futures</i>	<i>Spot</i>	<i>Mandi</i>
<i>Futures</i>	1		
<i>Spot</i>	0.62602	1	
<i>Mandi</i>	0.257932	0.287492	1

Standard Deviation			
	<i>Futures</i>	<i>Spot</i>	<i>Mandi</i>
<i>Futures</i>	1	0.711326	1.726814
<i>Spot</i>	1.405824	1	2.427597
<i>Mandi</i>	0.579101	0.41193	1



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

NA

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

Correlation			
	<i>Futures</i>	<i>Spot</i>	<i>Mandi</i>
<i>Futures</i>	1		
<i>Spot</i>	0.62602	1	
<i>Mandi</i>	0.257932	0.287492	1

Standard Deviation			
	<i>Futures</i>	<i>Spot</i>	<i>Mandi</i>
<i>Futures</i>	1	0.711326	1.726814
<i>Spot</i>	1.405824	1	2.427597
<i>Mandi</i>	0.579101	0.41193	1

- 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 Standard Deviation of daily returns for the period from 1 April 2022 to 31 March 2023**)

Volatility	Futures		Spot	
	Month	Value	Month	Value
Max	Apr	0.027013952	Apr	0.01971
Min	Jun	0.010465383	Jun	0.007313

- g. Number of times the futures contract was in backwardation/contango by more than 4% for the near month contract in the period under review

Contango	23
backwardation	8

4. Other 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

Basis Volatility	9.60385
Hedge Efficiency	60.03%

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 centres (information to be provided state-wise and UT-wise).

State	Major Physical Markets	Availability of NCDEX Delivery centre
Rajasthan	Baran	
	Jhalawar(Bhawani Mandi)	
	Kota	ADC
	Bundi	
	Ramgunjmandi	ADC
Madhya Pradesh	Mandsaur	
	Neemuch	
	Guna	
	Binagunj	
	Biaora	
	Kumbhraj	
Gujarat	Junagadh	

	Gondal	Basis
	Rajkot	

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

Note – The OI for each month is classified based on the Member level. The Average OI is on gross level (Long OI + Short OI)

State	GUJARAT (in MT)	MADHYA PRADESH (in MT)	RAJASTHAN (in MT)
Apr-22	5,296	3,699	13,336
May-22	7,992	2,996	10,130
Jun-22	8,423	3,089	9,546
Jul-22	7,778	2,931	8,050
Aug-22	11,331	2,359	7,396
Sep-22	11,240	1,719	6,943
Oct-22	9,258	2,089	5,563
Nov-22	6,593	1,852	6,207
Dec-22	8,512	2,040	6,174
Jan-23	4,626	1,384	5,942
Feb-23	4,448	2,453	8,479
Mar-23	7,097	6,910	7,202

"Note - The OI for CP is not mapped to any State/ location and hence not considered in the above data."

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

Following is the list of Awareness program, Stakeholder engagement program exchange has conducted for FY 2022-23.

Sr. No.	Program Type	Location	Participants
1	Investor Awareness Program	Mandsaur, Madhya Pradesh	65
2	Investor Awareness Program	Neemuch, Madhya Pradesh	40
3	Investor Awareness Program	Manohar Thana, Jhalawar	45
4	Investor Awareness Program	Bakani, Jhalawar	48
5	Investor Awareness Program	Dugg, Jhalawar	53
6	Investor Awareness Program	Jhalrapatan, Jhalawar	75
7	Investor Awareness Program	Gardan Khedi, Jhalawar	52
8	Investor Awareness Program	Gondal	62
9	Investor Awareness Program	Kota	53
10	Investor Awareness Program	Junagadh	40
11	Investor Awareness Program	Rajgarh	50
12	Investor Awareness Program	Agar Malwa	120
13	Investor Awareness Program	Shivpuri	50
14	Investor Awareness Program	Bundi	74
15	Investor Awareness Program	Chechet	70
16	Investor Awareness Program	Asnavar Viilage , Jhalawar	54
17	Investor Awareness Program	Chhipabarod (Ataru)	58
18	Investor Awareness Program	Ahmedabad, Gujarat	32
19	Investor Awareness Program	Rajkot, Gujarat	55
20	Investor Awareness Program	Unjha	60
21	Investor Awareness Program	Kolkata	35
22	Investor Awareness Program	Surat	18
23	Investor Awareness Program	Guna, Madhya Pradesh	30
24	Investor Awareness Program	Anjar, Lutch, Gujarat	38
25	Investor Awareness Program	Raipur, Chhattisgarh	112
26	Investor Awareness Program	Patan, Gujarat	104
27	Investor Awareness Program	Nashik	200
28	Investor Awareness Program	Udaipur	150
29	Investor Awareness Program	Rajkot	100
30	Investor Awareness Program	Hissar	100
31	Investor Awareness Program	Nagpur, Maharashtra	120
32	Investor Awareness Program	Raipur	100
33	Investor Awareness Program	Gwalior, Madhya Pradesh	78
34	Investor Awareness Program	Bhopal , MP	54

35	Investor Awareness Program	Indore, Madhya Pradesh	47
36	Investor Awareness Program	Siliguri, West Bengal	39
37	Investor Awareness Program	Alipurduar, West Bengal	31
38	Investor Awareness Program	Meerut, Uttar Pradesh	30
39	Investor Awareness Program	Bhopal, Madhya Pradesh	44
40	Investor Awareness Program	Indore, Madhya Pradesh	80
41	Investor Awareness Program	Chennai, Tamil Nadu	24
42	Investor Awareness Program	Kanpur, Uttar Pradesh	60
43	Investor Awareness Program	Chindwara, MP	50
44	Investor Awareness Program	Seoni, MP	40
45	Investor Awareness Program	Kolkata	25
46	Investor Awareness Program	Raipur, Chattisgarh	136
47	Investor Awareness Program	Lucknow	177
48	Investor Awareness Program	Rourkela	65
49	Investor Awareness Program	Muzaffarnagar	70
50	Investor Awareness Program	Kochi	86
51	Investor Awareness Program	Bhilai	70
52	Investor Awareness Program	Thalamadla	80
53	Investor Awareness Program	Kolkata	45
54	Investor Awareness Program	Online	30
55	Investor Awareness Program	Online	18
56	Investor Awareness Program	Online	23
57	Investor Awareness Program	Odisha	9
58	Investor Awareness Program	Odisha	15
59	Investor Awareness Program	Karnataka	5
60	Investor Awareness Program	Bihar	18
61	Investor Awareness Program	West Bengal	6
62	Investor Awareness Program	Andhra Pradesh	29
63	Investor Awareness Program	Online	11
64	Investor Awareness Program	Online	7
65	Investor Awareness Program	Online	21
66	Investor Awareness Program	Online	6
67	Investor Awareness Program	Online	9
68	Investor Awareness Program	Online	14
69	Investor Awareness Program	Online	82
70	Investor Awareness Program	Online	28
71	Investor Awareness Program	Online	25
72	Investor Awareness Program	Online	50
73	Investor Awareness Program	Online	30
74	Investor Awareness Program	Online	25
75	Investor Awareness Program	Online	5
76	Investor Awareness Program	Online	10
77	Investor Awareness Program	Online	7

78	Investor Awareness Program	Online	13
79	Investor Awareness Program	Online	16
80	Investor Awareness Program	Online	23
81	Investor Awareness Program	Online	53
82	Investor Awareness Program	Online	17
83	Investor Awareness Program	Online	30
84	Investor Awareness Program	Online	15
85	Investor Awareness Program	Online	25
86	Investor Awareness Program	Online	35
87	Investor Awareness Program	Online	10
88	Investor Awareness Program	Online	30
89	Investor Awareness Program	Online	12
90	Investor Awareness Program	Online	6
91	Investor Awareness Program	Online	7
92	Investor Awareness Program	Online	20
93	Investor Awareness Program	Online	50
94	Investor Awareness Program	Online	30
95	Investor Awareness Program	Online	13
96	Investor Awareness Program	Online	10
97	Investor Awareness Program	Online	6
98	Investor Awareness Program	Online	6
99	Investor Awareness Program	Online	8
100	Investor Awareness Program	Online	13
101	Investor Awareness Program	Online	6
102	Investor Awareness Program	Online	25
103	Investor Awareness Program	Online	8
104	Investor Awareness Program	Online	14
105	Investor Awareness Program	Online	11
106	Investor Awareness Program	Online	10
107	Investor Awareness Program	Online	6
108	Investor Awareness Program	Online	9
109	Investor Awareness Program	Online	14
110	Investor Awareness Program	Online	16
111	Investor Awareness Program	Online	11
112	Investor Awareness Program	Online	8
113	Investor Awareness Program	Online	8
114	Investor Awareness Program	Online	13
115	Investor Awareness Program	Online	15
116	Investor Awareness Program	Online	25
117	Investor Awareness Program	Online	25
118	Investor Awareness Program	Online	26
119	Investor Awareness Program	Online	18
120	Investor Awareness Program	Online	52

121	Investor Awareness Program	Online	16
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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 Masala processors/ Traders/ Stockiest
- Awareness Programme in major trading centres as well as remote location
- One to one meeting with market participants and hedgers

5. Any other information to be disclosed as deemed important by the exchange or as suggested by the PAC.

NA

ANNEXURE I

Qualitative and quantitative measure for Hedge effectiveness ratio

Hedging Efficiency Methodology

Regression analysis is carried out between near month futures returns and NCDEX polled spot prices returns of the FY2022-23.

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.