

FSSAI EDIBLE OIL SURVEY 2020



fssai


FOOD SAFETY AND STANDARDS
AUTHORITY OF INDIA

Inspiring Trust, Assuring Safe & Nutritious Food
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CONTENTS OF THIS REPORT

	EXECUTIVE SUMMARY	5
1.	INTRODUCTION AND OBJECTIVES	7
1.1.	INTRODUCTION	7
1.2.	OBJECTIVES	7
2.	METHODOLOGY	8
2.1.	SCOPE, COVERAGE AND PERIOD	8
2.2.	SAMPLING	8
2.3.	SAMPLE ANALYSIS	9
2.4.	LIMITATIONS OF THE SURVEY	9
3.	RESULTS AND DISCUSSION	10
3.1.	GEOGRAPHICAL STUDY (REGION, STATE / UT, DISTRICT RANKING BASED ON COMPLIANCE)	12
3.2.	TEST GROUP-WISE STUDY OF FAILED SAMPLES	15
3.2.1.	SAFETY PARAMETERS	16
3.2.1.1.	TOTAL AFLATOXINS	17
3.2.1.2.	PESTICIDE RESIDUES	20
3.2.1.3.	HEAVY METALS	20
3.2.2.	QUALITY PARAMETERS	22
3.2.2.1.	ADULTERATION INDICATORS	22
3.2.2.2.	SHELF-LIFE INDICATORS	38
3.2.2.3.	ADDITIVES	44
3.2.2.4.	OTHER DEFECTS	45
3.2.3.	MISBRANDING	50
3.2.3.1.	FORTIFICANT MISLABELS	50
3.2.3.2.	LABELING REQUIREMENTS	52
3.3.	OIL TYPE-WISE STUDY	53
3.4.	COMPARISON OF 2019 OIL SURVEY WITH CURRENT 2020 SURVEY (ONLY FOR DELHI NCR REGION)	54
4.	KEY FINDINGS	56
5.	CONCLUSION	57

6.	WAY FORWARD	58
7.	GLOSSARY OF TERMS USED IN THE REPORT	59
8.	ABBREVIATIONS USED IN THE REPORT WITH EXPANDED FORMS	61
9.	CITED REFERENCES	62
	ACKNOWLEDEMENTS	62

ANNEXURES

I.	TEST REQUEST FORM SHARED WITH THE STATE OFFICIALS	63
II.	TEST PARAMETERS' CLASSIFICATION (ANALYTICAL BASIS)	64
III.	DETAILS OF OIL TYPES WITH CODES COLLECTED DURING SURVEY	65
IV.	LIST OF LABORATORIES PARTICIPATED IN SURVEY	66
V.	STATE / UT-WISE SAMPLES FAILED PER MILLION POPULATION	68
VI.	DISTRICT-WISE NUMBER OF SAMPLE COLLECTED/ ANALYSED, FAILED, PASS, PERCENTAGE FAIL, PERCENTAGE PASS AND ALL INDIA RANK OF EACH DISTRICT	70
VII.	REFRACTIVE INDEX: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs	105
VIII.	BUTYRO-REFRACTIVE (BR) READING: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs	108
IX.	FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs	112
X.	IODINE VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs	118
XI.	SAPONIFICATION VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs	122
XII.	BELLIER TEST (BT): DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs	126
XIII.	PRESENCE OF MINERAL OIL: STATE AND OIL TYPE-WISE SHARE IN FAILED SAMPLES	128
XIV.	ACID VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs.	129
XV.	UNSAPONIFIABLE MATTER: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES	132

	AMONG THE STATES / UTs.	
XVI.	RANCIDITY: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs.	134
XVII.	LEAD (Pb): DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs.	135
XVIII.	PHOSPHOROUS: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs.	137
XIX.	VITAMIN A: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs.	138
XX.	VITAMIN D ₂ : DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES / UTs.	140
XXI.	SUMMARY OF PERCENTAGE PASS / FAIL FOR ALL TESTS PERFORMED	142
XXII.	STATE / UT-WISE SAMPLE FAILURE IN ALL OIL TYPE	150
XXIII.	SUMMARY OF ALL OIL TYPES FAILED	153
XXIV.	STATE-WISE AND OIL-WISE FAILURE IN ORYZANOL CONTENT	154
XXV.	TEST-WISE DATA FOR NUMBER OF SAMPLES TESTED, FAILED AND PERCENTAGE OF FAILURE	156

EXECUTIVE SUMMARY

FSSAI conducted an All India Edible Oil survey to assess the quantum of adulteration and to identify hotspots of adulteration and contamination for 15 different types of Edible Oils. The Survey was conducted across all States and Union Territories (UTs) of India on 25-27 August 2020, covering areas up to district level and involving State Food Safety Officers. The sample size in total was 4461 which was subjected to the analysis of various parameters broadly grouped into: Safety, Quality and Misbranding aspects. The number of laboratories involved in the analysis were 43 (FSSAI notified labs). However, the sample size varied with respect to the parameters analyzed based on the lab's capability and, therefore, the details of failed samples out of the actual sample analyzed are different for a given parameter, which is described in the result and discussion part of this report as well as supporting annexure tables. Here the key findings reported below are out of the 4461 samples. The numbers mentioned within the parenthesis after the percentage indicate the number of samples failed out of 4461 samples.

- 2.42% (108) samples failed in safety parameters, 24.21% (1080) samples failed in quality parameters, while 12.82% (572) samples were misbranded.
- Among the safety parameters, Total Aflatoxins were detected in 0.65% (29) of the samples, out of which majority belonged to Tamil Nadu and Karnataka. Maximum failure was observed in Ground Nut oil from Tamil Nadu and Coconut oil from Karnataka.
- 0.36% (16) samples from Maharashtra, Gujarat, Madhya Pradesh, Chhattisgarh and Karnataka failed in the test for pesticide residues.
- Further, heavy metals like Arsenic (0.20%, 9 samples) and Mercury (0.10%, 4 samples) were detected in Rice Bran, Sesame and Soybean Oil samples from Maharashtra. While, 1.34% (60) of oil samples failed on account of detection of higher than prescribed limits of Lead; majority being Mustard oil samples from Jammu & Kashmir.

- In the criteria of Quality parameters indicating adulteration, majority of the samples failed in Physico-chemical tests like Refractive index, Iodine Value, Butyro-Refractometer reading and Fatty acid profile; with Mustard oil reporting the maximum percentage of failed samples.
- Around 12.82% (572) samples failed in the parameter of Misbranding/Mislabelling including failure to meet the specified level for fortificants (Vitamins A&D) and labelling requirements of FSSR.
- About 4.98% (222) of samples failed under major shelf-life indicators such as Acid Value, Rancidity and Moisture content, maximum belonging to Tamil Nadu. Among the oil types, Palm oil reported highest sample failure.
- Although the additives such as DMPS, BHA and TBHQ etc. are antioxidants, their concentration was higher than the prescribed limits in 0.25% (11 samples), 0.06% (3 samples) and 0.11% (5 samples) of the analysed oil samples respectively.
- Andaman & Nicobar Islands, Arunachal Pradesh, Meghalaya and Tripura emerged out to be the best performing States / UTs. Out of the non-compliant States / UTs, Nagaland showed least non-compliance followed by Manipur, Telangana and Uttar Pradesh in that order.
- Among the oil types, majority of the samples failed in Mustard oil followed by Soybean Oil, Blended Oil, Groundnut Oil and Sesame Oil.

The key findings of the Survey and actionable points have been shared with the States/ UTs as well as aligned Departments/Ministries to initiate and execute necessary action.

REPORT OF THE EDIBLE OIL SURVEY 2020

1. INTRODUCTION AND OBJECTIVES

1.1. INTRODUCTION

Vegetable oils are extracted from oil seeds and used for various purposes in the food sector. There is wide variety of cooking oils (edible oils) used in India and they constitute an integral part of the Indian cuisine. Availability of safe, nutritious and quality edible oils is vital to the health of all consumers and to ensure this, FSSAI has prescribed their specifications in FSSR.

In the past, a pilot survey was conducted in 2019 to assess the quality of edible oils in Delhi NCR. This survey was conducted by Consumer Voice (a Non-profit Organization) and FSSAI. Samples of Mustard oil, Extra virgin Olive oil, Virgin Coconut oil and Coconut oil were collected from eleven districts of Delhi and 4 regions of Delhi NCR (Faridabad, Gurgaon, Ghaziabad and Noida). In all, 739 samples of these edible oils were tested for various chemical tests, and failure to FSSR compliance was reported in both branded and unbranded types of oils. Therefore, it was felt to carry out an all India edible oil survey in 2020 to assess the safety and quality of edible oils sold in the country.

1.2. OBJECTIVES:

- ✓ To check the level of safety, quality and misbranding in edible oils through analysis of various indicative parameters as described in the FSSR.
- ✓ To assess the quantum of safety, quality and misbranding in edible oils and identify its hotspots in the country.
- ✓ To evaluate presence of contaminants such as Aflatoxins, heavy metals and pesticide residues in edible oils.

2. METHODOLOGY

2.1. SCOPE, COVERAGE AND PERIOD

Scope of the study was to carry out survey of edible vegetable oils being manufactured and marketed in India. Far-flung areas as well as hilly and difficult terrains including Ladakh, Arunachal Pradesh, Andaman & Nicobar Islands were included as a part of this exercise for a comprehensive approach. The survey was coordinated by FSSAI and was executed through Food Safety Officers (FSOs) of the States/ UTs. The FSOs were directed to pick 50 samples from the metro cities: Delhi, Mumbai, Bengaluru, Chennai and Kolkata and 6-8 samples from each district across the country other than the aforementioned metro cities.

Before the conduct of the survey, FSSAI shared detailed Guidelines (SOP) with all State / UT Commissioners of Food Safety in the country in regard to the planning and execution of this survey. Further, a video conference was also organized to discuss the SOP of this survey with States / UTs Designated Officers (DOs) and Food Safety Officers (FSOs). The State officials were also directed to send samples to the nearest State Food Testing Laboratories or notified food testing laboratories notified by FSSAI. Simultaneously, SOPs for laboratory analysis was also framed and shared with all the participating laboratories, wherein they were asked to perform the analysis of edible oils as per FSSR 2011. The Survey was conducted across the country from 25th to 27th August 2020.

2.2. SAMPLING

Guidelines (SOP) was issued by FSSAI for collecting, coding, transporting and testing of picked edible oil samples, assigning clearly defined responsibilities to the Food Safety Officers (FSOs), Designated Officers (DOs) and the participating laboratory personnel of the States/ UTs. In this regard, FSSAI conducted a series of webinars for briefing the stakeholders that included the DOs, FSOs and participating Laboratory personnel involved in this survey, instructing them about the do's and don'ts, clearing their doubts as well as defining their relevant roles and responsibilities as given in the SOP.

In the SOP, 720 districts and five metro cities were chosen by FSSAI for sample collection. Respective FSOs were asked to pick up edible oil samples from any place under their jurisdiction. Samples (branded, unbranded, packed & loose) were required to be collected randomly from the local markets, retail stores, hypermarkets, etc. giving the freedom of choice to the FSOs. The FSOs were advised to pick minimum half liter of oil samples. This was followed by coding the samples as per the instructions given in the SOP, packing and labelling and transporting it to the nearest or convenient FSSAI recognized labs / SFTLs. Further FSOs were asked to submit the “Test Request Form” (Annexure-I) to the lab along with the picked-up oil samples.

2.3. SAMPLE ANALYSIS

In all, 161 testing parameters categorized into 10 different broad groups (Annexure-II) were analyzed in more than 15 different types (Annexure-III) of Edible Oil samples as per the parameters specified in FSSR for individual oil type at 43 FSSAI notified laboratories (Annexure-IV). Samples were analyzed by labs using standard methods and technology (as applicable for the specific test) as per Indian Standards (IS), Official Methods of Analysis of Association of Official Analytical Chemists (AOAC), FSSAI methods, and/or in-house validated methods. Analysis involved use of a wide range of instrumentation such as LC-MS/MS, GC-MS/MS and ICP-MS apart from classical chemical analytical techniques. Laboratories were instructed to report the value and conclusion of test as pass or fail against the specifications given in FSSR for specific oil type.

2.4. LIMITATIONS OF THE SURVEY

It was very challenging to coordinate with numerous Designated Officers and Food Safety Officers of the States/ UTs in order to ensure smooth collection of samples and their delivery to concerned laboratories. The involvement of multiple laboratories further complicated the process of collating data with respect to sample collection, sample receipt; sample analysis and test report generation. Most of the State labs and notified labs were unable to measure most of the parameters defined in the Standard Operating

Procedure (SOP), therefore, there was variation in the sample size for a particular parameter analyzed *in toto*. Despite sharing the SOPs through regular emails, telephonic conversations and Video-Conferencing, there was non-uniformity in data collection, compilation and analysis. Some of the samples picked-up by State FSOs had incorrect label information which confused the labs before proceeding for analysis. In few instances, samples of non-edible oils like almond oil, hair-oils, etc. were also picked-up.

3. RESULTS AND DISCUSSION

The total number of samples collected during the survey came from 591 districts including 4 metros out of the identified 720 districts and 5 metro cities were 4461. A few districts failed to collect minimum number of samples as prescribed by FSSAI. Summary of the samples collected across the country is shown in Figure 1A. District-wise number of samples collected is given in Annexure-VI. Out of the 4461 samples taken up for analysis, 3090 (69.3%) were found to be compliant while 1371 (30.7%) failed to meet the requirements as per FSSR (Annexure-XXIII) on either one or more parameters, which are discussed subsequently under different heads.

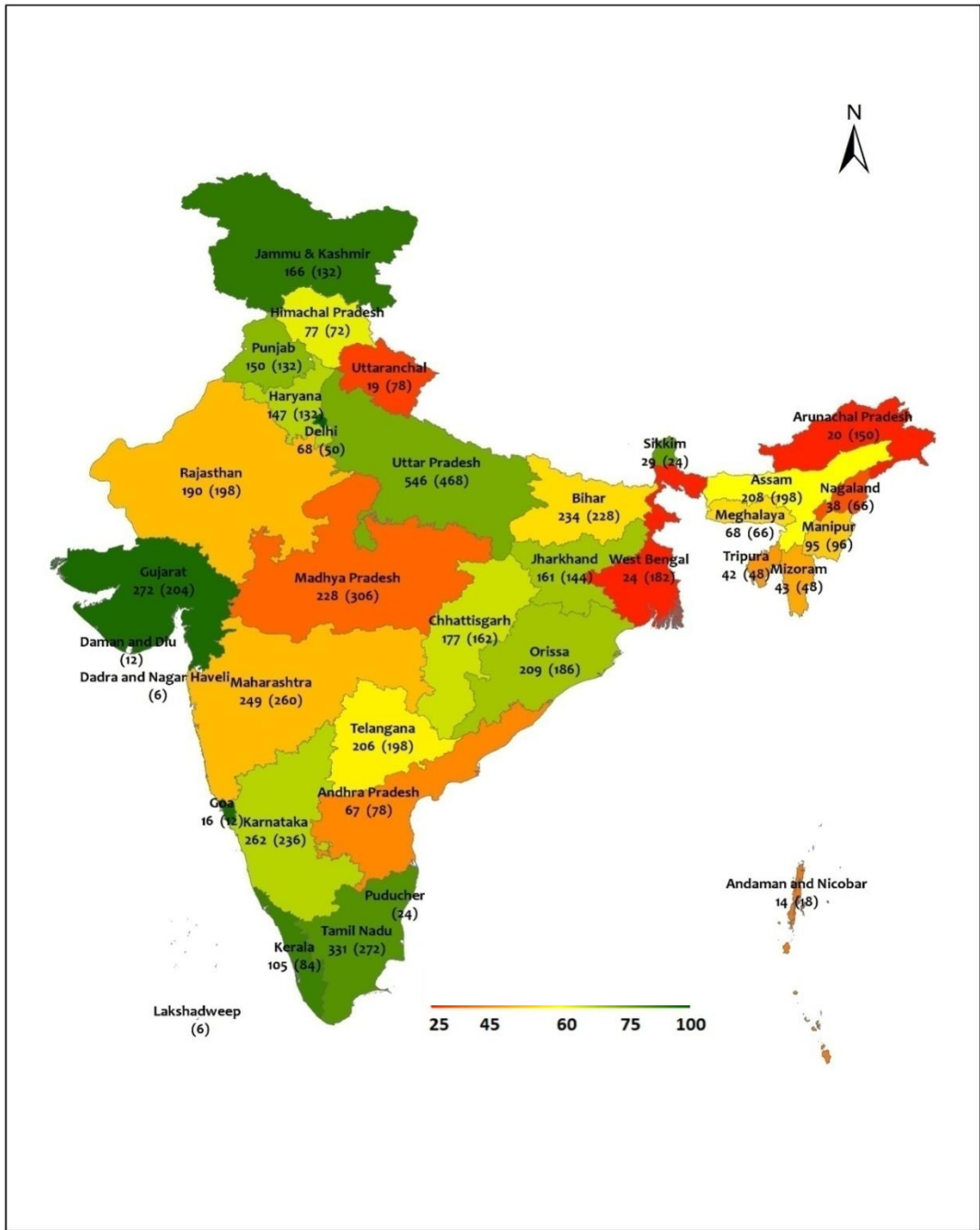


FIGURE 1A: GRAPHICAL REPRESENTATION OF THE NUMBER OF SAMPLES COLLECTED FROM VARIOUS REGIONS

3.1. GEOGRAPHICAL STUDY (REGION, STATE / UT, DISTRICT RANKING BASED ON COMPLIANCE)

Among the four regions of the country, maximum percentage of failed samples are from Southern region, followed by Northern, Eastern and Western regions as shown in Table-1

TABLE-1: REGION WISE COMPLIANCE DATA AND THEIR RANKING

REGION	TOTAL NO. OF SAMPLES TAKEN FOR ANALYSIS	NO. OF SAMPLES FAILED	% FAILED	NO. OF SAMPLES PASS	% PASS	RANK
WEST	765	152	19.9%	632	80.1%	1
EAST	1362	309	22.7%	1020	77.3%	2
NORTH	1363	485	35.6%	878	64.4%	3
SOUTH	971	425	43.8%	560	56.2%	4
TOTAL	4461	1371	30.7%	3090	69.3%	

Out of the participating States/UTs, Andaman & Nicobar, Arunachal Pradesh, Meghalaya and Tripura jointly secured number one position, followed by Bihar at second and Assam at third position respectively. Nagaland was the worst performing state (rank 29), while Manipur, Telangana and Uttar Pradesh were positioned at 28th, 27th and 26th position respectively. Table-2 displays the State / UT wise number of samples taken for analysis, reported as number of failed samples, percentage fail, percentage pass and ranking of States and UTs (based on percentage of pass samples). The State / UT with the maximum pass percentage is given Top Rank (Rank-1).

Based on population per million, maximum sample failures were observed in Union Territory of Ladakh (32 samples/million) followed by Manipur (24 samples/million), Sikkim (18 samples/million) and Nagaland (16 samples/ million) and others as listed in Annexure-V.

TABLE-2: STATE / UT-WISE COMPLIANCE DATA AND THEIR RANKING (ARRANGED A TO Z)

S NO	NAME OF STATE / UT	FSSAI REGION	TOTAL NO. OF SAMPLES	NO. OF FAILED SAMPLES	% FAIL	% PASS	RANK
1	ANDAMAN & NICOBAR ISLANDS	East	14	0	0.0%	100.0%	1
2	ANDHRA PRADESH	South	67	36	53.7%	46.3%	27
3	ARUNACHAL PRADESH	East	20	0	0.0%	100.0%	1
4	ASSAM	East	208	2	1.0%	99.0%	3
5	BIHAR	East	234	1	0.4%	99.6%	2
6	CHHATTISGARH	East	177	88	49.7%	50.3%	24
7	DELHI	North	68	19	27.9%	72.1%	15
8	GOA	West	16	2	12.5%	87.5%	8
9	GUJARAT	West	272	32	11.8%	88.2%	7
10	HARYANA	North	147	44	29.9%	70.1%	17
11	HIMACHAL PRADESH	North	77	24	31.2%	68.8%	19
12	JAMMU & KASHMIR	North	154	57	37.0%	63.0%	21
13	JHARKHAND	East	161	62	38.5%	61.5%	23
14	KARNATAKA	South	262	84	32.1%	67.9%	20
15	KERALA	South	105	16	15.2%	84.8%	9
16	LADAKH	North	12	1	8.3%	91.7%	6
17	MADHYA PRADESH	West	228	68	29.8%	70.2%	16
18	MAHARASHTRA	West	249	50	20.1%	79.9%	13
19	MANIPUR	East	95	65	68.4%	31.6%	29
20	MEGHALAYA	East	68	0	0.0%	100.0%	1
21	MIZORAM	East	43	1	2.3%	97.7%	4

22	NAGALAND	East	38	33	86.8%	13.2%	30
23	ODISHA	East	209	41	19.6%	80.4%	12
24	PUNJAB	North	150	12	8.0%	92.0%	5
25	RAJASTHAN	North	190	36	18.9%	81.1%	11
26	SIKKIM	East	29	11	37.9%	62.1%	22
27	TAMIL NADU	South	331	174	52.6%	47.4%	25
28	TELANGANA	South	206	115	55.8%	44.2%	28
29	TRIPURA	East	42	0	0.0%	100.0%	1
30	UTTAR PRADESH	North	546	289	52.9%	47.1%	26
31	UTTARAKHAND	North	19	3	15.8%	84.2%	10
32	WEST BENGAL	East	24	5	20.8%	79.2%	14
	Grand Total		4461	1371	30.7%	69.3%	

* Based on pass percentage; 1st rank assigned to state with maximum pass percentage.

Some Union Territories like Chandigarh, Puducherry, Lakshadweep, Dadra and Nagar Haveli could not participate in the survey. Out of the 591 districts and metros from where samples were picked-up and analyzed, 183 districts are at top position with 100% compliance, while 20 districts reported no compliant samples. Compliance level-wise number of districts and their percentage is shown in Table-3. District-wise number of samples analyzed, number and percentages of samples passed and vice versa are listed in Annexure-VI. This annexure also displays the rank of district (1 to 65) on all India basis.

TABLE-3: COMPLIANCE LEVEL WISE NUMBER OF DISTRICT AND THEIR PERCENTAGE

RANGE OF COMPLIANCE LEVEL (% OF SAMPLES PASSED FROM DISTRICT)	NO OF DISTRICTS FALLING IN THE RANGE	PERCENTAGES OF DISTRICTS FALLING IN THE RANGE
100%	183	31.0%

≥75 to <100%	89	15.1%
≥50 to <75%	115	19.5%
≥25 to <50%	133	22.5%
>0 to <25%	50	8.5%
0%	21	3.6%
GRAND TOTAL	591	---

3.2. TEST GROUP-WISE STUDY OF FAILED SAMPLES

Out of the 4461 samples analyzed on various parameters as per FSSR specifications as well as individual lab testing capabilities, 1371 (30.7%) samples failed in one or more parameters (Annexure-XXV). It may be clarified here that all samples were not tested on all parameters due to some parameters not being applicable to some samples and testing constraints in some labs. Sample failure in various testing parameters was further grouped into three major categories: a) Safety Indicators b) Quality Indicators and c) Misbranding/ Mislabelling (Table-4)

TABLE 4: REGION-WISE & BROAD-GROUP WISE NON-COMPLIANCE

Region	Total No. of Samples taken for analysis	No. of Non-compliance samples [%]	Parameter-wise Grouping	No. of Non-compliance samples [%] out of 4461 samples
North	1363	485 (35.58)	Safety (S)	108 (2.42)
East	1362	309 (22.68)	Quality (Q)	1080 (24.21)
West	765	152 (19.86)	Misbranding (M)	572 (12.82)
South	971	425 (43.76)	S + Q	1134 (25.42)
Total	4461	1371 (30.73)	S + M	663 (14.86)
			M + Q	1322 (29.63)
			S + Q + M	1371 (30.73)

Data was analyzed to identify the hot spots i.e. affected oil types and States / UTs as well as to estimate percentage of failed parameters against the total number of tests performed. Among all the indicator categories, maximum contribution to failed tests were under Misbranding (17.8%, 794 samples) followed by Quality (10.29%, 459 samples) and Safety parameters (2.42%, 108 samples)[Figure3A]. Further, study of each indicator group of tests (Safety, Quality and Misbranding) was carried out. Significance of each test is also given thereof.



FIGURE 3A: INDICATIVE SAMPLE FAILURES IN THE CATEGORIZED GROUPS

3.2.1. SAFETY INDICATORS

The safety indicators present in edible oils can include Aflatoxins, pesticide residues and heavy metals which are potential health hazards and may have deleterious health effects. The percentage contribution of Aflatoxins, heavy metals and pesticide residues to sample failure in ascending order is illustrated in the Figure 3B below:

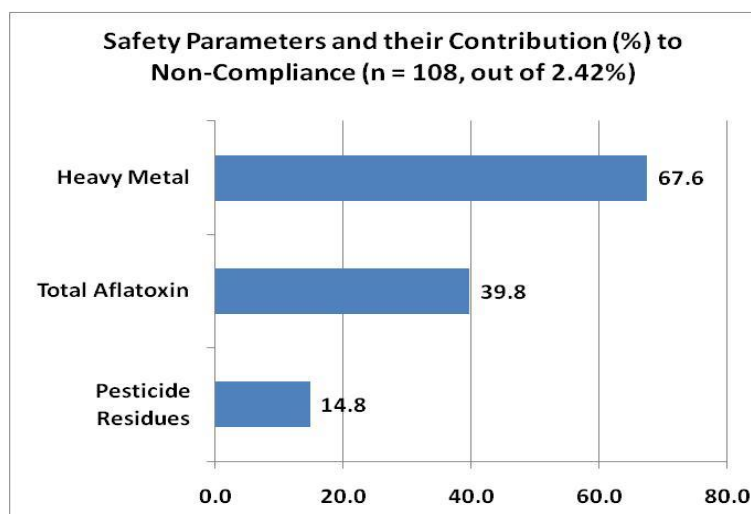


FIGURE 3B: % CONTRIBUTION TO FAILED TESTS (2.42%= 108 samples) AMONG THE SAFETY INDICATORS

3.2.1.1. TOTAL AFLATOXINS

Out of the 2896 samples analysed, 29 samples failed in Total Aflatoxin (viz. B1, B2, G1 and G2) content. Aflatoxin B1 was detected in majority of samples (28 samples), while Aflatoxin B2 was reported in 9 samples, Aflatoxin G1 was reported in 4 samples and Aflatoxin G2 in 2 samples. Total Aflatoxins were found in 29 samples as indicated earlier, as those failed in B1 also failed in B2, G1 and G2 except 1 sample which exclusively failed in Aflatoxin B2. Out of 29 failed samples, 26 samples failed from South India, wherein maximum failure of 62% (18 samples out of failed 29 samples) was from Tamil Nadu. Figure 3C represents the state-wise percentage of samples failed in Total Aflatoxin. Maximum samples failed in Total Aflatoxins came from Ground Nut oil (72%, 21 samples out of 29 failed samples), followed by Coconut oil (17%, 5 samples out of 29 failed samples), Palm oil (3%, 1 sample out of 29 failed samples), Mustard oil (3%, 1 sample out of 29 failed samples) and Sesame oil (3%, 1 sample out of 29 failed samples) as detailed in Figure 3D for oil type and state-wise distribution of failures. Aflatoxins are carcinogenic substances produced by certain genus of fungi (molds), which can pose a serious health risk to humans and livestock.

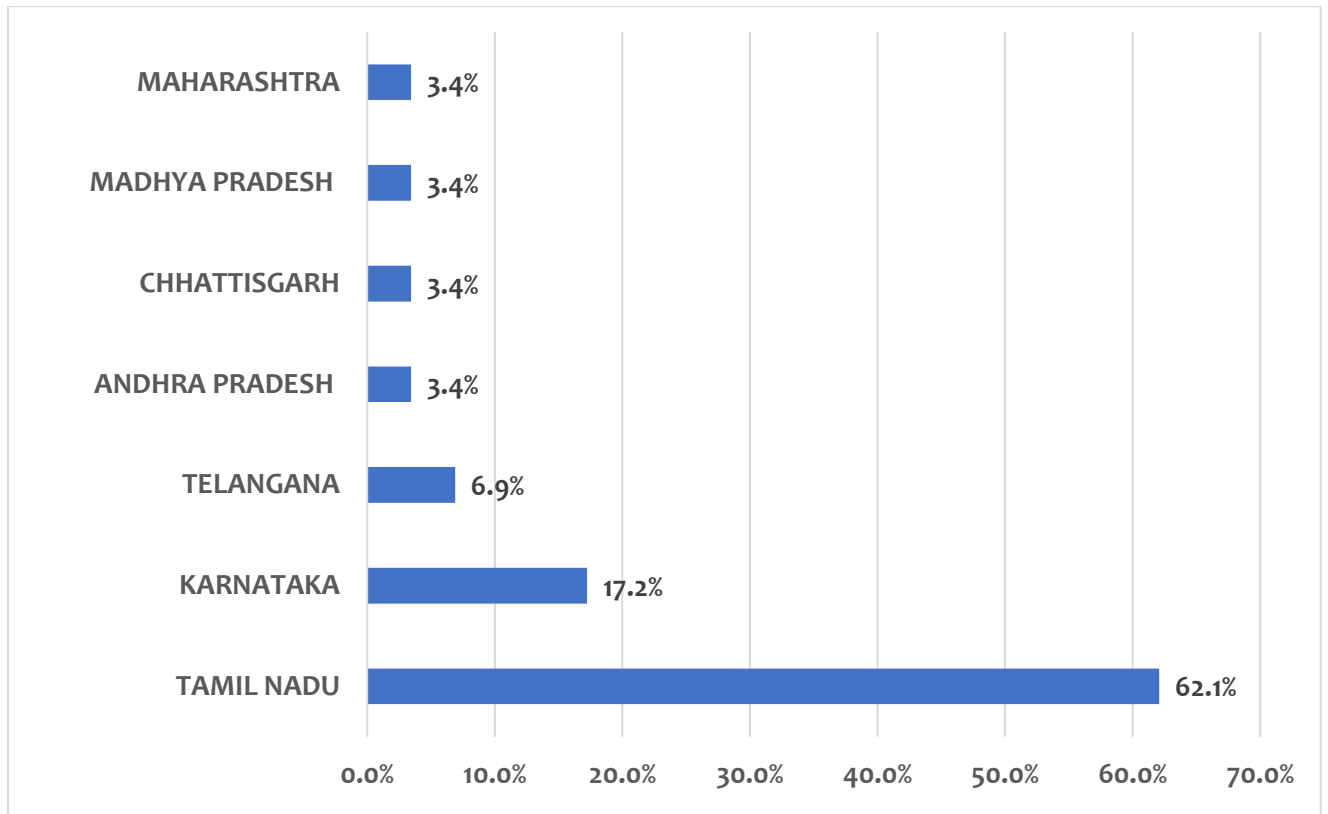


FIGURE 3C: TOTAL AFLATOXINS-STATE / UT WISE CONTRIBUTION TO FAILED SAMPLES (0.65%)

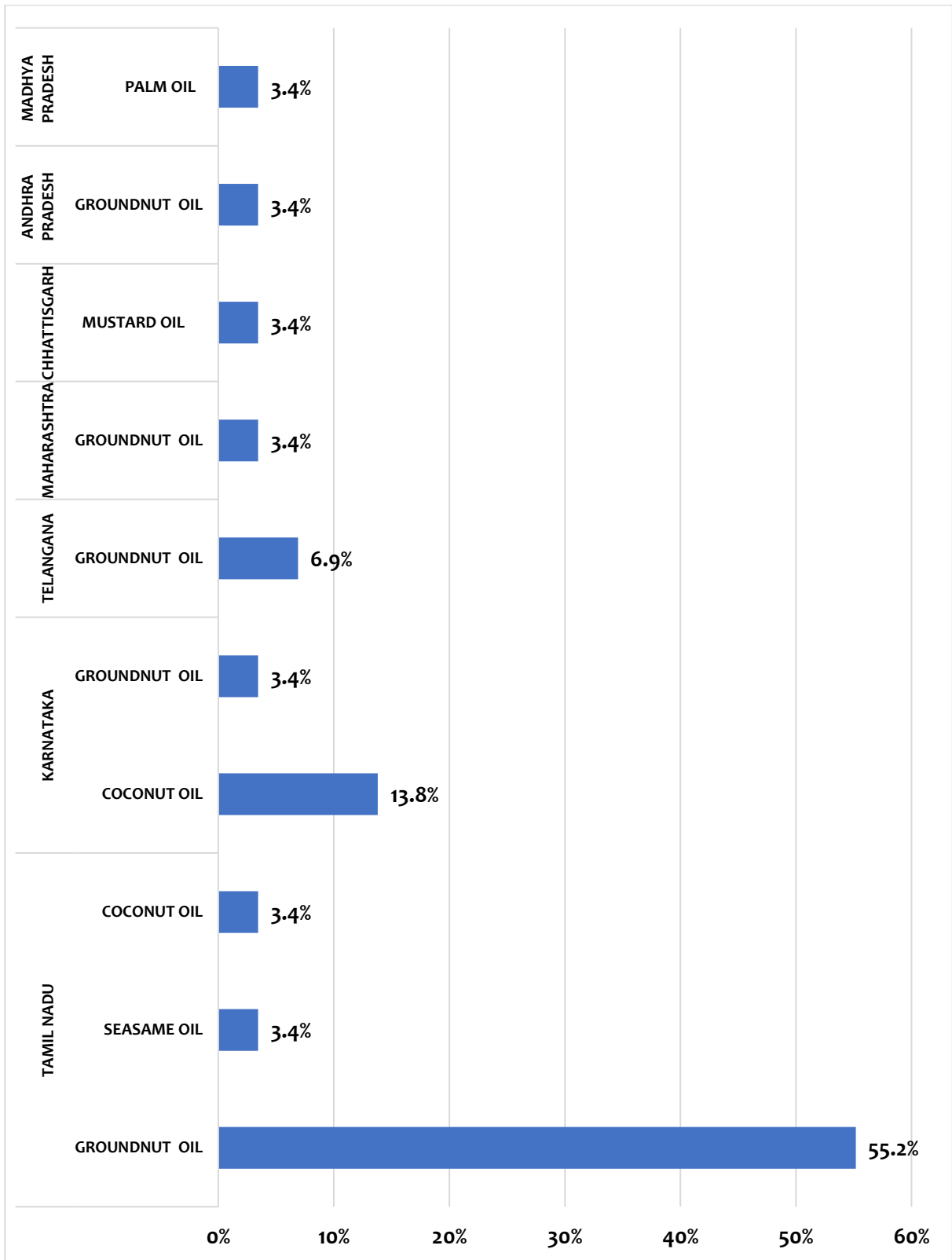


FIGURE 3D: OIL-TYPE & STATE-WISE CONTRIBUTION TO FAILURES IN TOTAL AFLATOXIN

3.2.1.2. PESTICIDE RESIDUES

Six pesticide residues detected in the failed samples are as follows:

- Phenthoate (0.20%, i.e., 7 failed samples out of 3419 samples analysed). This failure was maximum reported in Maharashtra. The 7 failed samples came from Ground Nut oil (3 samples: 2 samples from Maharashtra and 1 sample from Madhya Pradesh) and 1 sample each coming from Sesame oil (Maharashtra and Karnataka), Rice Bran Oil (Maharashtra) and Soybean oil (Madhya Pradesh).
- Methyl parathion (0.34%, i.e., 4 failed samples out of 1167 samples analysed). This failure was reported from Gujarat only, which comprised 2 samples each of Cotton seed oil and Mustard oil.
- Cypermethrin (0.31%, i.e., 1 failed sample out of 322 samples analysed) was reported from Gujarat in Cotton seed oil.
- Mepiquat chloride (0.19% i.e., 1 failed sample out of 516 samples analysed) was reported from Chhattisgarh in Mustard oil.
- Dichlorvos (0.13%, i.e., 2 failed samples out of 1545 samples analysed) was reported from Madhya Pradesh and Maharashtra in Ground nut oil and Mustard oil, respectively.
- Indoxacarb (0.14%, i.e., 1 failed samples out of 717 samples analysed) was reported from Madhya Pradesh in Soya Bean oil.

Pesticide residues refer to the pesticides that may remain in food products as a consequence of their application on food crops. Exposure of the population to pesticide residues through edible oil may cause chronic health risk to humans.

3.2.1.3. HEAVY METALS

Metals like Lead (Pb), Cadmium (Cd), Arsenic (As), Mercury (Hg) are toxic and are known to cause multiple organ failure even at low levels of exposure. The following heavy metals were detected in the analyzed samples:

- i. **LEAD 'Pb'**: Out of the 3799 samples analysed, 60 samples (1.58%) failed for excessive amounts of Lead. Maximum percentage of failed samples belonged to Jammu & Kashmir (22 samples out of 60 failed samples). Among the oil types, the excessive presence of Lead was observed in Mustard Oil (31 samples out of 60 failed samples). State / UT-wise distribution of failed oil types is listed in Annexure-XVII.
- ii. **ARSENIC 'As'**: Out of the 3803 samples analysed, 9 samples (0.24%) reported excessive amount of Arsenic. All of these samples came from Maharashtra, mostly being in Rice Bran Oil. Figure 3E shows the contribution to each oil-type for the presence of excessive Arsenic in edible oils.

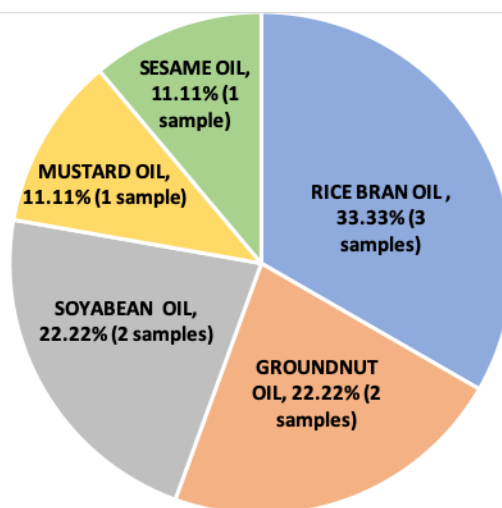


FIGURE 3E: ARSENIC-CONTRIBUTION TO TYPE OF OIL SAMPLES FAILED (0.24%)

- iii. **MERCURY 'Hg'**: Out of 3788 samples analysed, 4 samples (0.1%) failed for excessive amount of Mercury in edible oils. All failed samples belonged to Maharashtra with contribution of failure coming from Rice Bran Oil (2 samples), Sesame Oil (1 sample) and Soybean Oil (1 sample).

3.2.2. QUALITY PARAMETERS:

Of the various quality parameters analysed, the failure in the quality of edible oil, along with their geographical distribution (identification of hot spots), and oil types are given below. Data is presented as percentage of tests failed (Refer Annexure-XXI), state-wise percent share and oil type-wise share among failed samples for a specific test.

3.2.2.1. ADULTERATION INDICATORS

i. TEST FOR PRESENCE OF HYDROCYANIC ACID

Out of the 138 samples analysed, 31 samples (22.46%) failed for the presence of Hydrocyanic acid. All samples were from Jharkhand and were present in Mustard oil. Presence of Hydrocyanic acid can pose serious threat to humans.

ii. REFRACTIVE INDEX

Out of the 4060 samples analysed for Refractive Index, 198 samples failed (4.9%) to meet the specified limits. The maximum percentage failure came from Tamil Nadu [Figure 3F] and the oil type that showed the highest number of sample failure was Mustard oil [Figure 3G]. Deviation from the range indicates adulteration with other oil type(s). State / UT-wise distribution of failed oil types is listed in Annexure-VII.

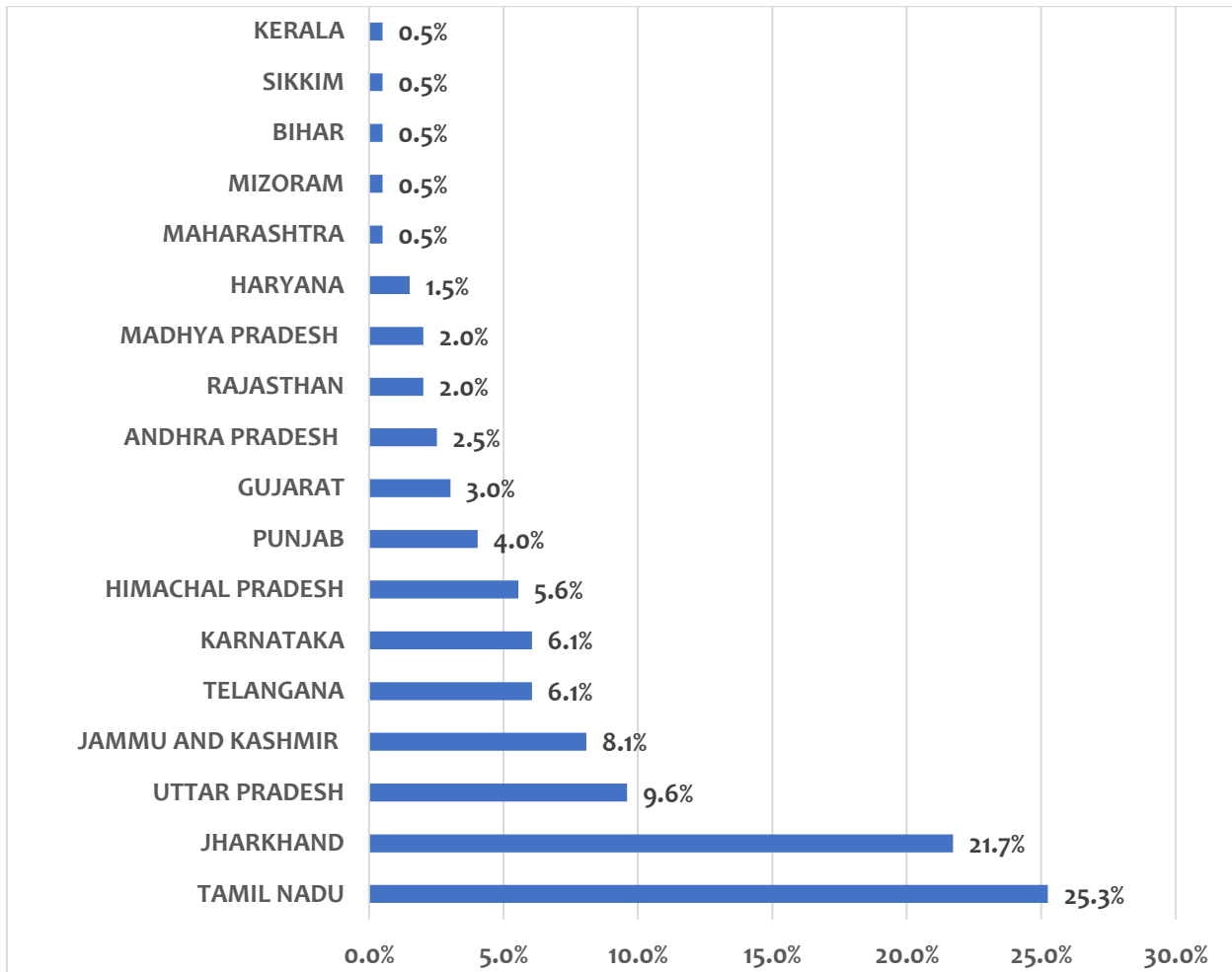


FIGURE 3F: REFRACTIVE INDEX-STATE / UT-WISE CONTRIBUTION TO FAILED SAMPLES (4.9%)

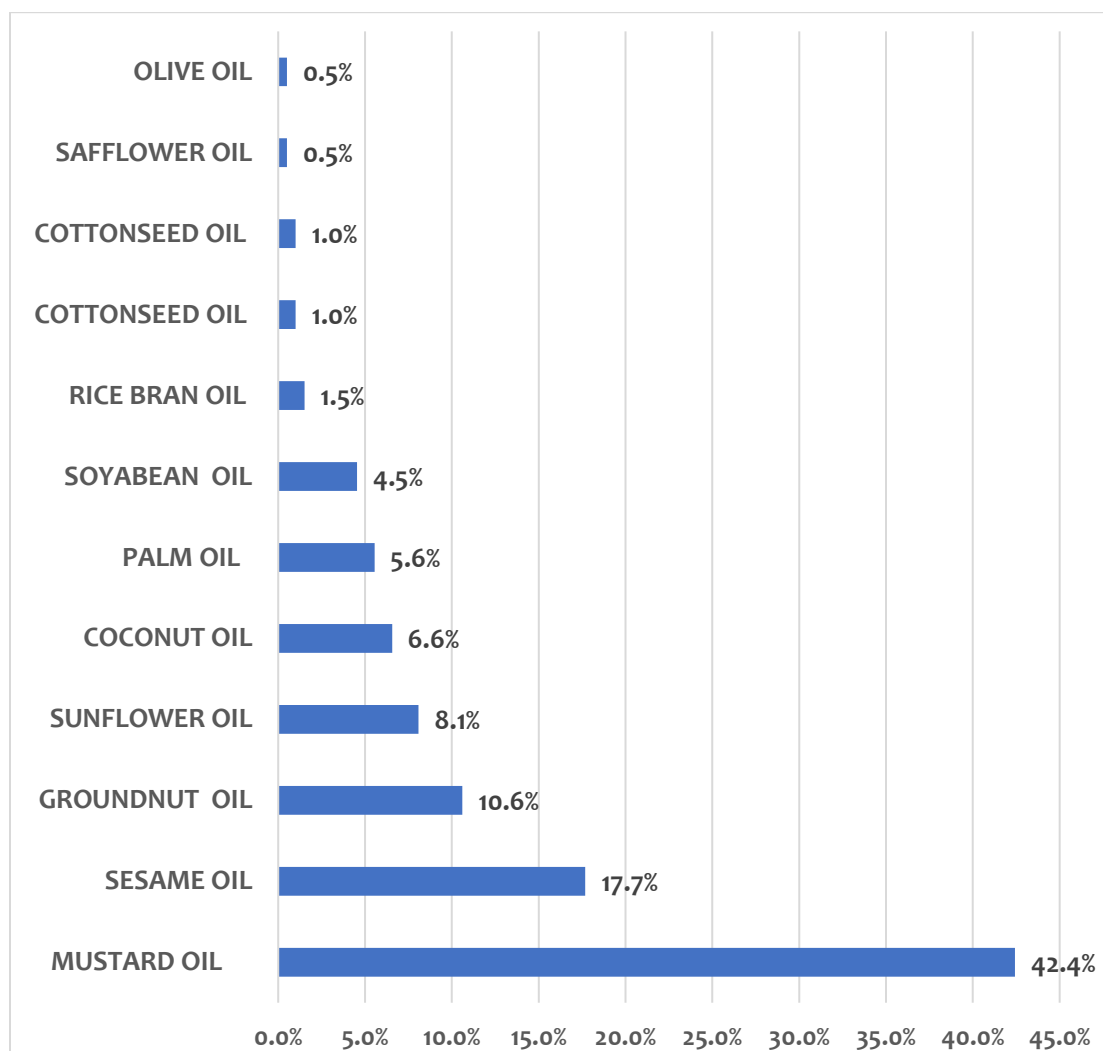


FIGURE 3G: REFRACTIVE INDEX-OIL TYPE WISE CONTRIBUTION TO FAILED SAMPLES (4.9%)

iii. BUTYRO-REFRACTOMETER READING AT 40°C (BR)

Out of the 4276 samples analysed for BR reading, 4.96% (212 samples) across 19 States / UTs failed, with Tamil Nadu (20.8 %, 44 Samples out of 212 failed samples) reporting maximum sample failure [Figure 3H]. Among the oil types, Mustard oil reported the maximum percentage of failed samples, whose contribution is more than two times the next category of oil (Sesame Oil) [Figure 3I]. BR reading is used to detect the purity of edible oils and deviation from specified range may indicate the presence of other vegetable oils or fat from animal tissue. State / UT wise distribution of failed oil types is listed in Annexure-VIII.

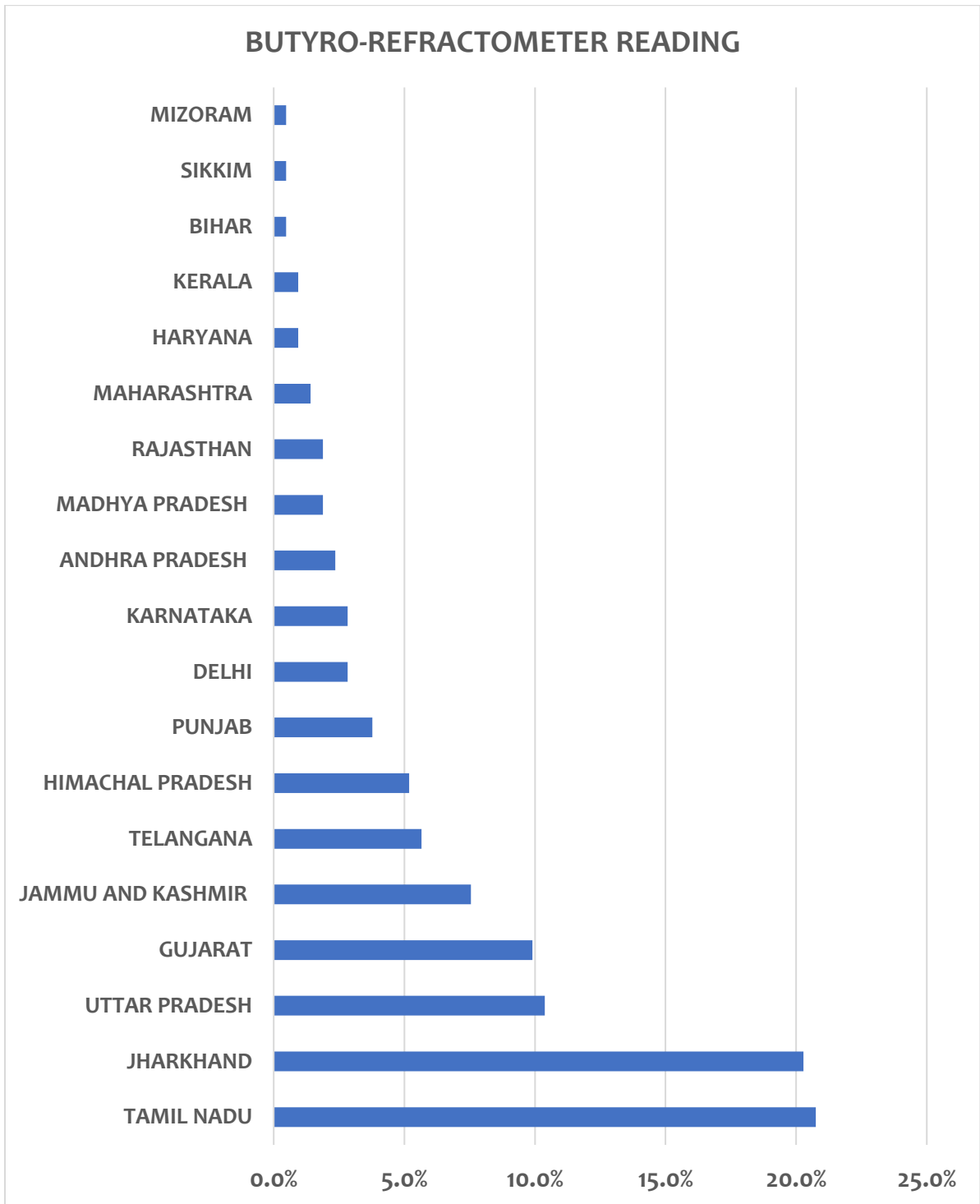


FIGURE 3H: BR READING-STATE / UT-WISE CONTRIBUTION TO FAILED SAMPLES (4.96%)

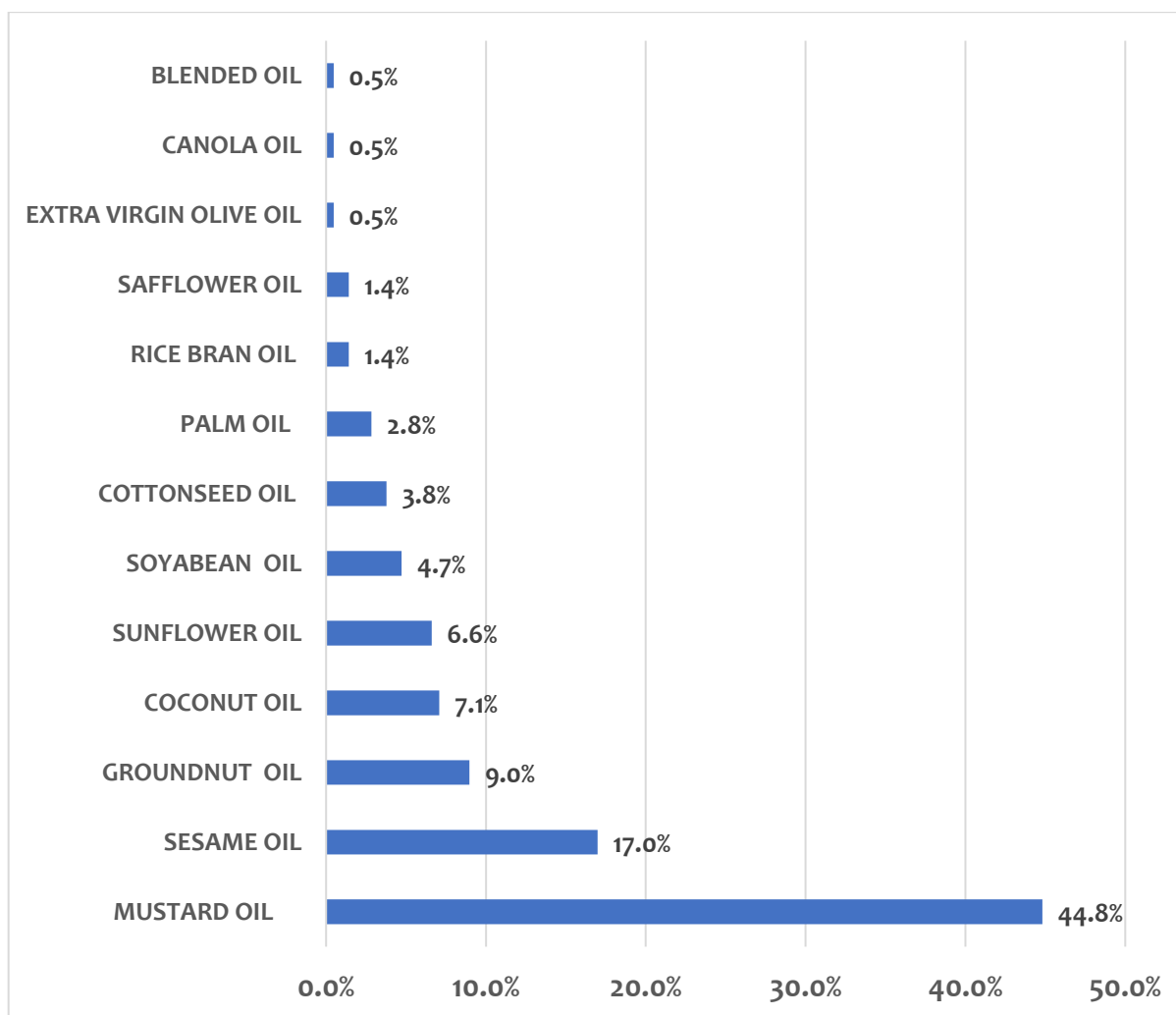


FIGURE 3I: BR READING-OIL TYPE-WISE CONTRIBUTION TO FAILED SAMPLES (4.96%)

iv. FATTY ACID PROFILING

Out of the 3920 samples analysed for fatty acid profiling, around 17.3% (680 samples) failed since the composition of fatty acids of tested samples did not match with specific oil type standards. The purity of edible oil samples is altered by mixing with other oil types. Maximum number of samples failed in Tamil Nadu followed by Uttar Pradesh [Figure 3J]. Among the oil types, Mustard oil reported the highest number of sample failures followed by Coconut oil [Figure 3K]. The examination of fatty acid profiles helps to identify the quality of the edible oil. Mis-match with the standard fatty acid profile is indicative of sub-standard

quality. Annexure-IX displays the distribution of failed oil types among the States/UTs.

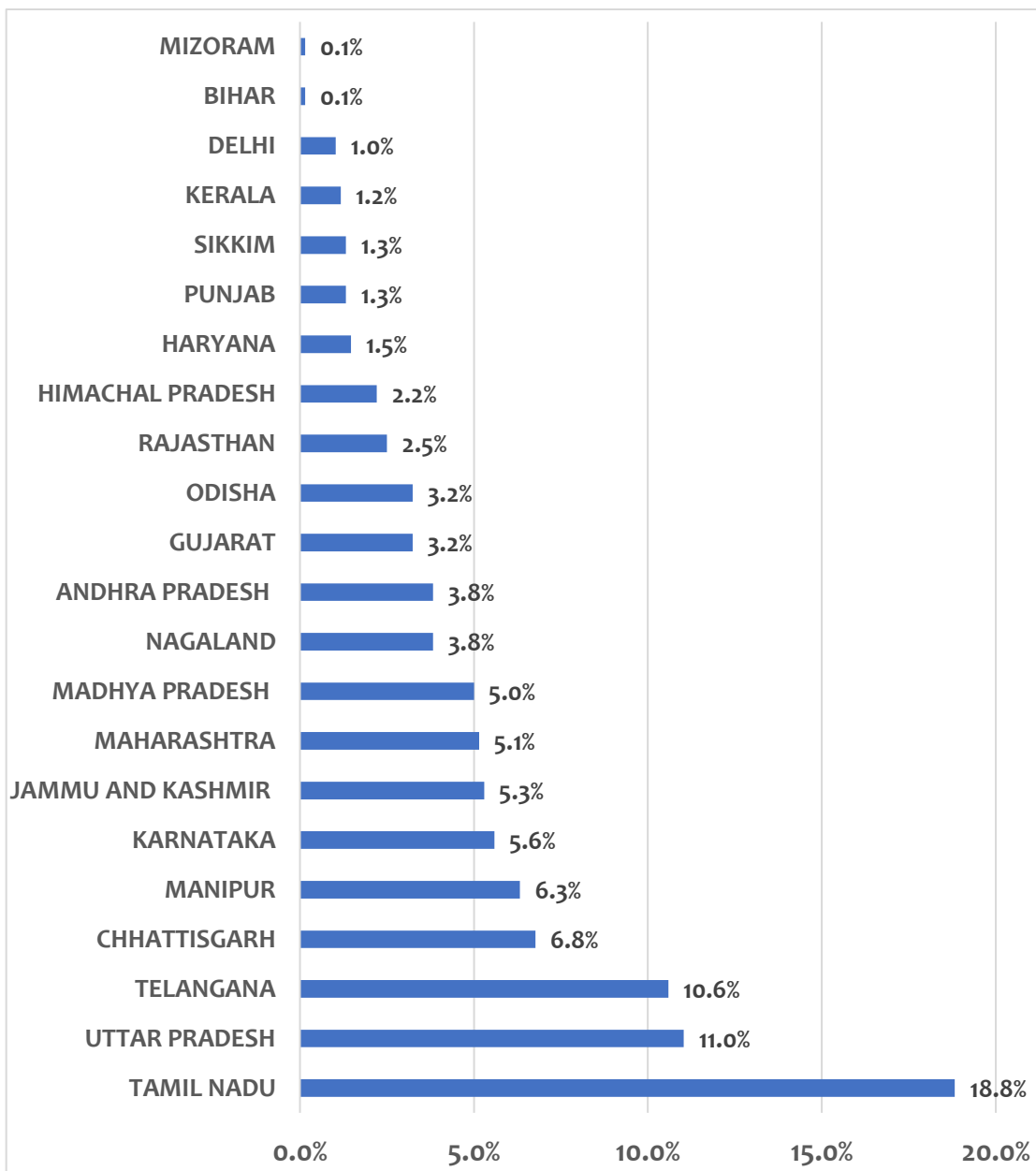


FIGURE 3J: FATTY ACID PROFILE-STATE / UT WISE CONTRIBUTION TO FAILED SAMPLES (17.3%)

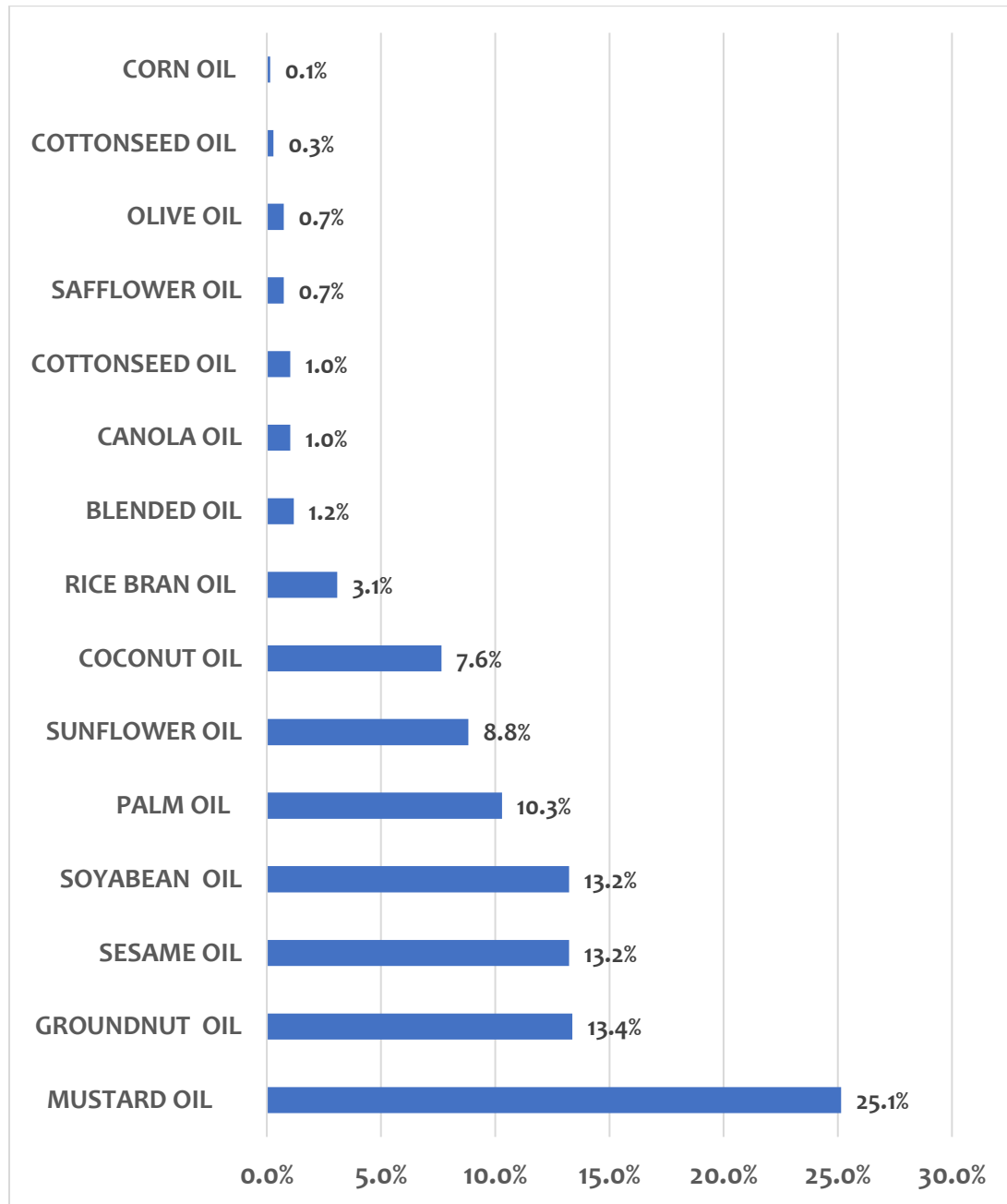


FIGURE 3K: FATTY ACID PROFILE-OIL TYPE WISE CONTRIBUTION TO FAILED SAMPLES (17.3%)

v. TEST FOR IODINE VALUE

Out of the 4297 samples analysed for Iodine Value, 5.42% (233 samples) failed, with maximum percentage of failure in Tamil Nadu (24.4%, 57 samples out of 233 failed samples) [Figure 3L]. Among the oil types, Mustard oil reported maximum failure in Iodine value [Figure 3M]. The iodine value measures the degree of unsaturation in fats and oils. Thus, higher the iodine value indicates higher level of unsaturation in given oil; which implies mixing with other oils. State / UT wise distribution of failed oil types is listed in Annexure-X.

Disclaimer: There is no congruence observed between the Refractive Index and the iodine value in few samples. Since the Iodine value is determined by titration method, there could be analytical errors and minor variations. It is to be noted that this Survey was conducted as a part of surveillance activity and not meant for regulatory/enforcement purposes.

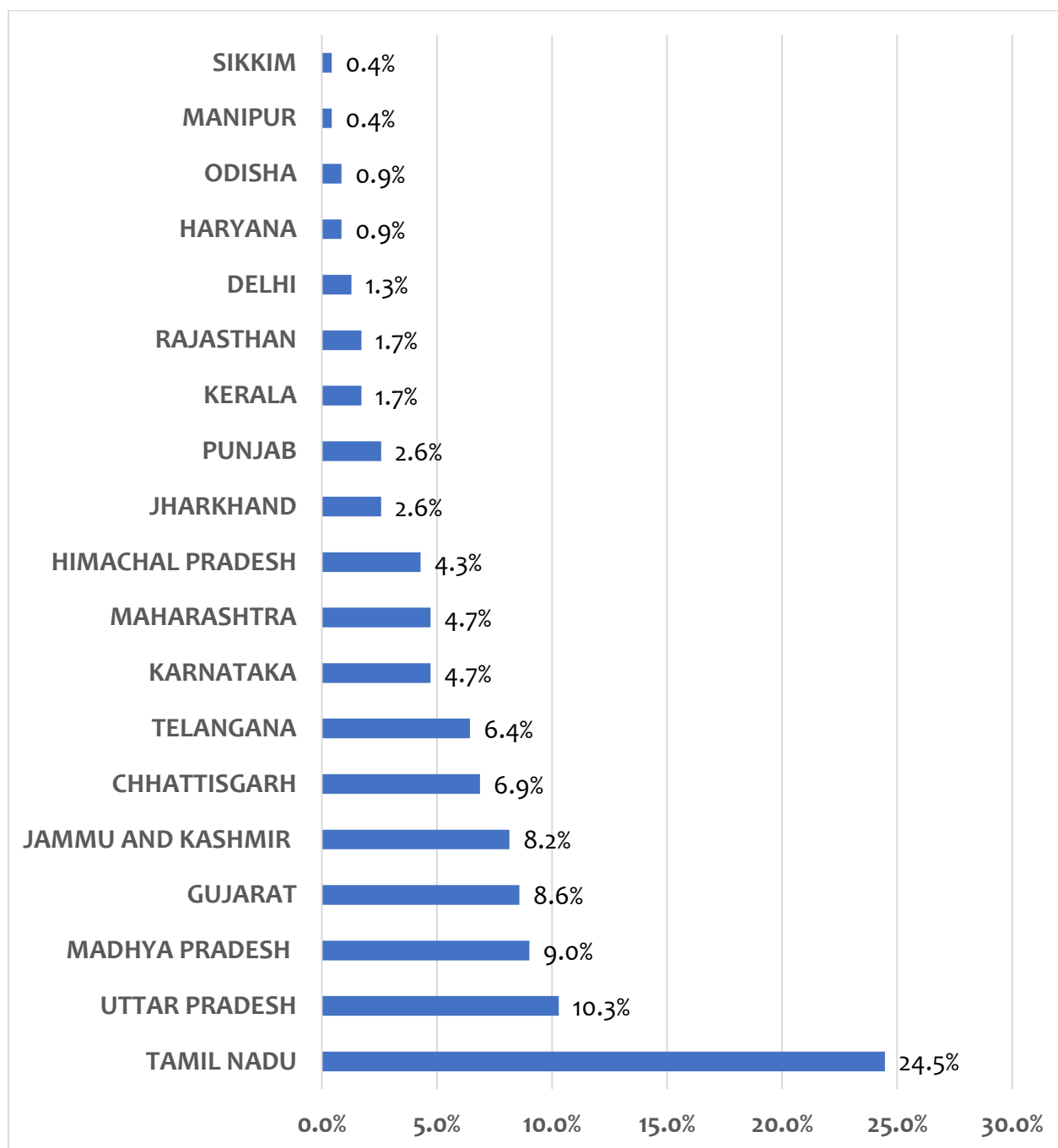


FIGURE 3L: IODINE VALUE-STATE / UT WISE CONTRIBUTION TO FAILED SAMPLES (5.42%)

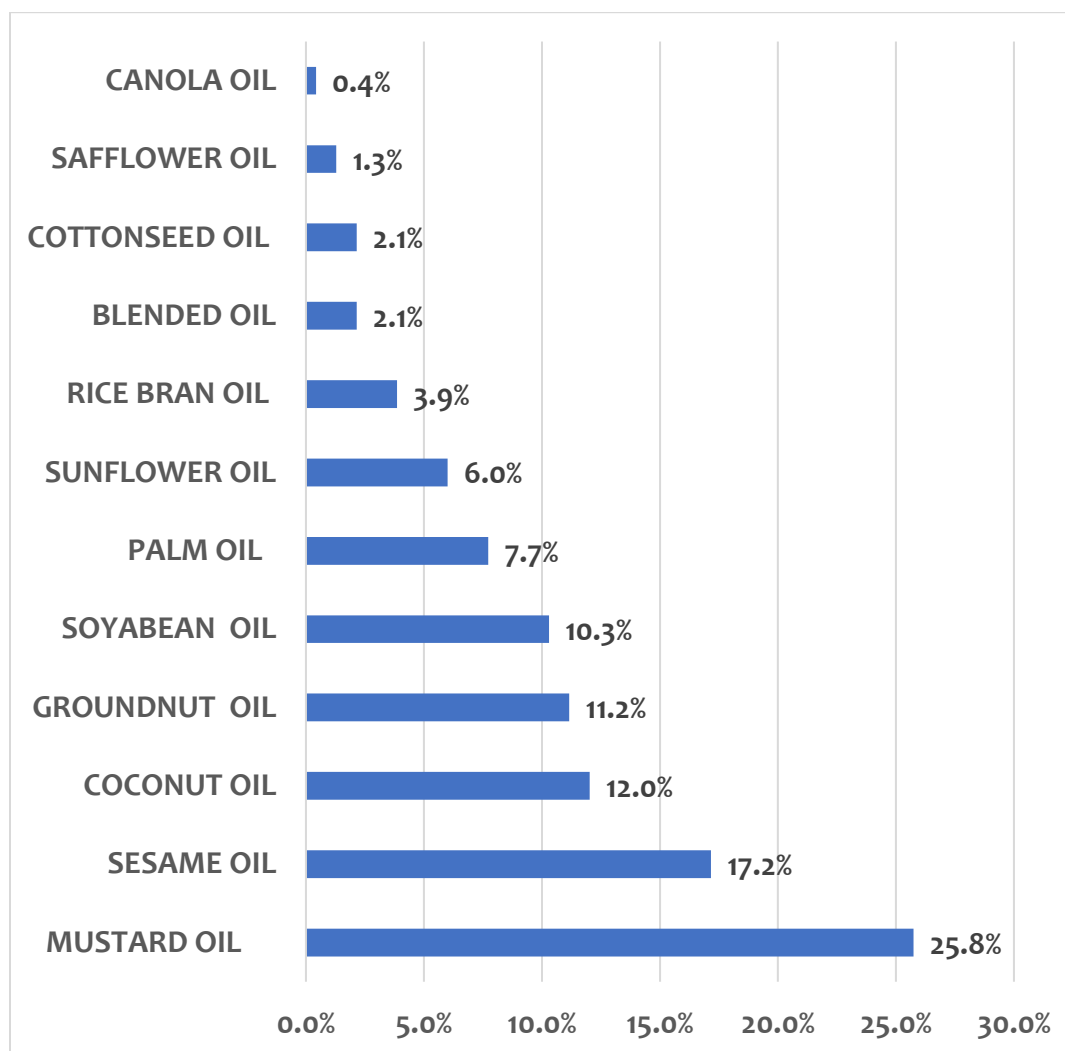


FIGURE 3M: IODINE VALUE- OIL TYPE WISE CONTRIBUTION TO FAILED SAMPLES (5.42%)

vi. **SAPONIFICATION VALUE**

Out of the 4299 samples analysed for the said parameter, 199 samples (4.63%) failed since they could not meet the requirements of FSSR. Among the States / UTs, maximum failures (13.6% i.e., 27 samples out of 199 failed samples) were reported for samples in Tamil Nadu [Figure 3N]. Among the oil types, Mustard oil (35.68% i.e., 71 samples out of 199 failed samples) reported maximum failure in saponification value [Figure 3O]. Each oil type has specific range of

saponification value, deviation from range indicates the presence of other oils.State / UT wise distribution of failed oil types is listed in Annexure-XI.

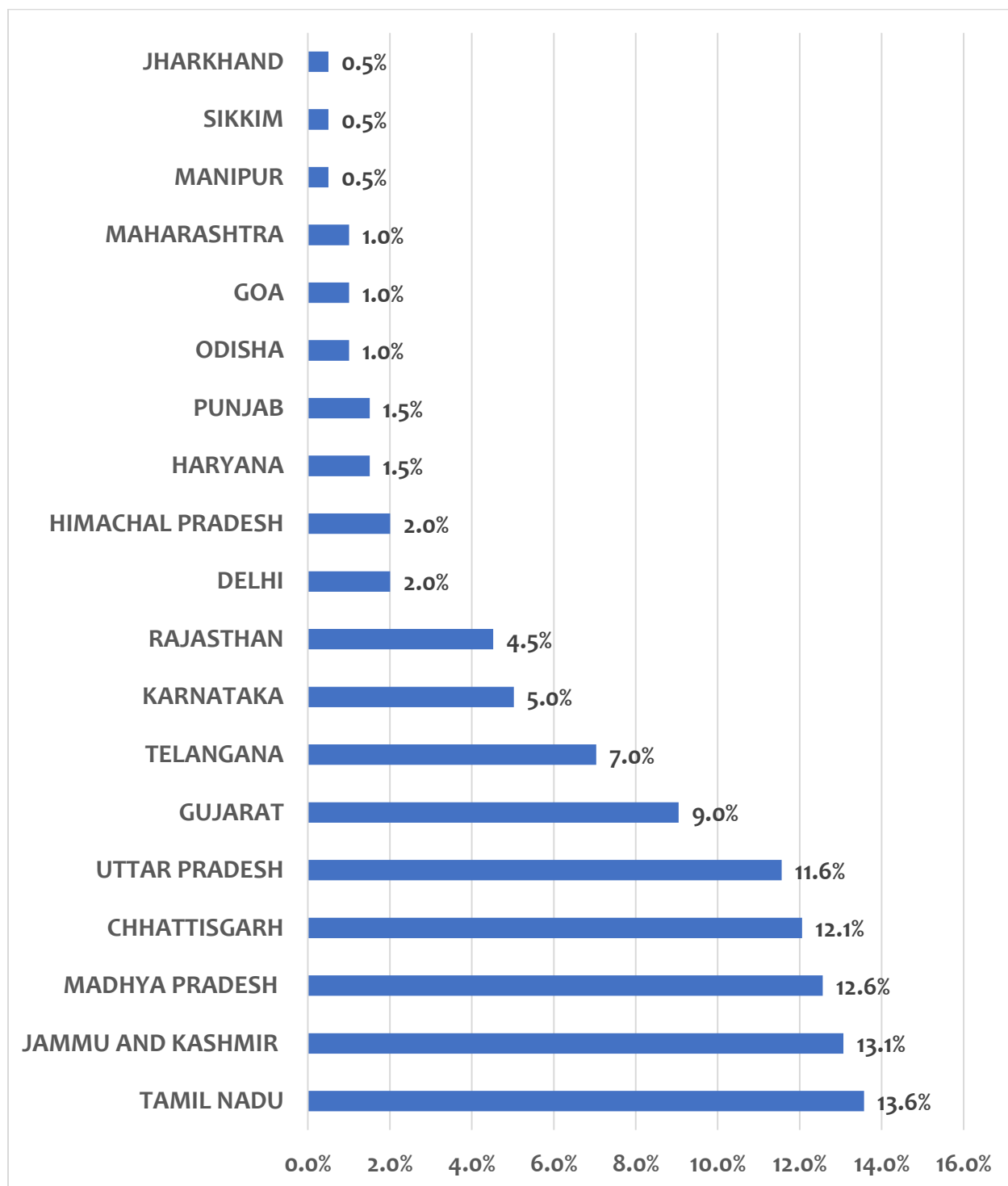


FIGURE 3N: SAPONIFICATION VALUE- STATE / UT WISE CONTRIBUTION TO FAILED SAMPLES (4.63%)

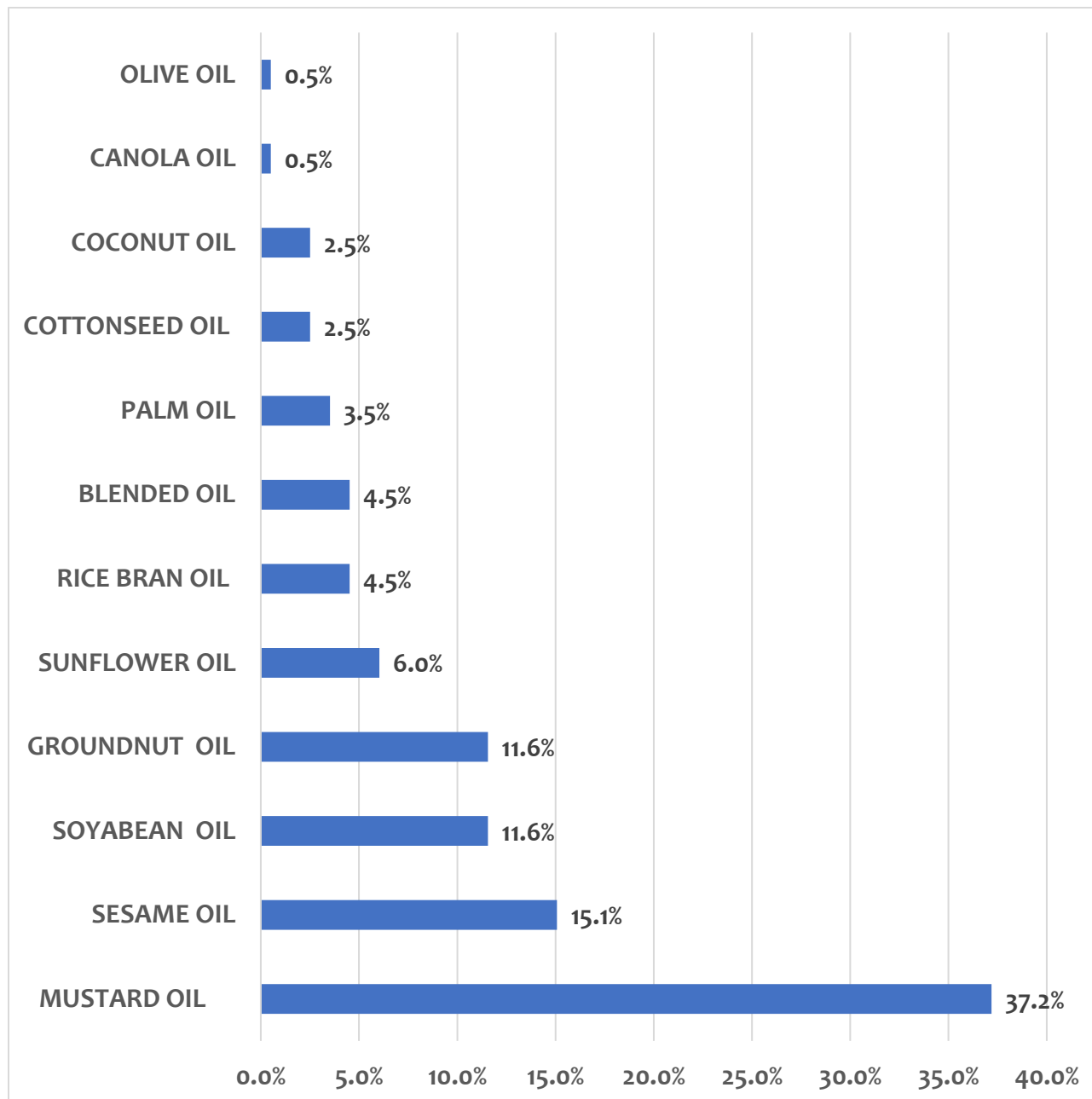


FIGURE 3O: SAPONIFICATION VALUE-OIL TYPE WISE CONTRIBUTION TO FAILED SAMPLES (4.63%)

vii. BELLIER TEST (TURBIDITY TEMPERATURE ACETIC ACID METHOD) (BT TEST)

Out of the 2190 samples analysed for BT Test, 75 samples (3.42%) failed to meet the specified criteria. Samples from 13 States / UTs failed in the BT test and

among them, maximum contribution to failed samples was from Maharashtra and Uttar Pradesh (16% i.e., 12 samples out of 75 failed samples). Mustard oil (52% i.e., 39 samples out of 75 failed samples) showed the maximum percentage of failed samples [Table-5]. BT range is specific for each oil-type; deviation from the specified range indicates adulteration with other kinds of fat. State/ UT wise distribution of failed oil types is listed in Annexure-XII. The Food Safety and Standards Authority of India (FSSAI) has removed the provisions for 'Bellier Test', used to find purity of edible vegetable oil since January 2021.

TABLE-5: BT TEST-STATE AND OILTYPE WISE SHARE IN FAILED SAMPLES (3.42%)

S NO	STATE/ UT	% OF FAILED SAMPLES	S NO	TYPE OF OIL	% OF FAILED SAMPLES
1	MAHARASHTRA	16.0%	1	MUSTARD OIL	52.0%
2	UTTAR PRADESH	16.0%	2	GROUNDNUT OIL	28.0%
3	GUJARAT	14.7%	3	SESAME OIL	10.7%
4	HIMACHAL PRADESH	10.7%	4	COTTONSEED OIL	4.0%
5	TAMIL NADU	9.3%	5	SAFFLOWER OIL	2.7%
6	JAMMU AND KASHMIR	8.0%	6	CANOLA OIL	1.3%
7	KARNATAKA	6.7%	7	EXTRA VIRGIN OLIVE OIL	1.3%
8	MADHYA PRADESH	5.3%		Grand Total	100%
9	RAJASTHAN	5.3%			
10	PUNJAB	4.0%			
11	DELHI	1.3%			
12	ANDHRA PRADESH	1.3%			
13	HARYANA	1.3%			
	Grand Total	100.0%			

viii. POLENSKE VALUE

Out of the 292 samples analysed for Polenske Value, 5 samples (1.71%) failed. Coconut Oil samples from Haryana, Karnataka, Odisha, Uttar Pradesh and Kerala failed in the test for Polenske Value. It is an indicator of how much steam volatile and water insoluble fatty acids can be extracted from fat through saponification. Every oil type has a specific Polenske Value. Deviation from the specified range indicate that oil as a sub-standard product.

ix. UNSAPONIFIABLE MATTER

Out of the 4299 samples analysed for Unsaponifiable matter, 75 samples (1.74%) failed to meet the requirements of FSSR. Among the States / UTs, maximum percentage of failure was reported in oil samples from Tamil Nadu (33% i.e., 25 samples out of 75 failed samples) and among the oil types, Mustard oil (40% i.e., 30 samples out of 75 failed samples) reported maximum failures [Table-6]. FSSAI prescribed specific limits for Unsaponifiable matter for all the edible oils, failing to meet the requirements is indicative of sub-standard product. State / UT-wise distribution of failed oil types is listed in Annexure-XV.

TABLE-6: UNSAPONIFIABLE MATTER-STATE AND OILTYPE WISE SHARE IN FAILED SAMPLES (1.74%)

STATE	% OF FAILED SAMPLES	OIL TYPE	% OF FAILED SAMPLES
TAMIL NADU	33.3%	MUSTARD OIL	40.0%
JHARKHAND	28.0%	SESAME OIL	18.6%
MADHYA PRADESH	17.3%	SOYBEAN OIL	10.7%
CHHATTISGARH	8.0%	GROUNDNUT	9.4%

UTTAR PRADESH	5.3%
GUJARAT	2.7%
ODISHA	2.7%
SIKKIM	1.3%
JAMMU AND KASHMIR	1.3%
GRAND TOTAL	100.0%

OIL	
RICE BRAN OIL	8.0%
SUNFLOWER OIL	4.0%
BLENDED OIL	4.0%
COCONUT OIL	2.7%
PALM OIL	2.7%
GRAND TOTAL	100.0%

x. TEST FOR PRESENCE OF MINERAL OIL

Out of the 4238 samples analysed for the presence of Mineral Oil, 25 samples failed (0.59%) as they tested positive for the presence of mineral oil. Significant percentage of failures was observed in Mustard oil (36% i.e., 9 samples out of 25 failed samples). Highest percentage failure for presence of mineral oil came from Haryana (52% i.e., 13 samples out of 25 failed samples). Annexure – XIII describes the failure percentage with respect to the State/ UT and oil type. Addition of mineral oil into edible oil can affect the health of consumer adversely.

xi. TEST FOR PRESENCE OF ARGEMONE OIL

Out of the 4433 samples analysed, presence of Argemone oil was noticed in 0.34% samples (i.e., 15 failed samples) with maximum percentage being from Haryana (86.67% i.e., 13 samples out of 15 failed samples). Among the oil types, Mustard oil had maximum failures (66.67% i.e., 10 samples out of 15 failed samples) having adulteration with Argemone Oil [Table-7]. Argemone oil is extracted from Argemone seeds. It is mixed with mustard oil or other edible oils to increase their quantity as it is cheaper in cost. Argemone oil is reported to cause glaucoma, dropsy and sometimes total blindness due to the presence of alkaloids.

TABLE-7: ARGEMONE OIL: STATE AND OILTYPE WISE SHARE IN FAILED SAMPLES (0.34%)

STATE & OIL TYPE	% OF FAILED SAMPLES	OIL TYPE	% OF FAILED SAMPLES
HARYANA	86.7%	MUSTARD OIL	66.7%
MUSTARD OIL	60.0%	RICE BRAN OIL	13.3%
RICE BRAN OIL	13.3%	PALM OIL	6.7%
SOYBEAN OIL	13.3%	SOYBEAN OIL	13.3%
JHARKHAND	6.7%	GRAND TOTAL	100.0%
MUSTARD OIL	6.7%		
GUJARAT	6.7%		
PALM OLEIN OIL	6.7%		
GRAND TOTAL	100.0%		

xii. TOTAL POLAR COMPOUNDS (TPC)

Out of the 3370 samples analysed for Total Polar Compounds, 11 samples (0.33%) failed in the test. 64% of failed samples (7 samples out of 11 failed samples) belonged to Madhya Pradesh followed by Chhattisgarh (27%, 3 samples out of 11 failed samples) and Jammu & Kashmir (9%, 1 sample out of 11 failed samples). Among the oil types, Soybean oil (5 samples out of 11 failed samples) was the most affected oil type as shown in Figure 3P. Presence of higher TPC% in the fresh/unused oil indicates mixing with used (heated) oil. The toxicity of these compounds has been associated with several diseases like hypertension, atherosclerosis, Alzheimer's, liver damage, etc.

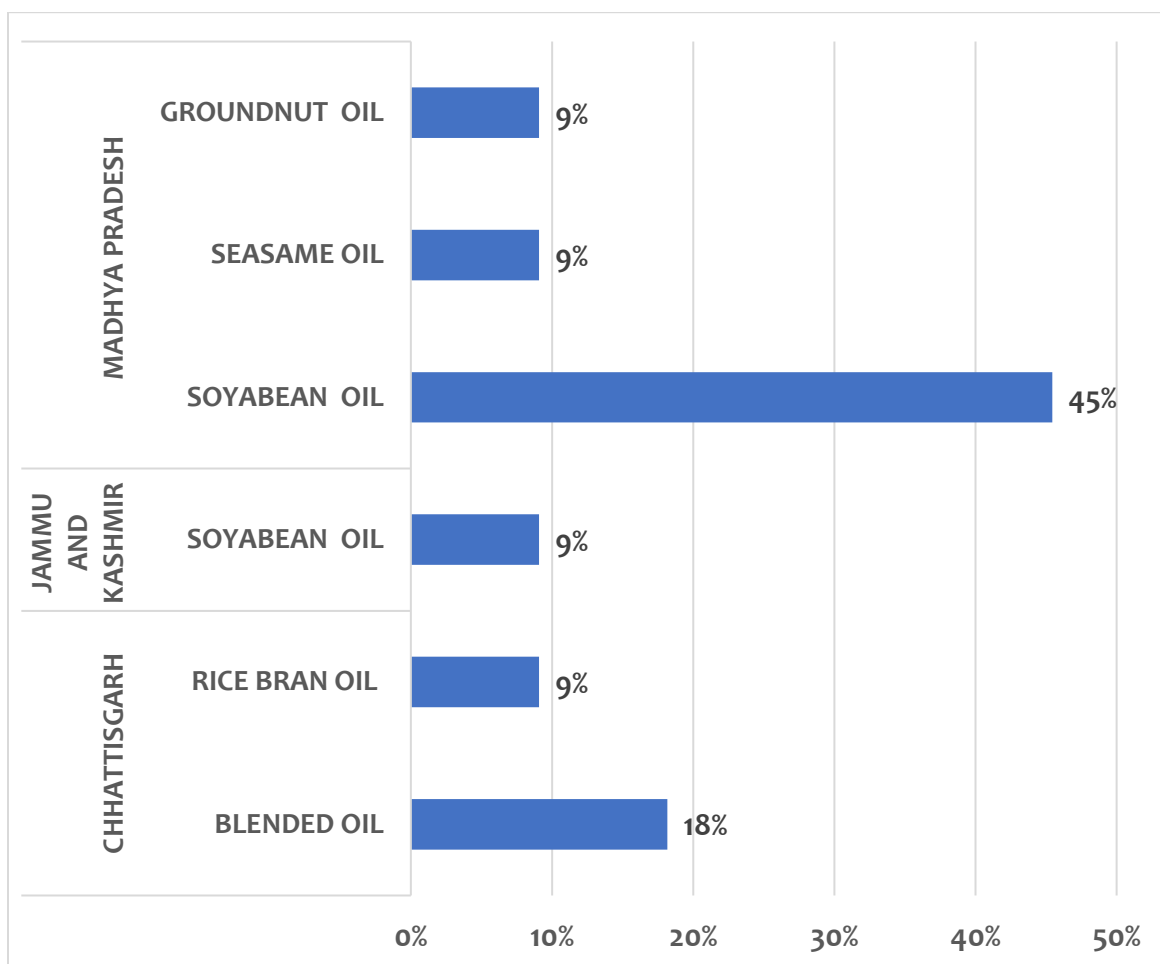


FIGURE 3P: TPC-STATE WISE AND OIL TYPE PERCENTAGE OF FAILURES (0.33%)

xiii. CLOUD POINT

Out of the 1490 samples analysed for Cloud Point, 4 samples (0.27%) failed. All failed samples came from Palm oil from Gujarat and UP (2 samples from each State). Every oil type has a specific cloud point; deviation from the specified range indicates the adulteration.

xiv. FLASH POINT

Out of the 1240 samples analysed for Flash Point, 2 samples (0.16%) failed in the test for Flash Point. One sample each of Sunflower oil and Blended oil from

Odisha State failed in the test. Every oil type is having a specific flash point and deviation from the specified ranges indicates adulteration.

xv. TEST FOR PRESENCE OF CASTOR OIL

Out of the 1538 samples analysed for the presence of Castor Oil, one sample (0.07%) of Blended oil from Haryana State failed for presence of Castor Oil. Mixing of edible oil with Castor Oil is generally done since it is a cheaper substitute. Castor oil cannot be blended with edible oil due to health risk to humans.

xvi. TEST FOR PRESENCE OF OLIVE RESIDUE OIL (POMACE) IN OLIVE OIL

Out of the 124 samples analysed for the presence of Pomace Oil, one sample (0.81%) of Olive Oil from Haryana failed. Extra Virgin Olive Oil is produced from the fruit of the olive. Pomace, on the other hand, is produced from the remains of the already spun pulp, so Pomace oil is cheaper than the Olive Oil.

3.2.2.2. SHELF-LIFE INDICATORS

i. ACID VALUE

Out of the 4442 samples analysed for Acid Value, 123 samples (2.77%) failed in the test. Samples from 16 States / UTs failed, and among them, maximum percentage of failed samples were from Tamil Nadu (28.5% i.e., 35 samples out of 123 failed samples). Rice Bran oil (37.4% i.e., 46 samples out of 123 failed samples) reported the maximum percentage of failed samples (Table-8). State / UT-wise distribution of failed oil types is listed in Annexure-XIV. It is a measure of the free fatty acids (FFA) present in the fat or oil. Free fatty acids are normally formed during decomposition of triglycerides. So, acid value gives an idea about the age of the oil. Rancid oil can develop harmful free radicals that cause long-term cell damage and potentially lead to the development of chronic diseases. FSSR has revised

the prescribed limits for Acid Values of Refined Edible oils from 0.5 to 0.6. However, since this Survey was conducted in August 2020, the samples were analysed for Acid Value based on the previous limit of 0.5)

TABLE-8: ACID VALUE-STATE AND OILTYPE WISE SHARE IN FAILED SAMPLES (2.77%)

S NO	STATE / UT	% OF FAILED
1	TAMIL NADU	28.5%
2	CHHATTISGARH	20.3%
3	UTTAR PRADESH	11.4%
4	MAHARASHTRA	8.9%
5	MADHYA PRADESH	8.1%
6	ANDHRA PRADESH	5.7%
7	TELANGANA	4.1%
8	GUJARAT	3.3%
9	JAMMU & KASHMIR	3.3%
10	JHARKHAND	1.6%
11	HIMACHAL PRADESH	1.6%
12	KARNATAKA	1.6%
13	KERALA	0.8%
14	NAGALAND	0.8%
	GRAND TOTAL	100.0%

S NO	OIL TYPE	% OF FAILED
1	RICE BRAN OIL	37.4%
2	BLENDED OIL	21.1%
3	PALM	11.4%
4	SESAME OIL	9.8%
5	SOYBEAN OIL	5.7%
6	GROUNDNUT OIL	4.9%
7	COTTONSEED OIL	3.3%
8	OTHER OIL	1.6%
9	COCONUT OIL	1.6%
10	SUNFLOWER OIL	1.6%
11	MUSTARD OIL	0.8%
12	OLIVE OIL	0.8%
	GRAND TOTAL	100.0%

ii. MOISTURE

Out of the 1427 samples analysed for the presence of Moisture, 32 samples (2.24%) failed. Among the five States which reported failure in test for moisture content, maximum percentage of failed samples were from Odisha 40.63% (13 samples out of 32 failed samples)[Figure 3Q]. Among the oil types, Rice Bran Oil (37.5% i.e., 12 samples out of 32 failed samples), followed by Palm oil (25% i.e., 8 samples out of 32 failed samples), Soya Bean oil (18.8% i.e., 6 samples out of 32 failed samples), Blended oil, coconut oil (6.3% i.e., each 2 samples out of 32 failed samples), Sunflower and Mustard oil (3.1% i.e., each 1 sample out of 32 failed samples) reported highest sample failure. Presence of higher moisture content in edible oils leads to many deteriorative changes affecting the quality and shelf life of the edible oils and hence has to be below the prescribed limit given in FSSR.

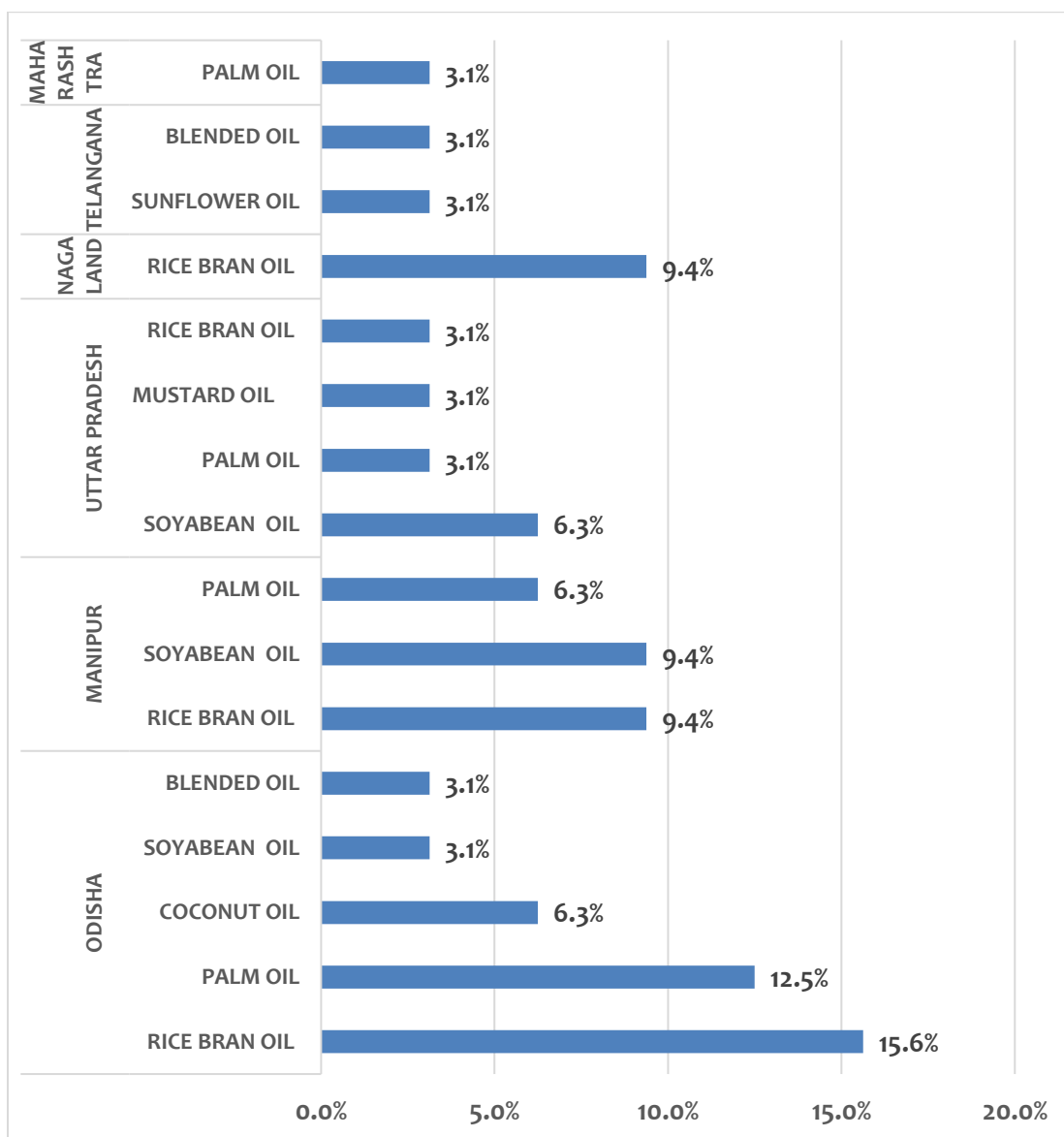


FIGURE 3Q: MOISTURE-STATE WISE AND OIL TYPE PERCENTAGE OF FAILURES (2.24%)

iii. **MOISTURE AND VOLATILE MATTER**

Out of the 1112 samples analysed for the presence of Moisture and Volatile Matter, 17 samples (1.53%) failed in meeting the requirements as per FSSR. Maximum percentage of failed samples are from Chhattisgarh & Telangana (35.3% i.e., 6 samples out of 17 failed samples in both States) followed by Tamil Nadu (17.6% i.e., 3 samples out of 17 failed samples), Uttar Pradesh and Madhya

Pradesh (5.9% i.e., 1 sample out of 17 failed samples in both States). Among the oil types, highest sample failures were found in oil types Rice Bran Oil (76.5% i.e., 13 samples out of 17 failed samples) [Table-9]. Presence of Moisture content and volatile matter above the prescribed limit affects the quality and shelf life of the oil.

TABLE-9: MOISTURE&VOLATILE MATTER – STATE/OILTYPE WISE SHARE IN FAILED SAMPLES (1.5%)

STATE/ OIL TYPE	% OF FAILED SAMPLES	OIL TYPE	% OF FAILED SAMPLES
CHHATTISGARH	35.3%	RICE BRAN OIL	76.5%
RICE BRAN OIL	23.5%	BLENDED OIL	17.7%
BLENDED OIL	11.8%	OLIVE OIL	5.9%
TELANGANA	35.3%	Grand Total	100.00%
RICE BRAN OIL	35.3%		
TAMIL NADU	17.7%		
RICE BRAN OIL	11.8%		
OLIVE OIL	5.9%		
UTTAR PRADESH	5.88%		
RICE BRAN OIL	5.9%		
MADHYA PRADESH	5.9%		
BLENDED OIL	5.9%		
Grand Total	100.0%		

iv. RANCIDITY

Out of the 4141 samples analysed for the test of rancidity, 1.04% (43 samples) failed, with maximum percentage of failed samples from Telangana (79.1% i.e., 34 samples out of 43 failed samples), followed by Gujarat (9.3% i.e., 4 samples out of 43 failed samples), Uttar Pradesh and Chhattisgarh (4.7% i.e., 2 samples out of 43 failed samples in both States) and Haryana (2.3% i.e., 1 sample out of 43 failed samples). Among the oil types, Palm oil (55.8% i.e., 24 samples out of 43 failed samples) reported maximum sample failure. Rancidification is the process of complete or incomplete oxidation or hydrolysis of fats and oils when exposed to air, light, or moisture or by bacterial action, resulting in unpleasant taste and odour, thus poor quality. State/ UT wise distribution of failed oil types is listed in Annexure-XVI.

v. OLEIC ACID

Out of the 625 samples analysed for the presence of Oleic Acid, 5 samples (0.8%). All failures were from Gujarat and the affected oil types were Cottonseed Oil (40% i.e., 2 samples out of 5 failed samples) and one each of Groundnut Oil, Sesame Oil and Palm Oil. The Oleic Acid content of edible oil is an important parameter for indication of its quality. It determines the level of rancidity in oil and gets higher with prolonged storage and transportation. It also has safety concerns as rancid oil can develop harmful free radicals that cause long-term cell damage and potentially lead to the development of chronic diseases.

vi. PEROXIDE VALUE

Out of the 926 samples analysed for peroxide Value, 2 samples (0.22%) failed in the Country, coming from only Goa State in Mustard oil. Concentration of peroxide in an oil or fat is useful for assessing the extent to which spoilage has advanced.

3.2.2.3.ADDITIVES

Dimethylpolysiloxane (DMPS), Butylated Hydroxyanisole(BHA) and Tert-Butylhydroquinone (TBHQ) are added as additives (anti-oxidants) in edible oil. However, these additives were found at higher level than the prescribed FSSR limits as in certain oil types. The Additives are generally added to the edible oils to prevent oxidation of oil in order to avoid its deterioration.

i. DIMETHYLPOLYSILOXANE (DMPS OR POLYMETHYLSILOXANE OR DIMETHICONE) (FOOD ADDITIVE)

Out of the 351 samples analysed for the presence of DMPS, 11 oil samples (3.13%) failed. All the failure came from Uttar Pradesh. Maximum number of samples belong to Mustard oil (54.55% i.e., 6 samples out of 11 failed samples) followed by Sunflower oil (27.27% i.e., 3 samples out of 11 failed samples), Blended oil and Rice Bran Oil (each contributing 9.09% i.e., 1 sample out of 11 failed samples) as shown in Figure 3R. Dimethylpolysiloxane is an anti-foaming agent added to oil to prevent it from bubbling up when frozen ingredients are added, so as to improve the safety and quality of the product. FSSAI has prescribed a specific limit for this food additive since consumption of this additive in high concentration may be deleterious to human health in the long run.

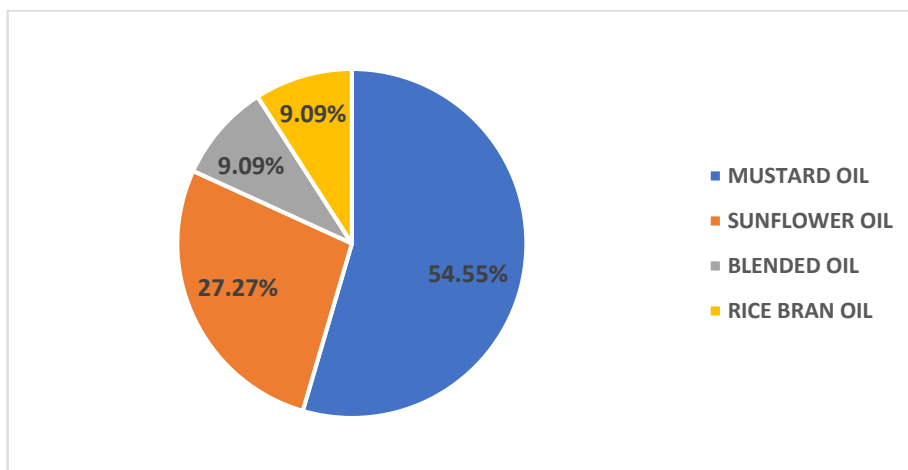


FIGURE 3R: OIL TYPES FAILED IN DMPS (3.13%)

ii. Tert-BUTYLHYDROQUINONE (TBHQ, TERTIARYBUTYLHYDROQUINONE)

Out of the 1831 samples analysed for the presence of TBHQ, 5 samples (0.27%). One sample from Haryana (Blended oil), 2 samples from Uttar Pradesh (Blended and Ground Nut oil) and 2 samples from Karnataka (Rice bran oil and Sun flower oil) failed in the test for TBHQ. In food products, primary advantage of addition of TBHQ is to extend the shelf life. It is a preservative for unsaturated edible oils and prevents discoloration even in the presence of iron and does not alter the flavor or odor of the material to which it is added. However, prolonged high consumption of TBHQ can have potential health risks to humans.

iii. BUTYLATED HYDROXYANISOLE (BHA)

Out of the 1335 samples analysed for the presence of BHA, total 3 samples failed (0.22%). The failure in BHA content came from the 2 samples picked up in Rajasthan (Ground Nut oil and Coconut oil) and 1 sample picked up in Madhya Pradesh (Mustard Oil). BHA is added to edible fats and fat-containing foods due to its antioxidant properties. It also prevents rancidification of food since rancidity creates objectionable odors. However, BHA is a known carcinogen and any excessive amount beyond the prescribed FSSR limit can be harmful.

3.2.2.4. OTHER DEFECTS**i. ORYZANOL TEST**

Out of the 1788 samples analysed for the presence of Oryzanol, 93 samples (5.2%) failed to meet the criteria. This 93 samples comprised of other oil types where the oryzanol content was observed (Annexure XXIV). While 30 samples out of 93 failed samples came from Rice Bran Oil which failed to meet the minimum required quantity of Oryzanol content [Table-10]. Rice Bran Oil is popularly known to be a heart-friendly oil which helps in lowering cholesterol because of the huge amounts of Oryzanol

present in it. If Oryzanol is not present as per the specified limit, it means that the oil is of lower quality.

TABLE-10: TEST FOR ORYZANOL–STATESWHERE RICE BRAN OIL FAILED TO MEET THE MINIMUM SPECIFIED LIMIT OF ORYZANOLCONTENT (32.25%) OUT OF 93 FAILED SAMPLES.

STATE/ UT	% CONTRIBUTION TO FAILED	NUMBER OF FAILED SAMPLES
RAJASTHAN	30.00%	9
TELANGANA	16.67%	5
UTTAR PRADESH	13.33%	4
MADHYA PRADESH	13.33%	4
HIMACHAL PRADESH	10.00%	3
ANDHRA PRADESH	6.67%	2
TAMIL NADU	6.67%	2
JAMMU AND KASHMIR	3.33%	1
Grand Total	100.00%	30

ii. ALLYLISOTHIOCYANATE (AITC) CONTENT IN MUSTARD OIL

Out of the 1093 samples analysed for Allyl isothiocyanate (AITC) content in mustard oil, 19 Mustard oil samples (1.74%) from eight States failed. The maximum failure was observed in Uttar Pradesh (42.11% i.e., 8 samples out of 19 failed samples). Break-up of failure is shown in Figure 35. Allyl isothiocyanate is responsible for the pungent flavour of mustard oil. 'Kacchi Ghani'/cold pressed mustard oil is expected to be rich in Allyl isothiocyanate which is naturally present in mustard oil. FSSAI has defined the specifications for Allyl isothiocyanate for both chemically refined and cold pressed oils and deviation from the specifications indicates the poor quality oil or adulteration.

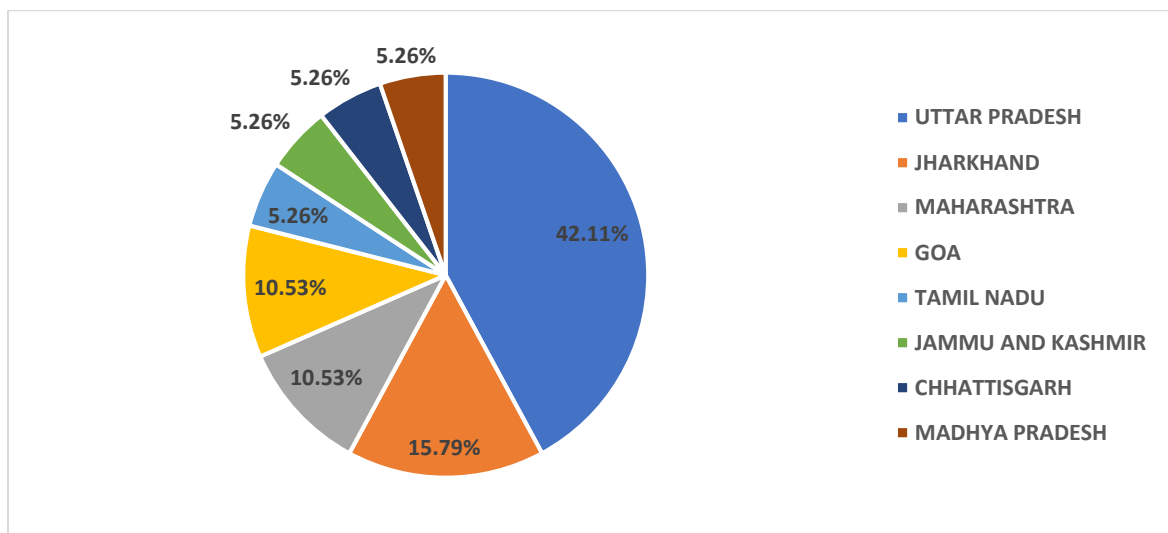


FIGURE 35: STATE / UT-WISE % OF TOTAL SAMPLES FAILED FOR ALLYLISOTHIOCYANATE (1.74%)

iii. PHOSPHORUS (MINERAL)

Out of the 749 samples analysed for Phosphorus content, 11 samples (1.47%) failed, out of which maximum percentage of failed samples were from Manipur (55% i.e., 6 samples out of 11 failed samples) [Figure 3T] followed by Nagaland (27.27% i.e., 3 samples out of 11 failed samples). All failure in high phosphorus content was from Soybean Oil. Phosphorus may appear in edible oil during the refining process and determines the stability of edible oils especially Soybean Oil.

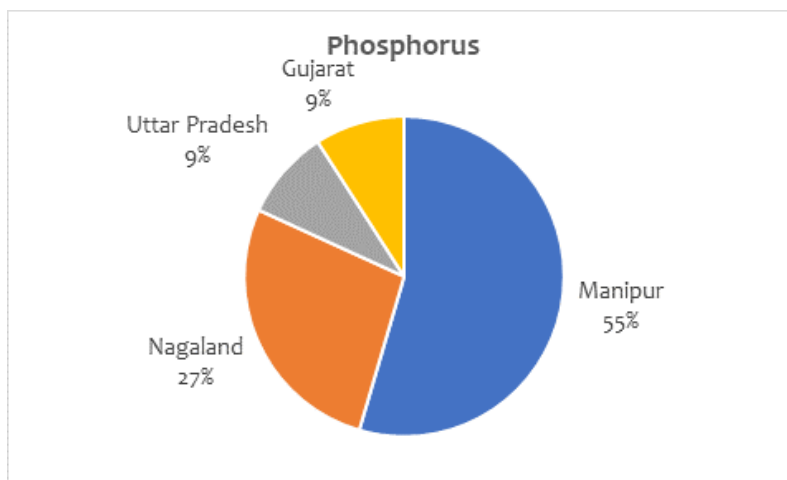


FIGURE 3T: PHOSPHORUS-OIL TYPE-WISE CONTRIBUTION TO FAILED SAMPLES (1.47%)

iv. IRON (MINERAL)

Out of the 411 samples analysed for Iron content, failure was observed in 2 samples (0.49%), one each of olive oil and extra virgin olive oil samples from Uttar Pradesh. Iron is a mineral essentially required for body functions. Although the human body absorbs only required amounts of iron, regular intake of high amounts of iron may lead to iron toxicity.

v. PHYSICAL EXAMINATION OF OIL

Out of the 4281 samples analysed for Physical Examination, 22 samples (0.51%) failed, as they did not meet the criteria upon visual examination (Table-11).

TABLE-10: PHYSICAL EXAMINATION-STATE AND OILTYPE WISE SHARE IN FAILED SAMPLES

State name/ Oil Type	% of failed samples	Oil Type	% of failed samples
KERALA	59.09%	SESAME OIL	36.36%
SESAME OIL	36.36%	COCONUT OIL	18.18%
COCONUT OIL	18.18%	MUSTARD OIL	18.18%
RICE BRAN OIL	4.55%	GROUNDNUT OIL	4.55%
GUJARAT	31.82%	SUNFLOWER OIL	4.55%
MUSTARD OIL	18.18%	SOYBEAN OIL	4.55%
COTTONSEED OIL	4.55%	COTTONSEED OIL	4.55%
SOYBEAN OIL	4.55%	RICE BRAN OIL	4.55%
PALMOIL	4.55%	PALM OIL	4.55%

ODISHA	4.55%
SUNFLOWER OIL	4.55%
MADHYA PRADESH	4.55%
GROUNDNUT OIL	4.55%
Grand Total	100.00%

Grand Total	100.00%
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vi. INSOLUBLE IMPURITIES

Out of the 872 samples analyzed for insoluble impurities, 1 sample(0.11%) failed and the failures were observed in Coconut oil from Tamil Nadu. Insoluble impurities in edible oils are determined by the presence of dirt, minerals, resins, oxidized fatty acids, alkaline soaps of Palmitic and Stearic acids, and proteins that are suspended in the oil. Impurities can negatively influence the taste and smell of the oil as well as its appearance, thus reducing consumer acceptance and marketability.

vii. SUSPENDED AND OTHER FOREIGN MATTER, SEPARATED WATER, ADDED COLOURING OR FLAVOURING SUBSTANCES

Out of the 4278 samples analyzed for the test for the presence of suspended and other foreign matter, separated water, added coloring or flavoring substances, 3samples (0.07%) coming from Gujarat (Soybean Oil, Mustard Oil) and Telangana (Palm Oil) failed. The process, time, temperature, light, air, exposed surface, moisture, nitrogenous organic material, traces of metals, adulteration are the factors responsible for the presence of suspended and other foreign matter, separated water, added colouring or flavouring substances, thus affecting the quality of the product.

3.2.3. MISBRANDING

Failure to meet the minimum levels of vitamins (Vitamin A, Vitamin D2 and Vitamin D3) in fortified oil samples as well as non-compliance to meet the

labelling requirements as per FSSR accounted for majority of sample failures under the category of Misbranding/ Mislabelling (Figure 3U). All the non-compliant samples failed to meet the minimal requirements of fortificants prescribed in FSSR. However, none of the non-compliant samples exceeded the maximum limit of fortificants prescribed for edible oils. Maximum failures were reported in Mustard Oil samples from Uttar Pradesh and Telangana.

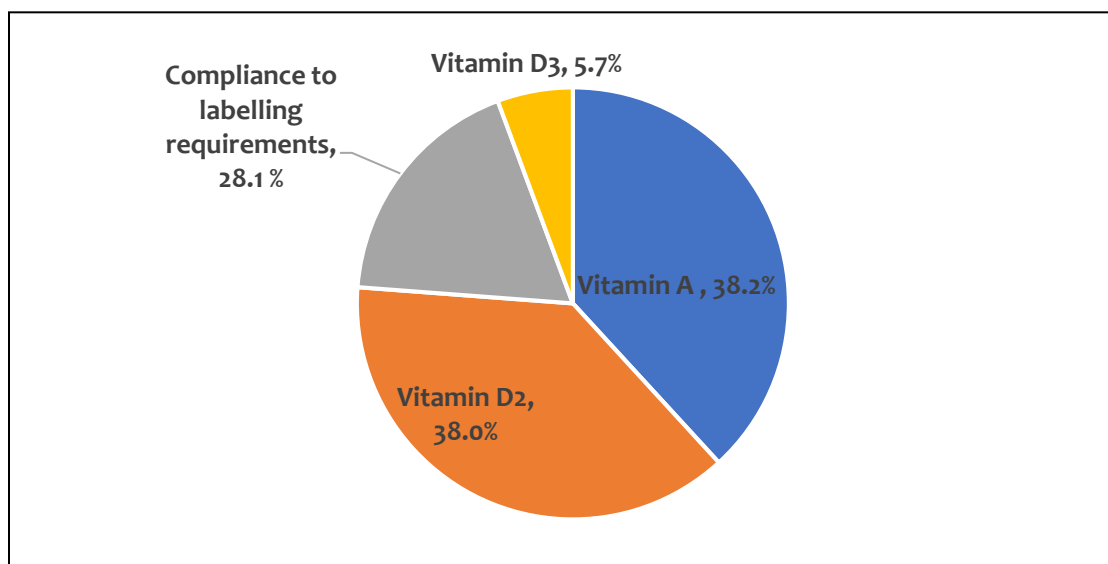


FIGURE 3U: VITAMINS A&D: STATE WISE CONTRIBUTION OF FAILED SAMPLES

3.2.3.1. FORTIFICANT LABELS

i. VITAMIN A

Out of the 1197 samples analysed, more than 18.05% (216 samples) failed to meet the label claim of Vitamin A. Maximum share of failed samples was from Uttar Pradesh (165 samples out of 216 failed samples) followed by Karnataka (41 samples out of 216 failed samples), Madhya Pradesh (5 samples out of 216 failed samples), Chhattisgarh (3 samples out of 216 failed samples) and Gujarat (2 samples out of 216 failed samples) as indicated in Figure 3V. Maximum samples failure came from Mustard oil (78 samples out of 216 failed

samples) as depicted in Figure 3W. State/ UT wise distribution of failed oil types is listed in Annexure-XIX.

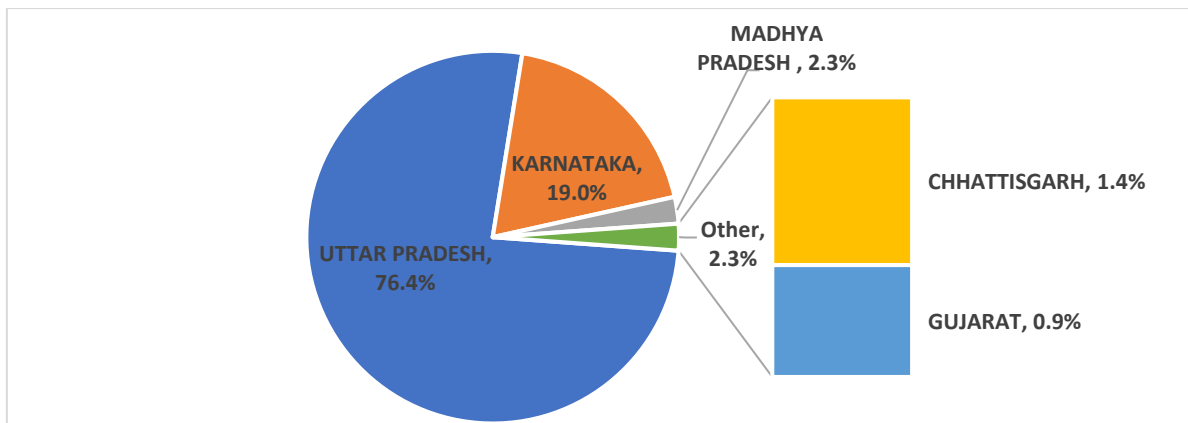


FIGURE 3V: VITAMIN A: STATE WISE CONTRIBUTION OF FAILED SAMPLES (18.05%)

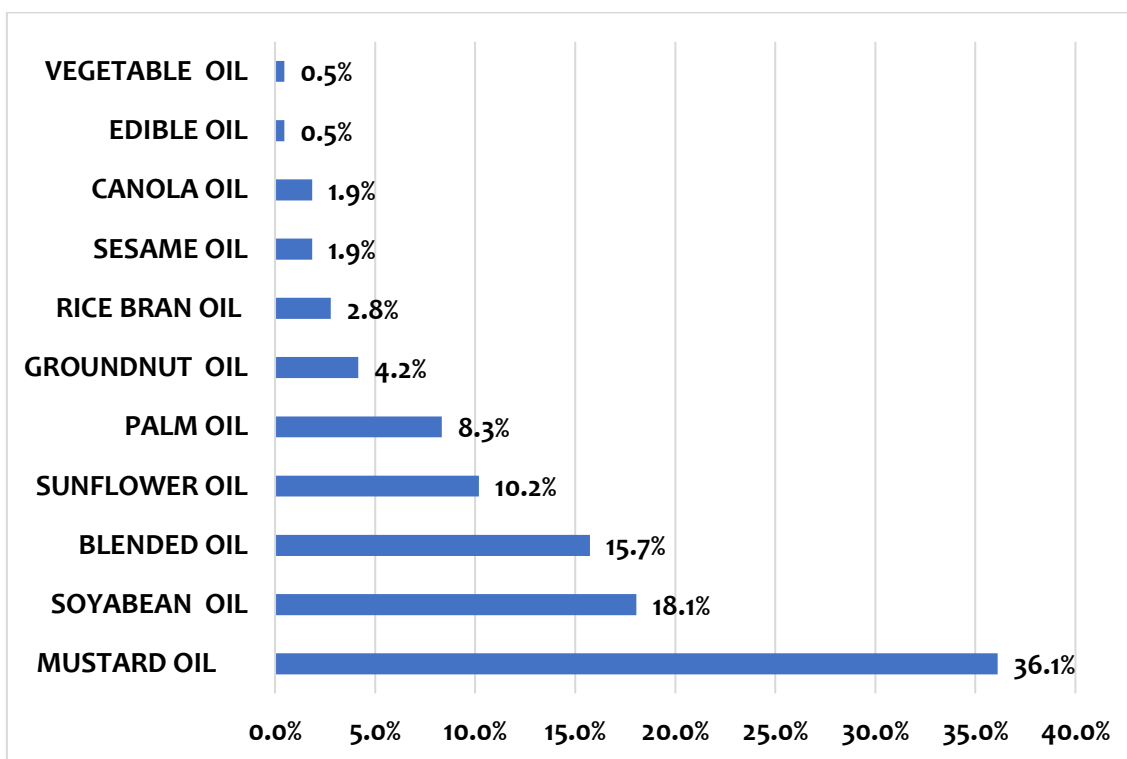


FIGURE 3W: VITAMIN A: OIL TYPE WISE % OF FAILED SAMPLE (18.05%)

ii. VITAMIN D₂

17.96% (203) of analysed samples (1130) failed to meet the label claim of Vitamin D₂. Maximum contribution was from Uttar Pradesh (84.24% i.e., 171 samples out of 203 failed samples), followed by Karnataka (8.87% i.e., 18 samples out of 203 failed samples), Madhya Pradesh (3.45% i.e., 7 samples out of 203 failed samples), Chhattisgarh (1.97% i.e., 4 samples out of 203 failed samples), Gujarat (0.99% i.e., 2 samples out of 203 failed samples) and Kerala (0.49% i.e., 1 sample out of 203 failed samples). Maximum failure was in Mustard Oil (38.42% i.e., 78 samples out of 203 failed samples). More than 90% of samples failed for Vitamin D₂ are same as those were for Vitamin A. State/ UT wise distribution of failed oil types is listed in Annexure-XX.

iii. VITAMIN D₃

2.67% (12 samples) of analysed samples (449) failed to meet the label claim of Vitamin D₃. Out of these, maximum failure contribution to meet this label requirement was from Uttar Pradesh (41.67% i.e., 5 samples out of 12 failed samples) followed by Madhya Pradesh (25% i.e., 3 samples out of 12 failed samples), Chhattisgarh and Gujarat (16.67% i.e., 2 samples out of 12 failed samples from both States). The failure was highest reported in blended oil and Soybean oil (each contributing 33.33% i.e., 4 out of 12 failed samples).

3.2.3.2. LABELLING REQUIREMENTS

Overall, 8.60% (364) samples out of 4233 samples failed to meet the labeling requirements as specified by FSSR. Among the failures, maximum percentage is from Telangana (31.04% i.e., 113 samples out of 364 failed samples) followed by Chhattisgarh (16.76% i.e., 61 samples out of 364 failed samples), Uttar Pradesh (14.84% i.e., 54 samples out of 364 failed samples) and other states as shown in Figure 3X. The oils that failed in the generic labelling requirement were in the order of Mustard oil (25.55% i.e., 93 samples out of 364 failed samples), blended (12.91% i.e., 47 samples out of 364 failed samples), sunflower (11.26% i.e., 41 samples out of 364 failed samples) followed by other oil types.

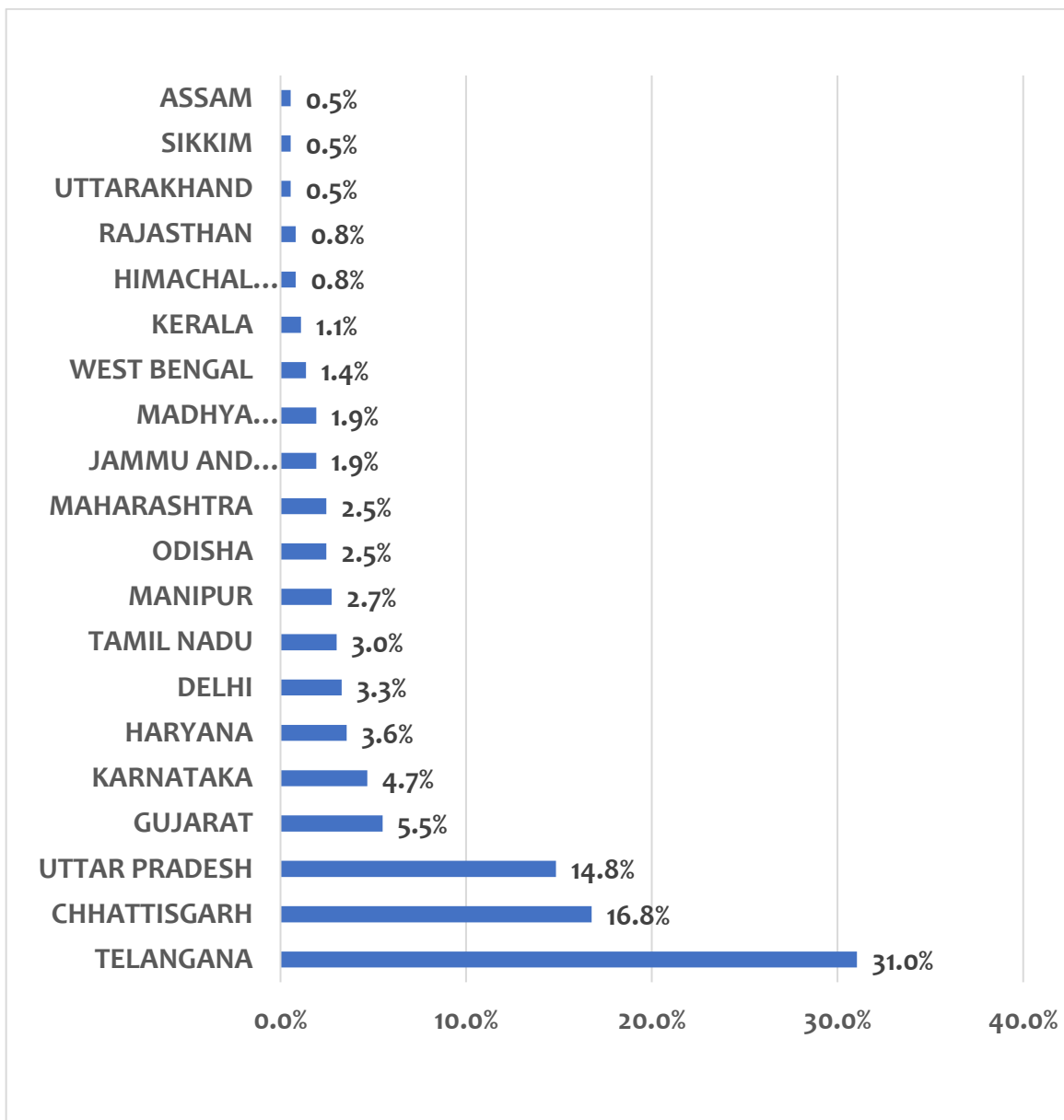


FIGURE 3X: LABEL CLAIM–STATE / UT WISE % OF FAILED SAMPLES (8.6%)

3.3. OIL TYPE WISE STUDY

Among the oil types, maximum number of failed samples were observed in Mustard oil (379 samples failed out of 1302 samples analyzed); followed by Soybean Oil (168 out of 733); Blended Oil (134 out of 484); Groundnut Oil (132 out of 304); Sesame Oil

(125 out of 281); Palm Oil (118 out of 306); Sunflower Oil (108 out of 457); Rice Bran Oil (105 out of 218); Coconut Oil (66 out of 195); Cottonseed Oil (11 out of 80); Other Oils (10 out of 42); Canola Oil (9 out of 32); Safflower Oil (5 out of 10); Corn Oil (1 out of 15); no sample was failed for Flax seed oil (0 out of 2 samples). The percentage failure of oil types is provided in Annexure- XXIII. List of number of samples of each oil type failed in each state is given in Annexure-XXII.

3.4. COMPARISON OF 2019 OIL SURVEY WITH CURRENT 2020 SURVEY (ONLY FOR DELHI NCR REGION)

A pilot scale edible oil survey was conducted in Delhi NCR in 2019 by Consumer Voice (a Non-profit Organization) which looked into safety and quality issues in oils like Mustard Oil, Extra Virgin Olive Oil and Coconut Oil. However, in 2020 National edible oil survey, Mustard oil, blended oil, soybean oil, groundnut oil, sesame oil, palm oil, rice bran oil, sunflower oil and canola oil were picked up by the FSOs from Delhi NCR. Therefore, it was felt to do a comparison of Mustard oil which was common edible oil for both 2019 and 2020 surveys. A comparison of result involving common parameters that were analyzed for mustard oil is given below:

Table 11: Comparison of survey results (2019 and 2020) for the analysis of Mustard Oil only for Delhi region.

S. No.	Parameters	2019		2020	
		Number of samples analysed	Number of samples Failed (% failure indicated in Parenthesis)	Number of samples analysed	Number of samples Failed(% failure indicated in Parenthesis)
1.	Acid Value	439	0 (0%)	30	0 (0%)

2.	Test For presence of Mineral Oil (Holdes Test)	439	0 (0%)	30	0 (0%)
3.	Trans-Fatty Acids	438	1 (0.23%)	30	0 (0%)
4.	Iodine Value	438	1 (0.23%)	30	1 (3.33%)
5.	Test for Oryzanol	381	58 (15.22%)	30	1 (3.33%)
6.	Refractive index at 40°C	390	49 (12.56%)	30	0 (0%)
7.	Butyro-Refractometer reading at 40°C	390	49 (12.56%)	30	3 (10%)
8.	Saponification Value	418	21 (5.02%)	30	3 (10%)
9.	Fatty Acid Profile	353	86 (24.36%)	30	4 (13.33%)

4. KEY FINDINGS

- i. Among the four regions of the Country, maximum percentage of samples failed from South (43% i.e., 425 failed samples out of 971 samples drawn) followed by North, East and West.
- ii. The top 5 States with maximum non-compliance are Nagaland, Manipur, Telangana, Andhra Pradesh and Uttar Pradesh in order.
- iii. 100% compliance was observed in 183 districts (31% of 591 districts and metros), while none of the samples from 21 districts were found to be compliant. These non-compliant districts belong to the States of Uttar Pradesh, Tamil Nadu, Telangana, Nagaland, Manipur, Karnataka and Haryana.
- iv. The top five non-compliant oil-types out of 1371 failed samples were Mustard Oil, Soybean Oil, Blended Oil, Groundnut Oil and Palm Oil.
- v. The findings of the survey pertaining to safety and misbranding are discussed below:

Safety Parameters: Only 2.42% (108 samples) were found to be unsafe. Aflatoxins were detected in Groundnut and Coconut oil samples from Tamil Nadu and Karnataka. Incidence of Pesticide residues and heavy metals above prescribed limits were observed in commonly consumed oils like Mustard oil in the North and Ground nut oil in the South. It is pertinent to mention that most of these oil types were either cold-pressed or filtered. The procedures used for the extraction and refining of edible vegetable oils can be effective in reducing Aflatoxins, varying with the type of oil and method of oil refining. However, the available data of this survey does not lead to any conclusive inference in support of this fact. Further, it was interesting to observe in the data that the pesticide residues detected in edible oils manufactured through refining process (solvent extraction) had slightly lower values as compared to their cold-pressed counterparts; this may be validated further through extensive research.

Quality Parameters: About 24.21% (1080) of samples failed in major Quality indicators like Refractive Index, BR reading, Fatty Acid Profile, Saponification Value, and Iodine value, indicating adulteration with cheaper substitutes. In the test for Total Polar Compounds, maximum samples of Soybean Oil failed, which indicates mixing of used oil with fresh oil. Majority of samples failed for Acid value (more shelf life claimed than the actual), Moisture (major factor affecting the shelf life), Unsaponifiable matter (cheaper oil quality) and Rancidity (Stale oil), implying that rancid and long stored oils are an issue of concern. Except for few States / UTs, sale of sub-standard oils was observed across the country, Mustard oil being the most affected oil type.

Misbranding: Failure to meet the minimum levels of vitamins (A, D₂ and D₃) accounted for majority of sample failures in fortified oil samples under the category of Misbranding. Maximum failures were reported in Mustard Oil samples from Uttar Pradesh and Telangana. Significant number of samples also failed to meet the labelling requirements.

5. CONCLUSION

All India Edible Oil survey 2020 was carried out with the aim to check the safety and quality of edible oils sold in the Country. Out of the 4461 samples tested, ~69% were found to be compliant in all respects while the remaining 31% were non-compliant with one or more parameters. The survey results broadly categorized into Safety, Quality and Misbranding indicated failures of 2.42% in terms of safety, 24.21% in terms of Quality and 12.82% in terms of Misbranding. The 5 States / UTs that reported maximum percentage of sample failures are Nagaland, Manipur, Telangana, Andhra Pradesh and Uttar Pradesh, while Meghalaya, Tripura, Arunachal Pradesh and Andaman & Nicobar were the best performing States / UTs with 100% compliance to FSSR. Among the oil types, Mustard Oil reported maximum sample failures followed by Soybean Oil, Blended Oil, Groundnut Oil and Palm Oil.

The results indicate that Edible Oils in India are largely safe for consumption with sporadic incidents of safety concerns. The incidence of misbranding/mislabelling issues found in the edible oil packet is because of not fulfilling the minimum regulatory requirements. Further, non-compliance to quality parameters can be attributed to malpractices prevalent among the Food Business Operators. An effective food safety ecosystem is a combined effort of food producers, food processors, transporters, suppliers, retailers and handlers, the Government and consumers of edible oils.

Considering the scope of the survey and nature of collected products, overall, it was a successful survey with valuable support from State Food Authorities. However, there were certain challenges during sample collection, sample coding and delivery to the laboratories as well as in sample analysis, data collection and collation that need to be addressed in the forthcoming surveys. The results of the analysis and data interpretation can serve as useful information necessitating further actions on the part of FSSAI, other Regulatory bodies and aligned Food Business Operators, Departments and Ministries as well as state governments.

6. WAY FORWARD

Based on the survey results, following actions are recommended for the stakeholders:

❖ **FOOD SAFETY DEPARTMENT (CENTRAL/STATE / UT)**

- i. Intensive training to Food Safety Officers (FSOs) for better monitoring / surveillance and enforcement, through regular trainings imparted to Officers of States/ UTs.
- ii. Currently, the limits for Acid Value of Olive Oil, Virgin olive Oil and Salad Oil have not been prescribed by FSSAI; the same needs to be framed.
- iii. Regular surveillance activities and enforcement drives to ensure edible oil safety and quality. About 15 % of regulatory samples picked by the FSOs should be of edible oils.
- iv. Regular inspection to check misbranding (fortified claims and mislabelling made on the packed oil products).
- v. Few loose samples were picked up during the survey which indicates the practice of selling edible oils in unpacked conditions. State Authorities need to crackdown on the sale of loose oil in the market which is prohibited as per clause 2.3.15 of FSSR (Prohibition and Restriction of Sales, 2011).
- vi. A list of brands that showed comparatively higher failure rate will be provided to FSCs separately. Regulatory sampling of these brands should be taken up in a time bound manner.

❖ **MoA& FW and STATE AGRICULTURAL DEPARTMENT**

- i. Ministry of Agriculture and Farmer's Welfare (MoA& FW), should ensure that GAP are stringently followed to minimise contaminants like pesticides, heavy metals and Aflatoxins. Microbial consortium suitable for pesticide degradation may be popularised among the farmers, and may be integrated with National Oilseed Mission.
- ii. Tamil Nadu and Karnataka need to examine and address the issue of Aflatoxins through regular inspection of warehouses and also through effective coordination with their respective State Agricultural Departments.
- iii. Maharashtra needs to mitigate the issue of heavy metals (Arsenic and Mercury), while Jammu & Kashmir, HP, MH, MP UP and UK need to check/control Lead contamination.

❖ **MINISTRY OF FOOD PROCESSING INDUSTRIES**

- i. MoFPI may issue guidelines for drying and storage of oilseeds for mitigating Aflatoxin contamination.
- ii. MoFPI can support creation of modern infrastructure with efficient supply chain management from farm gate to processing units under Pradhan Mantri Krishi Sinchayee Yojna (PMSKY).
- iii. MoFPI may identify/support development of technologies for sorting and grading of oil seeds (such as Automatic Color Sorter etc.) to minimise the risk of Aflatoxin contaminations through its own technical institutions or through other R & D organisations.

❖ **FOOD BUSINESS OPERATORS**

- i. FBOs may consider marketing of oils in 50/100 ml pouches as is done for other products like jams, ketchup, juices, etc.
- ii. Food Business Operators (FBOs) should comply with Good Manufacturing Practices to check safety and quality issues in edible oils. Blending of oils should be in accordance with FSSR.
- iii. FBOs should test the level of oil contaminants in their in-house labs. Further, it is a good practice to get their oil samples tested in other FSSAI notified labs in order to compare with their in-house lab results. Equipment like AAS, GC and UPLC can be installed for analysis of contaminants.
- iv. Enhance the use of rapid testing kits/ equipment for testing the quality of edible oils, like PIVA (Iodine Value), frying oil monitor (TPC) and Refractometer (BR reading) and other tests as described in FSSAI manual.
- v. FBOs should ensure the participation of their employees working in QA and lab divisions in the capacity building programmes to be organised by FSSAI.
- vi. FBOs may refer to the Standard specifications for establishing a basic functional food testing laboratory available at FSSAI website.

7. GLOSSARY OF TERMS TO EXPLAIN THE PARAMETERS DESCRIBED IN THE REPORT

- a) **Acid Value:** gives an idea about the age of the oil because acid content increases in oil with time due to hydrolysis with moisture. High Acid Value indicates stale oil stored under improper conditions.
- b) **Bellier Test:** Bellier Turbidity Temperature Test (BTTT) (acetic acid method), is used as a qualitative method for identification of pure mustard oil.
- c) **BHA:** A method is described for the analysis of 2- and 3-tert-butyl-4-hydroxyanisole (BHA) in edible fats and oils. The method is based on measurement of a specific color developed from the reaction of BHA with N,N-dimethyl-p-phenylenediamine in the presence of a mild oxidizing agent in alkaline solution.
- d) **Butyro-Refractometer Reading at 40°C:** Butyro-Refractometer (BR) Reading is the index of the purity of foods like ghee, sweets, fats and oils which can be accurately measured with the help of Butyro-Refractometer meter or BR meter.
- e) **Cloud Point:** The cloud point is that temperature at which under the conditions of this test, a cloud is induced in the sample caused by the first stage of crystallization.
- f) **DMPS:** The positive effect of dimethyl polysiloxane (DMPS) on oil degradation in the frying process has been attributed either to its direct antioxidative action at high temperature or to the formation of a monolayer on the oil surface impeding the solubilization of oxygen.
- g) **Fatty acid composition:** is a reliable means of assessing vegetable oil purity. Fatty acid composition of vegetable oils is determined by gas liquid chromatography expressed as percentage of total fatty acids. Each vegetable oil has fixed proportion of different fatty acids. Standard is there for extra virgin olive oil in the regulation of Food Safety and Standards Authority of India.

- h) **Flash point:** Flash point is the lowest temperature at which a liquid can give off vapour to form an ignitable mixture in air near the surface of the liquid.
- i) **Free Fatty Acids Edible Oils:** is mainly an indication of hydraulic rancidity. Rancidity gives an unpleasant odour and flavour to oil.
- j) **Iodine value:** All vegetable oil and fat are composed of saturated and unsaturated fat. Iodine value is a measure of the degree of unsaturation of oil and fat. The higher the iodine value means the oil is less stable and more susceptible to oxidation and rancidification which leads to off-flavour in oil.
- k) **Mineral oil:** is from a mineral source, particularly a distillate of petroleum. It is classified as non-edible oil so it shall be absent in edible oil.
- l) **Moisture:** refers to water in edible oils. Since water is only very slightly soluble in fats, it is present only in small amounts and is referred to as moisture. Moisture in oils and fats may be determined by drying, distillation, absorption or titrimetry. The presence of water, especially when in large amounts, may enhance hydrolysis especially at elevated temperatures.
- m) **Insoluble Impurities:** This method determines dirt, meal, and other foreign substances in fats and oils. Edible Oils shall be free from insoluble impurities.
- n) **Oleic Acid Content:** Oleic acid is a fatty acid that occurs naturally in various animal and vegetable fats and oils.
- o) **Peroxide value:** Fats consist of saturated and unsaturated acids. The unsaturated acids are susceptible to oxidation, that is oxygen, can add to the fatty chain to form peroxides or hydroperoxides. The peroxide value is a measure of the amount of these products.
- p) **Phosphorus:** Phosphorus is a chemical element which has an important functional role in the phospholipid molecule. During the refining of oils and fats, it is

- important to remove the phosphorus before high temperature treatment in the deodoriser. Therefore, analysis of phosphorus provides useful information to the technologist. The analysis is usually carried out by a colour reaction after charring and ashing the oil sample or, alternatively, in atomic absorption spectrophotometer.
- q) **Polenske Value:** The Polenske value (also known as the Polenske number) is a value determined when examining oil/fat. The Polenske value is an indicator of how much volatile fatty acid can be extracted from oil/fat through saponification.
 - r) **Rancidity:** Rancidity is the development of off-odours and off-flavour in edible oils and fats or manufactured food products caused by oxidative deterioration.
 - s) **Refractive index/BR reading at 40°C:** Both are tested by Refractometer. Generally, the tests are conducted for Refractive index (RI), whereas BR reading is derived from the results obtained from RI measurement. As per mandatory regulation, RI of mustard oil shall be 1,4646 to 1,4662, Extra Virgin Olive Oil between 1.4677-1.4705 and coconut oil 1,4481 to 1,4491 and BR reading of Mustard oil shall be 58.0 to 60.5 and coconut oil 34.0 to 35.5. If reading is not falling in-between, means adulteration is there with other oils.
 - t) **Saponification:** is the chemical process that turns oil / fat into soap. It helps to detect the presence of other oils / fats.
 - u) **Test for Presence of Cotton Seed Oil (Halphens Test):** This test is to ascertain that Extra Virgin Olive Oil is adulterated with cotton seed oil or not. This test shall be negative.
 - v) **Test for presence of Olive Residue Oil (Pomace) in Olive Oil:** Extra virgin olive oil used to be costlier than olive pomace oil. This test is to determine whether cheaper olive pomace oil is mixed in extra virgin olive oil or not.

- w) **Test for Semi-siccative oil in Olive Oil:** Oils are called siccative, or drying oils such as linseed oil, used in paint industry which is not edible oil. This test shall be negative.
- x) **Test for Sesame Seed Oil (Baudouin Test):** This test is to ascertain that Extra Virgin Olive Oil is adulterated with sesame seed oil or not. This test shall be negative.
- y) **Test for Presence of Tea Seed Oil:** This test is to ascertain that Extra Virgin Olive Oil is adulterated with tea seed oil or not. This test shall be negative.
- z) **Test for Oryzanol:** is a natural antioxidant found in rice bran oil, not in other edible oils. Presence of Oryzanol in edible oil shows that for economic gains, cheaper rice bran oil is mixed in edible oil.
- aa) **Trans-fat:** is produced by industrial process-partial hydrogenation of edible vegetable oil / oils. Product is called as-Partial hydrogenated oil/fat/VANASPATI (Ghee). Trans fat is harmful to human health; hence, Edible oil shall not have Trans-fat.
- bb) **Test for Argemone Oil:** Argemone (*Argemone mexicana L.*), yellow poppy, is a wild herb, which grows in mustard field and bears capsules full of brown black seeds. Because of its resemblance with black mustard, it is often used as an adulterant.
- cc) **Test for Presence of Castor Oil:** 'Triricinolein', a characteristic and predominant triglyceride component of castor oil is separated on silica gel TLC and visualized by iodine vapors.
- dd) **Test for presence of olive Residue Oil in olive Oil:** The test is based on the temperature of precipitation of salts of fatty acids after
- ee) **Test for Sesame Seed Oil:** Baudouin Test is used to identify the adulterant in the Sesame Oil. Baudouin test is applied to distinguish between desi ghee and vanaspati ghee.

ff) **TBHQ:** TBHQ, which stands for “tertiary-butyl hydroquinone”, is both used as a preservative and antioxidant in fats and oils.

gg) **Total polar compounds (TPC):** is a test is a widely accepted test to check the safety of cooking oil used for preparation of food. The TPC value is considered a better indicator since it refers to all degraded products from the initial triglycerides present in the oil

hh) **Unsaponifiable Matter:** The term refers to material present in oils and fats which, after saponification of the oil or fat by alkali, is extractable by solvent and remains non-volatile on drying. Unsaponifiable matter generally constitutes less than 1% in most oils and fats. It consists of hydrocarbons, higher alcohols, sterols and tocopherols.

8.ABBREVIATIONS USED IN THE REPORT

Sr. No.	ABBREVIATIONS	EXPANDED FORMS
1.	AITC	Allylithiocyanate
2.	AOAC	Analysis of Association of Official Analytical Chemists
3.	As	Arsenic
4.	BHA	Butylated Hydroxy Anisole
5.	BR	Butyro-Refractometer
6.	BT	Bellier Test
7.	Cd	Cadmium
8.	DMPS	Di-MethylPolySiloxane
9.	DO	Designated Officers of the State/ UT
10.	FSO	Food Safety Officers of the State/ UT
11.	FSSAI	Food Safety and Standards Authority of India
12.	FSSR	Food Safety and Standards (Food Products Standards and Food Additives) Regulation, 2011

13.	GC-MS/MS	Gas Chromatography with tandem Mass Spectrometry
14.	Hg	Mercury
15.	ICP-MS	Inductively Coupled Plasma–MassSpectrometry
16.	IS	Indian Standards
17.	LC-MS/MS	Liquid Chromatography - with tandem Mass Spectrometry
18.	Pb	Lead
19.	RI	Refractive index

20	SFTL	State Food Testing Lab
21.	SOP	Standard Operating Procedure
22.	TBHQ	Tert-Butylhydroquinone
23.	TPC	Total Polar Compounds
24.	UTs	Union Territories

9. CITED REFERENCES

1. Consumer Voice Survey 2011 [Authentication of Raman Spectrometry Test and Surveillance of Desi ghee and Edible oils in Delhi NCR.
2. Census Report of India, 2011.

ACKNOWLEDGEMENTS

FSSAI acknowledges the support and cooperation extended by the Central and State Food authorities in conducting this survey. Mr. Deepak Singh, Scientist at IASRI, Pusa, New Delhi deserves a special appreciation for his rigour and efforts in data analysis and interpretation of the results.

ANNEXURE-I: TEST REQUEST FORM SHARED WITH THE STATE OFFICIALS

TEST REQUEST FORM

(To be attached with each sample)

1. Sample Code:
2. Date of Sample Collection:
3. Location of sampling with address:
4. Name of Sample:
5. Brand Name (please indicate if it is loose):
6. Batch No. (In case of packed sample):
7. Manufacture Date (MM/DD/YYYY):
8. Best Before Date (MM/DD/YYYY):
9. Name of the Lab to which dispatched:
10. Date of dispatch to the State Food Testing Lab/FSSAI selected Lab:

Name and Signature of Food Safety Officer (FSO) with Stamp

ANNEXURE-II:TEST PARAMETERS' CLASSIFICATION (ANALYTICAL BASIS)		
S. NO.	GROUP	NO. OF TESTS
1	PHYSICAL EXAMINATION TEST GROUP	1
2	CHEMICAL TEST GROUP	35
3	ADDITIVES TEST GROUP	17
4	VITAMINS TEST GROUP (FORTIFICATION LABEL CLAIM)	3
5	FATTY ACID PROFILE TEST GROUP	22
6	HEAVY METALS TEST GROUP	8
7	CONTAMINANTS TEST GROUP	5
8	TOTAL POLAR COMPOUNDS	1
9	PESTICIDES TEST GROUP	68
10	LABELING REQUIREMENT TEST GROUP	1
	TOTAL	161

ANNEXURE-III: DETAILS OF OIL TYPES WITH CODES COLLECTED DURING SURVEY		
S. NO.	OIL TYPE	CODE
1	MUSTARD OIL, RAPE SEED OIL	MST
2	COTTONSEED OIL	CTN
3	GROUNDNUT OIL, PEA NUT OIL	GRN
4	SUNFLOWER OIL	SNF
5	COCONUT OIL	CCN
6	RICE BRAN OIL	RCB
7	SOYBEAN OIL	SYB
8	CANOLA OIL	CNL
9	FLAXSEED OIL	FLX
10	SESAME OIL, TILL OIL, GINGELLY OIL	SSM
11	CORN OIL	CRN
12	SAFFLOWER OIL	SFF
13	PALM OIL	PLM
14	BLENDED OIL, VEGETABLE OIL	BLN
15	ANY OTHER OIL (OLIVE OIL, SALAD OIL, NIGER SEED OIL)	XXX

ANNEXURE-IV: LIST OF LABORATORIES PARTICIPATED IN SURVEY	
S. No.	Name of Laboratory

ANNEXURE-IV: LIST OF LABORATORIES PARTICIPATED IN SURVEY	
S. No.	Name of Laboratory
1	AES LABORATORIES PRIVATE LTD., NOIDA
2	ASHWAMEDH ENGINEERS & CONSULTANTS, NASHIK
3	DEPARTMENT OF FOOD SAFETY (FOOD LABORATORY), DELHI
4	DEVANSH TESTING AND RESEARCH LABORATORY PRIVATE LIMITED, ROORKEE
5	EDWARD FOOD RESEARCH AND ANALYSIS CENTRE LIMITED, KOLKATA
6	EKO PRO ENGINEERS PRIVATE LIMITED, GHAZIABAD
7	ENVIROCARE INDIA PRIVATE LIMITED, THANE
8	ENVIRONMENTAL LABORATORY, BANGALORE
9	EUROFINS ANALYTICAL SERVICES INDIA PRIVATE LIMITED, BANGALORE
10	EXCELLENT BIO RESEARCH SOLUTIONS PVT LTD., JABALPUR
11	FARE LABS PRIVATE LIMITED, GURGAON
12	FOOD HYGIENE AND HEALTH LABORATORY, PUNE
13	GEO CHEMM LABO. PVT. LTD.,MUMBAI
14	GOVT. ANALYST'S LABORATORY,KERALA
15	HARYANA TEST HOUSE & CONSULTANCY SERVICES, PANIPAT
16	IDMA LABORATORIES LTD., PANCHKULA
17	INSTITUTE FOR ANALYSIS OF PHARMADAIRY,FOOD AND CULTURES, BANGALORE
18	MITRA S.K. PRIVATE LIMITED, KOLKATA
19	MONARCH BIOTECH PVT LTD., CHENNAI
20	NATIONAL COLLATERAL MANAGEMENT SERVICES LIMITED, GURGAON
21	NATIONAL COLLATERAL MANAGEMENT SERVICES LIMITED, MUMBAI
22	NATIONAL COLLATERAL MANAGEMENT SERVICES LIMITED, VISAKHAPATNAM
23	NATIONAL FOOD LABORATORY,GHAZIABAD
24	NATIONAL FOOD LABORATORY,KOLKATA
25	NEOGEN FOOD & ANIMAL SECURITY (INDIA) PVT LTD., KERALA

ANNEXURE-IV: LIST OF LABORATORIES PARTICIPATED IN SURVEY	
S. No.	Name of Laboratory
26	OIL LABORATORY, DEPARTMENT OF CHEMICAL TECHNOLOGY, KOLKATA
27	POLLUCON LABORATORIES PRIVATE LIMITED, GUJARAT
28	QUALICHEM LABORATORIES, NAGPUR
29	RAL ERNAKULAM, KERALA
30	REGIONAL FOOD LABORATORY,RAJKOT
31	SCIENTIFIC FOOD TESTING SERVICES (P) LTD., CHENNAI
32	SGS INDIA PRIVATE LIMITED, CHENNAI
33	SHIVA ANALYTICALS (INDIA) PRIVATE LIMITED, CHENNAI
34	SHRIRAM INSTITUTE FOR INDUSTRIAL RESEARCH, DELHI
35	SOPHISTICATED INDUSTRIAL MATERIALS ANALYTICAL LABS PRIVATE LIMITED, DELHI
36	STATE LAB, KHARAR, PUNJAB
37	STATE PUBLIC HEALTH LAB, KOLKATA
38	STATE PUBLIC HEALTH LABORATORY, PUNE
39	SUN TECH, RANCHI, JHARKHAND
40	TUV SUD SOUTH ASIA PRIVATE LIMITED, GURGAON
41	VIMTA LABS LIMITED, AHMEDABAD
42	VIMTA LABS LIMITED, HYDERABAD
43	VSIX ANALYTICAL LABS PRIVATE LIMITED, BANGALORE

ANNEXURE – V:STATE / UT-WISE SAMPLES FAILED PER MILLION POPULATION				
S No	States / UTs	NO. OF SAMPLES	POPULATION AS PER CENSUS,2011	SAMPLES FAILED PER MILLION
1	LADAKH	1	30,870	32.39
2	MANIPUR	65	27,21,756	23.88
3	SIKKIM	11	6,07,688	18.10
4	NAGALAND	33	19,80,602	16.66
5	JAMMU AND KASHMIR	57	1,25,48,926	4.54
6	HIMACHAL PRADESH	24	68,64,602	3.50
7	CHHATTISGARH	88	2,55,40,196	3.45
8	TELANGANA	115	3,52,86,757	3.26
9	TAMIL NADU	174	7,21,38,958	2.41
10	JHARKHAND	62	3,29,66,238	1.88
11	HARYANA	44	2,53,53,081	1.74
12	UTTAR PRADESH	289	19,98,12,341	1.45
13	KARNATAKA	84	6,11,30,704	1.37
14	GOA	2	14,57,723	1.37
15	DELHI	19	1,67,87,941	1.13
16	MADHYA PRADESH	68	7,25,97,565	0.94
17	MIZORAM	1	10,91,014	0.92
18	ANDHRA PRADESH	36	4,19,47,358	0.86
19	ODISHA	41	4,93,86,799	0.83
20	GUJARAT	32	6,03,83,628	0.53
21	RAJASTHAN	36	6,86,21,012	0.52
22	KERALA	16	3,33,87,677	0.48
23	MAHARASHTRA	50	11,23,72,972	0.44
24	PUNJAB	12	2,77,04,236	0.43
25	UTTARAKHAND	3	1,01,16,752	0.30
26	ASSAM	2	3,11,69,272	0.06
27	WEST BENGAL	5	9,13,47,736	0.05
28	BIHAR	1	10,38,04,637	0.01
29	ANDAMAN & NICOBAR	-	3,80,581	0.00
30	ARUNACHAL PRADESH	-	13,82,611	0.00
31	MEGHALAYA	-	29,64,007	0.00
32	TRIPURA	-	36,71,032	0.00

Below is the formula applied for calculation of number of samples failed per million population.

$$\text{Failure by per million population} = \left[\frac{\text{Sample failed in that State}}{\text{Population of the State (Census 2011)}} \right] \times 1000000$$

Note- Actual number of failures for some States and UTs may be higher as samples are drawn only from few districts of the state example West Bengal and Uttarakhand. Annexure VI lists the district from each state, from where samples are drawn.

ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT (ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)							
S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT

ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT

(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
	ANDAMAN & NICOBAR ISLAND	14	0	14	0.0%	100.0%	
1	NORTH & MIDDLE ANDAMAN	14	0	14	0.0%	100.0%	1
	ANDHRA PRADESH	67	36	31	53.7%	46.3%	
2	CHITTOOR	6	3	3	50.0%	50.0%	44
3	KADAPA	8	4	4	50.0%	50.0%	44
4	KRISHNA	8	6	2	75.0%	25.0%	58
5	KURNOOL	6	2	4	33.3%	66.7%	35
6	NELLORE	6	4	2	66.7%	33.3%	55
7	PRAKASAM	6	2	4	33.3%	66.7%	35
8	SRIKAKULAM	7	4	3	57.1%	42.9%	51
9	VISAKHAPATNAM	8	6	2	75.0%	25.0%	58
10	VIZIANAGARAM	6	3	3	50.0%	50.0%	44
11	WEST GODAVARI	6	2	4	33.3%	66.7%	35
	ARUNACHAL PRADESH	20	0	20	0.0%	100.0%	
12	NAHARLAGUN	20	0	20	0.0%	100.0%	1
	ASSAM	208	2	206	1.0%	99.0%	

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
13	BARPETA	8	0	8	0.0%	100.0%	1
14	BONGAIGOAN	12	0	12	0.0%	100.0%	1
15	DARRANG	6	0	6	0.0%	100.0%	1
16	DHUBRI	14	0	14	0.0%	100.0%	1
17	DIBRUGARH	6	0	6	0.0%	100.0%	1
18	DIPHU	18	0	18	0.0%	100.0%	1
19	GOLAGHAT & JORHAT	13	0	13	0.0%	100.0%	1
20	GUWAHATI	2	0	2	0.0%	100.0%	1
21	HOJAI	8	0	8	0.0%	100.0%	1
22	KAMRUP	15	0	15	0.0%	100.0%	1
23	KARIMGANJ	6	0	6	0.0%	100.0%	1
24	KOKRAJHAR	20	1	19	5.0%	95.0%	7
25	LAKHIMPUR	13	0	13	0.0%	100.0%	1
26	MORIGAON	6	1	5	16.7%	83.3%	19
27	NAGAON	6	0	6	0.0%	100.0%	1
28	NALBARI	7	0	7	0.0%	100.0%	1
29	SIVASAGAR	12	0	12	0.0%	100.0%	1
30	TEZPUR	12	0	12	0.0%	100.0%	1
31	TINSUKIA	6	0	6	0.0%	100.0%	1

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
32	UDALGURI	18	0	18	0.0%	100.0%	1
	BIHAR	234	1	233	0.4%	99.6%	
33	ARARIA	6	0	6	0.0%	100.0%	1
34	AURANGABAD	6	0	6	0.0%	100.0%	1
35	BANKA	4	0	4	0.0%	100.0%	1
36	BAXAR	7	0	7	0.0%	100.0%	1
37	BEGUSARAI	5	0	5	0.0%	100.0%	1
38	BHAGALPUR	5	0	5	0.0%	100.0%	1
39	BHOJPUR	8	0	8	0.0%	100.0%	1
40	CHAMPARAN	14	0	14	0.0%	100.0%	1
41	CHHAPRA	6	0	6	0.0%	100.0%	1
42	DARBHANGA	8	1	7	12.5%	87.5%	14
43	GAYA	8	0	8	0.0%	100.0%	1
44	GOPALGANJ	6	0	6	0.0%	100.0%	1
45	JAMUI	5	0	5	0.0%	100.0%	1
46	JEHANABAD	6	0	6	0.0%	100.0%	1
47	KAIMUR	8	0	8	0.0%	100.0%	1
48	KATIHAR	4	0	4	0.0%	100.0%	1
49	KHAGARIA	4	0	4	0.0%	100.0%	1

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
50	KISHANGANJ	7	0	7	0.0%	100.0%	1
51	LAKHISARAI	6	0	6	0.0%	100.0%	1
52	MADHUBANI	6	0	6	0.0%	100.0%	1
53	MADHUPURA	6	0	6	0.0%	100.0%	1
54	MUNGER	5	0	5	0.0%	100.0%	1
55	MUZAFFARPUR	8	0	8	0.0%	100.0%	1
56	NAWADA	7	0	7	0.0%	100.0%	1
57	PATNA	8	0	8	0.0%	100.0%	1
58	PURNIA	7	0	7	0.0%	100.0%	1
59	ROHTAS	8	0	8	0.0%	100.0%	1
60	SAHARSA	6	0	6	0.0%	100.0%	1
61	SAMASTIPUR	8	0	8	0.0%	100.0%	1
62	SHEKHPURA	6	0	6	0.0%	100.0%	1
63	SHEOHAR	8	0	8	0.0%	100.0%	1
64	SITAMARHI	8	0	8	0.0%	100.0%	1
65	SIWAN	6	0	6	0.0%	100.0%	1
66	SUPAUL	6	0	6	0.0%	100.0%	1
67	VAISHALI	8	0	8	0.0%	100.0%	1
	CHHATTISGARH	177	88	89	49.7%	50.3%	

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
68	BALOD	6	5	1	83.3%	16.7%	60
69	BALODA BAZAR	8	8	0	100.0%	0.0%	65
70	BALRAMPUR	6	4	2	66.7%	33.3%	55
71	BASTAR JAGDALPUR	8	3	5	37.5%	62.5%	37
72	BEMETARA	6	5	1	83.3%	16.7%	60
73	BIJAPUR	6	4	2	66.7%	33.3%	55
74	BILASPUR	8	1	7	12.5%	87.5%	14
75	DANEWADA	6	4	2	66.7%	33.3%	55
76	DHAMTARI	5	2	3	40.0%	60.0%	40
77	DURG	8	4	4	50.0%	50.0%	44
78	GARIBANAND	6	3	3	50.0%	50.0%	44
79	JANJGIR-CHAMPA	8	2	6	25.0%	75.0%	26
80	JASHPUR	6	1	5	16.7%	83.3%	19
81	KABIRDHAM	6	3	3	50.0%	50.0%	44
82	KANKER	7	4	3	57.1%	42.9%	51
83	KONDAGAON	7	3	4	42.9%	57.1%	41
84	KORBA	7	6	1	85.7%	14.3%	61
85	KORIYA	6	2	4	33.3%	66.7%	35
86	MAHASAMUND	6	3	3	50.0%	50.0%	44

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
87	MUNGELI	6	0	6	0.0%	100.0%	1
88	NARAYANPUR	6	3	3	50.0%	50.0%	44
89	RAIGARH	6	0	6	0.0%	100.0%	1
90	RAIPUR	8	7	1	87.5%	12.5%	63
91	RAJNANDGAON	7	3	4	42.9%	57.1%	41
92	SARGUJA	6	1	5	16.7%	83.3%	19
93	SUKAM	6	5	1	83.3%	16.7%	60
94	SURAJPUR	6	2	4	33.3%	66.7%	35
	DELHI	68	19	49	27.9%	72.1%	
95	CENTRAL	6	5	1	83.3%	16.7%	60
96	EAST	7	4	3	57.1%	42.9%	51
97	NEW DELHI	6	1	5	16.7%	83.3%	19
98	NORTH	6	1	5	16.7%	83.3%	19
99	NORTH EAST	6	3	3	50.0%	50.0%	44
100	NORTH WEST	6	0	6	0.0%	100.0%	1
101	SAHADRA	6	1	5	16.7%	83.3%	19
102	SOUTH	7	1	6	14.3%	85.7%	16
103	SOUTH EAST	6	1	5	16.7%	83.3%	19
104	SOUTH WEST	6	1	5	16.7%	83.3%	19

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
105	WEST	6	1	5	16.7%	83.3%	19
	GOA	16	2	14	12.5%	87.5%	
106	NORTH GOA	8	1	7	12.5%	87.5%	14
107	SOUTH GOA	8	1	7	12.5%	87.5%	14
	GUJARAT	272	32	240	11.8%	88.2%	
108	AHMEDABAD	8	2	6	25.0%	75.0%	26
109	AMRELI	8	1	7	12.5%	87.5%	14
110	ANANAD	8	0	8	0.0%	100.0%	1
111	ARAVALLI	8	1	7	12.5%	87.5%	14
112	BANASKANTHA	8	2	6	25.0%	75.0%	26
113	BHARUCH	8	1	7	12.5%	87.5%	14
114	BHAVNAGAR	8	0	8	0.0%	100.0%	1
115	BOTAD	8	0	8	0.0%	100.0%	1
116	CHHOTAUDEPUR	2	0	2	0.0%	100.0%	1
117	DAHOD	8	0	8	0.0%	100.0%	1
118	DANG	5	4	1	80.0%	20.0%	59
119	DEWBHUMI DWARKA	3	0	3	0.0%	100.0%	1
120	DIU	6	0	6	0.0%	100.0%	1
121	GANDHINAGAR	8	0	8	0.0%	100.0%	1

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
122	GIR-SOMNATHA	8	0	8	0.0%	100.0%	1
123	GODHARA	6	0	6	0.0%	100.0%	1
124	JAMNAGAR	4	0	4	0.0%	100.0%	1
125	JUNAGADH	8	0	8	0.0%	100.0%	1
126	KHEDA	8	0	8	0.0%	100.0%	1
127	KUTCH	8	0	8	0.0%	100.0%	1
128	MAHESANA	8	4	4	50.0%	50.0%	44
129	MAHISAGAR	8	0	8	0.0%	100.0%	1
130	MORBI	8	2	6	25.0%	75.0%	26
131	NARMADA	8	1	7	12.5%	87.5%	14
132	NAVSARI	8	2	6	25.0%	75.0%	26
133	PANCHMAHAL	2	1	1	50.0%	50.0%	44
134	PATAN	8	1	7	12.5%	87.5%	14
135	PORBANDAR	8	2	6	25.0%	75.0%	26
136	RAJKOT	8	0	8	0.0%	100.0%	1
137	SABARKANTHA	8	0	8	0.0%	100.0%	1
138	SILVASSA	14	1	13	7.1%	92.9%	8
139	SURAT	8	0	8	0.0%	100.0%	1
140	SURENDRANAGAR	8	0	8	0.0%	100.0%	1

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
141	TAPI	8	2	6	25.0%	75.0%	26
142	VADODARA	14	0	14	0.0%	100.0%	1
143	VALSAD	8	5	3	62.5%	37.5%	54
	HARYANA	147	44	103	29.9%	70.1%	
144	AMBALA	7	3	4	42.9%	57.1%	41
145	BHIWANI	6	6	0	100.0%	0.0%	65
146	CHARKHI DADRI	6	1	5	16.7%	83.3%	19
147	FARIDABAD	6	1	5	16.7%	83.3%	19
148	FATEHABAD	7	5	2	71.4%	28.6%	57
149	GURUGRAM	8	2	6	25.0%	75.0%	26
150	HISAR	6	3	3	50.0%	50.0%	44
151	JHAJJAR	6	1	5	16.7%	83.3%	19
152	JIND	6	4	2	66.7%	33.3%	55
153	KAITHAL	7	6	1	85.7%	14.3%	61
154	KARNAL	6	4	2	66.7%	33.3%	55
155	KURUKSHETRA	8	0	8	0.0%	100.0%	1
156	NARNAUL	7	1	6	14.3%	85.7%	16
157	NUH	6	0	6	0.0%	100.0%	1
158	PALWAL	6	0	6	0.0%	100.0%	1

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
159	PANCHKULA	6	0	6	0.0%	100.0%	1
160	PANIPAT	8	0	8	0.0%	100.0%	1
161	REWARI	7	0	7	0.0%	100.0%	1
162	ROHTAK	8	1	7	12.5%	87.5%	14
163	SIRSA	6	1	5	16.7%	83.3%	19
164	SONIPAT	8	0	8	0.0%	100.0%	1
165	YAMUNA NAGAR	6	5	1	83.3%	16.7%	60
	HIMACHAL PRADESH	77	24	53	31.2%	68.8%	
166	BILASPUR	6	5	1	83.3%	16.7%	60
167	CHAMBA	6	0	6	0.0%	100.0%	1
168	HAMIRPUR	6	3	3	50.0%	50.0%	44
169	KANGRA	7	5	2	71.4%	28.6%	57
170	KINNAUR	6	1	5	16.7%	83.3%	19
171	KULLU	7	0	7	0.0%	100.0%	1
172	MANDI	8	1	7	12.5%	87.5%	14
173	SHIMLA	15	2	13	13.3%	86.7%	15
174	SOLAN	8	5	3	62.5%	37.5%	54
175	UNA	8	2	6	25.0%	75.0%	26

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
	JAMMU AND KASHMIR	154	57	97	37.0%	63.0%	
176	ANANTNAG	8	1	7	12.5%	87.5%	14
177	BANDIPORE	6	0	6	0.0%	100.0%	1
178	BARAMULLA	6	5	1	83.3%	16.7%	60
179	BUDGAM	8	2	6	25.0%	75.0%	26
180	DODA	8	3	5	37.5%	62.5%	37
181	GANDERBAL	7	3	4	42.9%	57.1%	41
182	JAMMU	15	4	11	26.7%	73.3%	27
183	KATHUA	8	5	3	62.5%	37.5%	54
184	KISHTWAR	6	3	3	50.0%	50.0%	44
185	KULGAM	6	2	4	33.3%	66.7%	35
186	KUPWARA	6	3	3	50.0%	50.0%	44
187	POONCH	8	1	7	12.5%	87.5%	14
188	PULWAMA	8	5	3	62.5%	37.5%	54
189	RAJOURI	8	3	5	37.5%	62.5%	37
190	RAMBAN	8	2	6	25.0%	75.0%	26
191	REASI	8	4	4	50.0%	50.0%	44
192	SAMBA	8	3	5	37.5%	62.5%	37

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
193	SHOPIAN	6	3	3	50.0%	50.0%	44
194	SRINAGAR	8	3	5	37.5%	62.5%	37
195	UDHAMPUR	8	2	6	25.0%	75.0%	26
	JHARKHAND	161	62	99	38.5%	61.5%	
196	BOKARO	6	4	2	66.7%	33.3%	55
197	CHATRA	7	1	6	14.3%	85.7%	16
198	DALTONGANJ PALAMU	8	4	4	50.0%	50.0%	44
199	DEOGHAR	8	6	2	75.0%	25.0%	58
200	DHANBAD	6	0	6	0.0%	100.0%	1
201	DUMKA	8	2	6	25.0%	75.0%	26
202	GARHWA	7	2	5	28.6%	71.4%	29
203	GIRIDIH	6	4	2	66.7%	33.3%	55
204	GODDA	6	3	3	50.0%	50.0%	44
205	GUMLA	6	0	6	0.0%	100.0%	1
206	HAZARIBAGH	6	2	4	33.3%	66.7%	35
207	JAMSHEDPUR	6	3	3	50.0%	50.0%	44
208	JAMTARA	8	1	7	12.5%	87.5%	14
209	KHUNTI	8	4	4	50.0%	50.0%	44

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
210	KODERMA	8	5	3	62.5%	37.5%	54
211	LATEHAR	6	4	2	66.7%	33.3%	55
212	LOHARDAGA	6	0	6	0.0%	100.0%	1
213	PAKUR	7	0	7	0.0%	100.0%	1
214	RAMGARH	6	3	3	50.0%	50.0%	44
215	RANCHI	8	7	1	87.5%	12.5%	63
216	SAHIBGANJ	6	1	5	16.7%	83.3%	19
217	SERAIKELA KHARSAWAN	6	3	3	50.0%	50.0%	44
218	SIMDEGA	6	0	6	0.0%	100.0%	1
219	WEST SINGHBHUM	6	3	3	50.0%	50.0%	44
	KARNATAKA	262	84	178	32.1%	67.9%	
220	BAGALKOT	8	2	6	25.0%	75.0%	26
221	BALLARI	8	6	2	75.0%	25.0%	58
222	BANGALORE	50	0	50	0.0%	100.0%	1
223	BIDAR	10	1	9	10.0%	90.0%	11
224	BIJAPUR	8	2	6	25.0%	75.0%	26
225	CHAMARAJNAGAR	8	1	7	12.5%	87.5%	14
226	CHIKKABALLAPUR	8	5	3	62.5%	37.5%	54

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
227	CHIKMAGALUR	8	2	6	25.0%	75.0%	26
228	CHITRADURGA	8	4	4	50.0%	50.0%	44
229	DAKSHINA KANNADA	8	1	7	12.5%	87.5%	14
230	DAVANAGERE	8	0	8	0.0%	100.0%	1
231	DHARWAD	8	3	5	37.5%	62.5%	37
232	GADAG	8	7	1	87.5%	12.5%	63
233	HASSAN	8	4	4	50.0%	50.0%	44
234	HAVERI	8	3	5	37.5%	62.5%	37
235	KALABURAGI	8	6	2	75.0%	25.0%	58
236	KODAGU	2	0	2	0.0%	100.0%	1
237	KOLAR (MALUR)	9	9	0	100.0%	0.0%	65
238	KOPPAL	8	5	3	62.5%	37.5%	54
239	MANDYA	8	2	6	25.0%	75.0%	26
240	MYSORE CITY	8	5	3	62.5%	37.5%	54
241	RAICHUR	8	0	8	0.0%	100.0%	1
242	RAMANAGARA	8	3	5	37.5%	62.5%	37
243	SHIVAMOGGA	8	0	8	0.0%	100.0%	1
244	SIRSI	8	3	5	37.5%	62.5%	37
245	TUMKUR	8	5	3	62.5%	37.5%	54

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
246	UDUPI	8	4	4	50.0%	50.0%	44
247	YADAGIRI	7	1	6	14.3%	85.7%	16
	KERALA	105	16	89	15.2%	84.8%	
248	ALAPPUZHA	8	0	8	0.0%	100.0%	1
249	ERNAKULAM	8	4	4	50.0%	50.0%	44
250	IDUKKI	7	3	4	42.9%	57.1%	41
251	KANNUR	8	2	6	25.0%	75.0%	26
252	KASARGOD	6	1	5	16.7%	83.3%	19
253	KOLLAM	8	1	7	12.5%	87.5%	14
254	KOTTAYAM	8	0	8	0.0%	100.0%	1
255	KOZHIKODE	6	1	5	16.7%	83.3%	19
256	MALAPPURAM	8	2	6	25.0%	75.0%	26
257	PALAKKAD	8	1	7	12.5%	87.5%	14
258	PATHANAMTHITTA	8	0	8	0.0%	100.0%	1
259	THIRUVANANTHAPURAM	8	0	8	0.0%	100.0%	1
260	THRISSUR	8	0	8	0.0%	100.0%	1
261	WAYANAD	6	1	5	16.7%	83.3%	19
	LADAKH	12	1	11	8.3%	91.7%	

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
262	KARGIL	6	1	5	16.7%	83.3%	19
263	LEH	6	0	6	0.0%	100.0%	1
	MADHYA PRADESH	228	68	160	29.8%	70.2%	
264	ALIRAJPUR	6	2	4	33.3%	66.7%	35
265	ASHOK NAGAR	6	2	4	33.3%	66.7%	35
266	BARWANI	6	2	4	33.3%	66.7%	35
267	BHIND	5	0	5	0.0%	100.0%	1
268	BHOPAL	9	2	7	22.2%	77.8%	25
269	BURHANPUR	6	2	4	33.3%	66.7%	35
270	CHHATARPUR	8	0	8	0.0%	100.0%	1
271	DAMOH	7	3	4	42.9%	57.1%	41
272	DATIA	6	3	3	50.0%	50.0%	44
273	DEWAS	8	3	5	37.5%	62.5%	37
274	DHAR	8	2	6	25.0%	75.0%	26
275	GUNA	8	3	5	37.5%	62.5%	37
276	GWALIOR	7	3	4	42.9%	57.1%	41
277	INDORE	8	3	5	37.5%	62.5%	37
278	JHABUA	6	2	4	33.3%	66.7%	35
279	KHANDWA	8	2	6	25.0%	75.0%	26

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
280	KHARGONE	6	1	5	16.7%	83.3%	19
281	MALWA	6	2	4	33.3%	66.7%	35
282	MANDSAUR	6	2	4	33.3%	66.7%	35
283	MORENA	8	1	7	12.5%	87.5%	14
284	NEEMUCH	8	2	6	25.0%	75.0%	26
285	PANNA	6	0	6	0.0%	100.0%	1
286	RAISEN	6	1	5	16.7%	83.3%	19
287	RAJGARH	6	2	4	33.3%	66.7%	35
288	RATLAM	8	4	4	50.0%	50.0%	44
289	SAGAR	7	3	4	42.9%	57.1%	41
290	SEHORE	7	1	6	14.3%	85.7%	16
291	SHAJAPUR	6	0	6	0.0%	100.0%	1
292	SHEOPUR	8	4	4	50.0%	50.0%	44
293	SHIVPURI	7	3	4	42.9%	57.1%	41
294	TIKKAMGARH	7	2	5	28.6%	71.4%	29
295	UJJAIN	8	4	4	50.0%	50.0%	44
296	VIDISHA	6	2	4	33.3%	66.7%	35
	MAHARASHTRA	249	50	199	20.1%	79.9%	
297	AHMADNAGAR	6	3	3	50.0%	50.0%	44

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
298	AKOLA	9	1	8	11.1%	88.9%	12
299	AMARAVATI	11	5	6	45.5%	54.5%	42
300	AURANGABAD	8	1	7	12.5%	87.5%	14
301	BEED	7	1	6	14.3%	85.7%	16
302	BHANDARA	6	2	4	33.3%	66.7%	35
303	BULDANA	8	3	5	37.5%	62.5%	37
304	CHANDRAPUR	2	0	2	0.0%	100.0%	1
305	DHULE	4	4	0	100.0%	0.0%	65
306	GADCHIROLI	4	1	3	25.0%	75.0%	26
307	JALNA	7	2	5	28.6%	71.4%	29
308	KOLHAPUR	8	0	8	0.0%	100.0%	1
309	LATUR	7	2	5	28.6%	71.4%	29
310	MUMBAI	48	2	46	4.2%	95.8%	6
311	NAGPUR	8	4	4	50.0%	50.0%	44
312	NANDED	7	2	5	28.6%	71.4%	29
313	NANDURBAR	3	2	1	66.7%	33.3%	55
314	NASHIK	12	6	6	50.0%	50.0%	44
315	OSMANABAD	8	1	7	12.5%	87.5%	14
316	PALGHAR	6	0	6	0.0%	100.0%	1

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
317	PARBHANI	6	1	5	16.7%	83.3%	19
318	PUNE	8	1	7	12.5%	87.5%	14
319	RAIGAD	6	0	6	0.0%	100.0%	1
320	RATNAGIRI	6	0	6	0.0%	100.0%	1
321	SANGLI	6	3	3	50.0%	50.0%	44
322	SATARA	8	0	8	0.0%	100.0%	1
323	SINDHUDURG	6	0	6	0.0%	100.0%	1
324	SOLAPUR	6	1	5	16.7%	83.3%	19
325	THANE	6	0	6	0.0%	100.0%	1
326	WARDHA	6	1	5	16.7%	83.3%	19
327	YAVATMAL	6	1	5	16.7%	83.3%	19
	MANIPUR	95	65	30	68.4%	31.6%	
328	BISHNUPUR	6	6	0	100.0%	0.0%	65
329	CHANDEL	6	0	6	0.0%	100.0%	1
330	CHURACHANDPUR	6	5	1	83.3%	16.7%	60
331	IMPHAL	6	0	6	0.0%	100.0%	1
332	IMPHALWEST	6	0	6	0.0%	100.0%	1
333	JIRIBAM	6	5	1	83.3%	16.7%	60
334	KAKCHING	6	6	0	100.0%	0.0%	65

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
335	KAMJONG	6	5	1	83.3%	16.7%	60
336	KANGPOKPI	5	0	5	0.0%	100.0%	1
337	NONEY	6	5	1	83.3%	16.7%	60
338	PHERZAWL	6	6	0	100.0%	0.0%	65
339	SENAPATI	6	5	1	83.3%	16.7%	60
340	TAMENGLONG	6	6	0	100.0%	0.0%	65
341	TENGNOUNPAL	6	5	1	83.3%	16.7%	60
342	THOUBAL	6	6	0	100.0%	0.0%	65
343	UKHRUL	6	5	1	83.3%	16.7%	60
	MEGHALAYA	68	0	68	0.0%	100.0%	
344	AMPATI	5	0	5	0.0%	100.0%	1
345	EAST KHASI HILLS, SHILLONG	8	0	8	0.0%	100.0%	1
346	KHLIEHRIAT	19	0	19	0.0%	100.0%	1
347	MAWKYRWAT	6	0	6	0.0%	100.0%	1
348	NONGSTOIN	6	0	6	0.0%	100.0%	1
349	NORTH GARO HILLS	6	0	6	0.0%	100.0%	1
350	RI BHOI	5	0	5	0.0%	100.0%	1

ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT

(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
351	WEST GARO HILLS,TURA	7	0	7	0.0%	100.0%	1
352	WILLIAMNAGAR	6	0	6	0.0%	100.0%	1
	MIZORAM	43	1	42	2.3%	97.7%	
353	AIZAWL	31	1	30	3.2%	96.8%	5
354	CHAMPHAI	6	0	6	0.0%	100.0%	1
355	LUNGLEI	6	0	6	0.0%	100.0%	1
	NAGALAND	38	33	5	86.8%	13.2%	
356	DIMAPUR	8	7	1	87.5%	12.5%	63
357	KOHIMA	7	7	0	100.0%	0.0%	65
358	MOKOKCHUNG	7	5	2	71.4%	28.6%	57
359	PEREN	7	7	0	100.0%	0.0%	65
360	TUENSANG	7	5	2	71.4%	28.6%	57
361	WOKHA	2	2	0	100.0%	0.0%	65
	ODISHA	209	41	168	19.6%	80.4%	
362	ANGUL	8	0	8	0.0%	100.0%	1
363	BALANGIR	6	4	2	66.7%	33.3%	55
364	BALASORE	6	0	6	0.0%	100.0%	1
365	BARGARH	6	4	2	66.7%	33.3%	55

ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT

(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
366	BHADRAK	8	0	8	0.0%	100.0%	1
367	BOUDH	6	0	6	0.0%	100.0%	1
368	CUTTACK	6	0	6	0.0%	100.0%	1
369	DEOGHAR	6	0	6	0.0%	100.0%	1
370	DHENKANAL	7	4	3	57.1%	42.9%	51
371	GAJAPATI,PARALAKH EMUNDI	8	7	1	87.5%	12.5%	63
372	GANJAM	8	0	8	0.0%	100.0%	1
373	JAGATSINGHPUR	8	0	8	0.0%	100.0%	1
374	JEYPORE	7	0	7	0.0%	100.0%	1
375	JHARSUGUDA	6	5	1	83.3%	16.7%	60
376	KALAHANDI	8	0	8	0.0%	100.0%	1
377	KANDHAMAL	6	1	5	16.7%	83.3%	19
378	KENDRAPARA	8	0	8	0.0%	100.0%	1
379	KEONJHAR	6	0	6	0.0%	100.0%	1
380	KHORDHA	8	0	8	0.0%	100.0%	1
381	KORAPUT	12	4	8	33.3%	66.7%	35
382	MAYURBHANJ	8	0	8	0.0%	100.0%	1
383	NABARANGPUR	6	2	4	33.3%	66.7%	35

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
384	NAYAGARH	7	0	7	0.0%	100.0%	1
385	NUAPADA	6	0	6	0.0%	100.0%	1
386	PURI	8	4	4	50.0%	50.0%	44
387	RAYAGADA	8	4	4	50.0%	50.0%	44
388	ROURKELA	5	0	5	0.0%	100.0%	1
389	SAMBALPUR	8	2	6	25.0%	75.0%	26
390	SUBARNAPUR	6	0	6	0.0%	100.0%	1
391	SUNDERGARH	3	0	3	0.0%	100.0%	1
	PUNJAB	150	12	138	8.0%	92.0%	
392	AMRITSAR	6	0	6	0.0%	100.0%	1
393	BATHINDA	6	0	6	0.0%	100.0%	1
394	CHANDIGARH	8	0	8	0.0%	100.0%	1
395	FARIDKOT	8	2	6	25.0%	75.0%	26
396	FATEHGARH SAHIB	6	0	6	0.0%	100.0%	1
397	FAZILKA	9	1	8	11.1%	88.9%	12
398	FIROZPUR	7	2	5	28.6%	71.4%	29
399	GURDASPUR	6	0	6	0.0%	100.0%	1
400	HOSHIARPUR	14	1	13	7.1%	92.9%	8
401	JALANDHAR	8	2	6	25.0%	75.0%	26

ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT

(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
402	KAPURTHALA	6	1	5	16.7%	83.3%	19
403	LUDHIANA	8	2	6	25.0%	75.0%	26
404	MANSA	9	0	9	0.0%	100.0%	1
405	MOGA	6	0	6	0.0%	100.0%	1
406	PATHANKOT	7	0	7	0.0%	100.0%	1
407	PATIALA	6	1	5	16.7%	83.3%	19
408	RUPNAGAR	6	0	6	0.0%	100.0%	1
409	SAHIBZADA AJIT SINGH NAGAR	6	0	6	0.0%	100.0%	1
410	SHAHEEB BHAGAT SINGH NAGAR	6	0	6	0.0%	100.0%	1
411	SRI MUKTSAR SAHIB	6	0	6	0.0%	100.0%	1
412	TARN TARAN SAHIB	6	0	6	0.0%	100.0%	1
	RAJASTHAN	190	36	154	18.9%	81.1%	
413	AJMER	8	3	5	37.5%	62.5%	37
414	ALWAR	8	0	8	0.0%	100.0%	1
415	BANSWARA	4	0	4	0.0%	100.0%	1
416	BARAN	5	1	4	20.0%	80.0%	22

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
417	BARMER	8	0	8	0.0%	100.0%	1
418	BHARATPUR	8	2	6	25.0%	75.0%	26
419	BHILWARA	5	0	5	0.0%	100.0%	1
420	BIKANER	7	1	6	14.3%	85.7%	16
421	BUNDI	6	1	5	16.7%	83.3%	19
422	CHURU	8	1	7	12.5%	87.5%	14
423	DHOLPUR	8	2	6	25.0%	75.0%	26
424	DOSA	8	0	8	0.0%	100.0%	1
425	HANUMANGARH	8	4	4	50.0%	50.0%	44
426	JAIPUR	8	1	7	12.5%	87.5%	14
427	JAIPUR-I	5	1	4	20.0%	80.0%	22
428	JAIPUR-II	8	0	8	0.0%	100.0%	1
429	JHUNJHUNU	3	1	2	33.3%	66.7%	35
430	JODHPUR	8	3	5	37.5%	62.5%	37
431	KOTA	8	1	7	12.5%	87.5%	14
432	NAGORE	6	1	5	16.7%	83.3%	19
433	PALI	6	2	4	33.3%	66.7%	35
434	PRATAPGARH	4	0	4	0.0%	100.0%	1
435	RAJSAMAND	3	0	3	0.0%	100.0%	1

ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT

(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
436	SAWAI MADHOPUR	7	1	6	14.3%	85.7%	16
437	SIKAR	7	1	6	14.3%	85.7%	16
438	SIROHI	7	4	3	57.1%	42.9%	51
439	SRI GANGANAGAR	5	1	4	20.0%	80.0%	22
440	TONK	8	2	6	25.0%	75.0%	26
441	UDAIPUR	6	2	4	33.3%	66.7%	35
	SIKKIM	29	11	18	37.9%	62.1%	
442	GANGTOK	10	6	4	60.0%	40.0%	53
443	JORETHANG	6	1	5	16.7%	83.3%	19
444	NAYA BAZAR	7	3	4	42.9%	57.1%	41
445	PHAMTAM	1	0	1	0.0%	100.0%	1
446	PHODONG	5	1	4	20.0%	80.0%	22
	TAMIL NADU	331	174	157	52.6%	47.4%	
447	ARIYALUR	8	4	4	50.0%	50.0%	44
448	CHENGALPATTU	8	5	3	62.5%	37.5%	54
449	CHENNAI	50	27	23	54.0%	46.0%	48
450	COIMBATORE	8	5	3	62.5%	37.5%	54
451	CUDDALORE	8	4	4	50.0%	50.0%	44
452	DHARMAPURI	8	3	5	37.5%	62.5%	37

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
453	DINDIGUL	8	4	4	50.0%	50.0%	44
454	ERODE	7	3	4	42.9%	57.1%	41
455	KALLAKURICHI	7	3	4	42.9%	57.1%	41
456	KANCHEEPURAM	8	6	2	75.0%	25.0%	58
457	KANYAKUMARI	8	8	0	100.0%	0.0%	65
458	KARUR	8	4	4	50.0%	50.0%	44
459	KRISHNAGIRI	8	2	6	25.0%	75.0%	26
460	MADURAI	8	7	1	87.5%	12.5%	63
461	NAGAPATTINAM	6	2	4	33.3%	66.7%	35
462	NAMAKKAL	8	4	4	50.0%	50.0%	44
463	PERAMBALUR	6	3	3	50.0%	50.0%	44
464	PUDUKKOTTAI	8	4	4	50.0%	50.0%	44
465	RAMANATHAPURAM	8	4	4	50.0%	50.0%	44
466	RANIPET	8	5	3	62.5%	37.5%	54
467	SALEM	8	4	4	50.0%	50.0%	44
468	SIVAGANGA	8	7	1	87.5%	12.5%	63
469	THANJAVUR	8	5	3	62.5%	37.5%	54
470	THE NILGIRIS	8	3	5	37.5%	62.5%	37
471	THENI	7	5	2	71.4%	28.6%	57

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
472	THENKASI	8	5	3	62.5%	37.5%	54
473	THIRUNELVELI	8	4	4	50.0%	50.0%	44
474	THIRUPATHUR	8	4	4	50.0%	50.0%	44
475	THIRUVALLUR	8	4	4	50.0%	50.0%	44
476	THIRUVANNAMALAI	8	5	3	62.5%	37.5%	54
477	THIRUVARUR	8	1	7	12.5%	87.5%	14
478	TIRUPPUR	8	3	5	37.5%	62.5%	37
479	TRICHY	8	5	3	62.5%	37.5%	54
480	TUTICORIN	8	5	3	62.5%	37.5%	54
481	VELLORE	8	2	6	25.0%	75.0%	26
482	VILLUPURAM	8	3	5	37.5%	62.5%	37
483	VIRUDHUNAGAR	8	2	6	25.0%	75.0%	26
	TELANGANA	206	115	91	55.8%	44.2%	
484	ADILABAD	6	4	2	66.7%	33.3%	55
485	BHADRADRI KOTHAGUDAM	12	6	6	50.0%	50.0%	44
486	JAGITIAL	4	2	2	50.0%	50.0%	44
487	JOGULAMABA- GADWAL	4	3	1	75.0%	25.0%	58

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
488	KAMAREDDY	6	2	4	33.3%	66.7%	35
489	KARIMNAGAR	7	4	3	57.1%	42.9%	51
490	KHAMMAM	7	6	1	85.7%	14.3%	61
491	KOMARAM BHEEM	6	4	2	66.7%	33.3%	55
492	MAHABOOB NAGAR	6	3	3	50.0%	50.0%	44
493	MANCHERIAL	6	1	5	16.7%	83.3%	19
494	MEDAK	5	3	2	60.0%	40.0%	53
495	MEDCHAL	4	2	2	50.0%	50.0%	44
496	NAGARKURNOOL	4	4	0	100.0%	0.0%	65
497	NALGONDA	6	4	2	66.7%	33.3%	55
498	NIRMAL	6	2	4	33.3%	66.7%	35
499	NIZAMABAD	6	3	3	50.0%	50.0%	44
500	RAJANNA SIRCILLA	4	0	4	0.0%	100.0%	1
501	RANGAREDDY	24	13	11	54.2%	45.8%	49
502	SANAGREDDY	12	3	9	25.0%	75.0%	26
503	SIDDIPET	4	2	2	50.0%	50.0%	44
504	SURYAPET	6	4	2	66.7%	33.3%	55
505	VIKARABAD	6	6	0	100.0%	0.0%	65

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
506	WANAPARTHY	4	4	0	100.0%	0.0%	65
507	WARANGAL	48	28	20	58.3%	41.7%	52
508	YADGIRI-BHONGIR	3	2	1	66.7%	33.3%	55
	TRIPURA	42	0	42	0.0%	100.0%	
509	AGARTALA	14	0	14	0.0%	100.0%	1
510	DHALAI	12	0	12	0.0%	100.0%	1
511	GOMATI	16	0	16	0.0%	100.0%	1
	UTTAR PRADESH	546	289	257	52.9%	47.1%	
512	AGRA	8	6	2	75.0%	25.0%	58
513	ALIGARH	7	1	6	14.3%	85.7%	16
514	AMBEDKAR NAGAR	7	7	0	100.0%	0.0%	65
515	AMETHI	8	4	4	50.0%	50.0%	44
516	AMROHA (J.P. NAGAR)	7	6	1	85.7%	14.3%	61
517	AURAIYA	8	2	6	25.0%	75.0%	26
518	AYODHYA	8	7	1	87.5%	12.5%	63
519	AZAMGARH	8	5	3	62.5%	37.5%	54
520	BADAUN	8	0	8	0.0%	100.0%	1
521	BAGHPAT	6	1	5	16.7%	83.3%	19

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
522	BAHRAICH	8	6	2	75.0%	25.0%	58
523	BALLIA	8	2	6	25.0%	75.0%	26
524	BALRAMPUR	8	5	3	62.5%	37.5%	54
525	BANDA	6	0	6	0.0%	100.0%	1
526	BARABANKI	8	6	2	75.0%	25.0%	58
527	BAREILLY	8	7	1	87.5%	12.5%	63
528	BASTI	6	6	0	100.0%	0.0%	65
529	BHADOHI	7	4	3	57.1%	42.9%	51
530	BIJNOR	7	3	4	42.9%	57.1%	41
531	BULANDSHAHR	7	2	5	28.6%	71.4%	29
532	CHANDAULI	6	0	6	0.0%	100.0%	1
533	CHITRAKOOT	8	2	6	25.0%	75.0%	26
534	DEORIA	6	2	4	33.3%	66.7%	35
535	ETAWAH	6	4	2	66.7%	33.3%	55
536	FARRUKHABAD	7	4	3	57.1%	42.9%	51
537	FATEHPUR	8	6	2	75.0%	25.0%	58
538	FIROZABAD	9	3	6	33.3%	66.7%	35
539	GAUTAM BUDH NAGAR	7	2	5	28.6%	71.4%	29

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
540	GAZIPUR	8	5	3	62.5%	37.5%	54
541	GONDA	8	5	3	62.5%	37.5%	54
542	GORAKHPUR	8	7	1	87.5%	12.5%	63
543	HAMIRPUR	8	1	7	12.5%	87.5%	14
544	HARDOI	6	2	4	33.3%	66.7%	35
545	HATHRAS	7	4	3	57.1%	42.9%	51
546	JALAUN	8	3	5	37.5%	62.5%	37
547	JALESAR	6	2	4	33.3%	66.7%	35
548	JHANSI	8	3	5	37.5%	62.5%	37
549	JONEPUR	8	4	4	50.0%	50.0%	44
550	KANNAUJ	6	6	0	100.0%	0.0%	65
551	KANPUR DEHAT	4	3	1	75.0%	25.0%	58
552	KANPUR NAGAR	8	6	2	75.0%	25.0%	58
553	KANSHIRAM NAGAR(KASGANJ)	8	1	7	12.5%	87.5%	14
554	KAUSHAMBI	8	1	7	12.5%	87.5%	14
555	KUSHINAGAR	8	5	3	62.5%	37.5%	54
556	LAKHIMPUR KHIRI	9	8	1	88.9%	11.1%	64
557	LALITPUR	6	2	4	33.3%	66.7%	35

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
558	LUCKNOW	8	5	3	62.5%	37.5%	54
559	MAHARAJGANJ	6	6	0	100.0%	0.0%	65
560	MAHOBA	6	0	6	0.0%	100.0%	1
561	MAINPURI	6	3	3	50.0%	50.0%	44
562	MATHURA	7	7	0	100.0%	0.0%	65
563	MAU	6	5	1	83.3%	16.7%	60
564	MEERUT	8	4	4	50.0%	50.0%	44
565	MIRZAPUR	6	4	2	66.7%	33.3%	55
566	MORADABAD	6	0	6	0.0%	100.0%	1
567	MUZAFFAR NAGAR	24	12	12	50.0%	50.0%	44
568	PILIBHIT	7	3	4	42.9%	57.1%	41
569	PRATAPGARH	8	6	2	75.0%	25.0%	58
570	PRAYAGRAJ	8	5	3	62.5%	37.5%	54
571	RAEBARELI	7	4	3	57.1%	42.9%	51
572	RAMPUR	6	3	3	50.0%	50.0%	44
573	SAHARANPUR	7	0	7	0.0%	100.0%	1
574	SAMBHAL	7	6	1	85.7%	14.3%	61
575	SANT KABIR NAGAR	8	4	4	50.0%	50.0%	44

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
576	SHAHJAHANPUR	8	4	4	50.0%	50.0%	44
577	SHAMLI	6	5	1	83.3%	16.7%	60
578	SHRAWASTI	8	4	4	50.0%	50.0%	44
579	SIDDHARTHANAGAR	8	6	2	75.0%	25.0%	58
580	SITAPUR	8	4	4	50.0%	50.0%	44
581	SONBHADRA	6	5	1	83.3%	16.7%	60
582	SULTANPUR	8	4	4	50.0%	50.0%	44
583	UNNAO	8	4	4	50.0%	50.0%	44
584	VARANASI	8	5	3	62.5%	37.5%	54
	UTTARAKHAND	19	3	16	15.8%	84.2%	
585	ALMORA	4	0	4	0.0%	100.0%	1
586	DEHRADUN	8	1	7	12.5%	87.5%	14
587	PITHORAGARH	7	2	5	28.6%	71.4%	29
	WEST BENGAL	24	5	19	20.8%	79.2%	
588	BIRBHUM	3	0	3	0.0%	100.0%	1
589	HOWRAH	8	1	7	12.5%	87.5%	14
590	PASCHIM MEDINIPUR	6	1	5	16.7%	83.3%	19
591	PURBA BARDHAMAN	7	3	4	42.9%	57.1%	41

**ANNEXURE-VI: DISTRICT-WISE NUMBER OF SAMPLES COLLECTED/ ANALYSED, FAILED, PASS, % FAIL, % PASS AND ALL INDIA RANK OF EACH DISTRICT
(ALPHABETICALLY ARRANGED & RANK -1 IS FOR HIGHEST COMPLIANT DISTRICT& 65 FOR LOWEST)**

S NO	STATE / UT& DISTRICT	NO. SAMPLES ANALYSED	NO. OF FAILED SAMPLES	NO. OF PASS SAMPLES	% FAIL SAMPLES	% PASS SAMPLES	RANK OF DISTRICT
	Grand Total	4461	1371	3090	30.7%	69.3%	

ANNEXURE-VII: REFRACTIVE INDEX: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.

STATE/ UT & OIL TYPE	% OF FAILED
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ANNEXURE-VII: REFRACTIVE INDEX: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
TAMIL NADU	25.3%
SESAME OIL	12.12%
GROUNDNUT OIL	5.05%
COCONUT OIL	4.04%
SUNFLOWER OIL	1.52%
PALM OIL	1.01%
SAFFLOWER OIL	0.51%
RICE BRAN OIL	0.51%
COTTONSEED OIL	0.51%
JHARKHAND	21.7%
MUSTARD OIL	15.66%
SOYBEAN OIL	3.54%
SESAME OIL	1.01%
GROUNDNUT OIL	0.51%
COCONUT OIL	0.51%
PALM OIL	0.51%
UTTAR PRADESH	9.6%
MUSTARD OIL	7.07%
RICE BRAN OIL	0.51%
GROUNDNUT OIL	0.51%
SESAME OIL	0.51%
COCONUT OIL	0.51%
PALM OIL	0.51%
JAMMU AND KASHMIR	8.1%
MUSTARD OIL	8.08%

ANNEXURE-VII: REFRACTIVE INDEX: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
TELANGANA	6.1%
SUNFLOWER OIL	4.04%
PALM OIL	1.01%
COCONUT OIL	0.51%
GROUNDNUT OIL	0.51%
KARNATAKA	6.1%
GROUNDNUT OIL	2.02%
PALM OIL	1.52%
SESAME OIL	1.01%
SUNFLOWER OIL	0.51%
COCONUT OIL	0.51%
RICE BRAN OIL	0.51%
HIMACHAL PRADESH	5.6%
MUSTARD OIL	5.56%
PUNJAB	4.0%
SESAME OIL	2.02%
MUSTARD OIL	2.02%
GUJARAT	3.0%
MUSTARD OIL	1.01%
COTTONSEED OIL	1.01%
SOYBEAN OIL	0.51%
COTTONSEED OIL	0.51%
ANDHRA PRADESH	2.5%
SUNFLOWER OIL	2.02%
GROUNDNUT OIL	0.51%

ANNEXURE-VII: REFRACTIVE INDEX: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
RAJASTHAN	2.0%
MUSTARD OIL	1.52%
SOYBEAN OIL	0.51%
MADHYA PRADESH	2.0%
GROUNDNUT OIL	1.52%
SESAME OIL	0.51%
HARYANA	1.5%
MUSTARD OIL	0.51%
SESAME OIL	0.51%
OLIVE OIL	0.51%
MAHARASHTRA	0.5%
PALM OIL	0.51%
MIZORAM	0.5%
MUSTARD OIL	0.51%
BIHAR	0.5%
PALM OIL	0.51%
SIKKIM	0.5%
MUSTARD OIL	0.51%
KERALA	0.5%
COCONUT OIL	0.51%
Grand Total	100.00%

ANNEXURE-VIII:BR READING:DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
TAMIL NADU	20.8%
SESAME OIL	10.8%
COCONUT OIL	3.8%
GROUNDNUT OIL	3.8%
SUNFLOWER OIL	0.9%
COTTONSEED OIL	0.5%
SAFFLOWER OIL	0.5%
RICE BRAN OIL	0.5%
JHARKHAND	20.3%
MUSTARD OIL	14.6%
SOYBEAN OIL	3.3%
SESAME OIL	0.9%
GROUNDNUT OIL	0.5%
COCONUT OIL	0.5%
PALM OIL	0.5%
UTTAR PRADESH	10.4%
MUSTARD OIL	6.6%
SOYBEAN OIL	0.5%
RICE BRAN OIL	0.5%
PALM OIL	0.5%
EXTRA VIRGIN OLIVE OIL	0.5%
SESAME OIL	0.5%
GROUNDNUT OIL	0.5%
COCONUT OIL	0.5%
BLENDED OIL	0.5%

ANNEXURE-VIII:BR READING:DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
GUJARAT	9.9%
MUSTARD OIL	4.7%
COTTONSEED OIL	3.3%
GROUNDNUT OIL	0.9%
SOYBEAN OIL	0.5%
PALM OIL	0.5%
JAMMU AND KASHMIR	7.5%
MUSTARD OIL	7.5%
TELANGANA	5.7%
SUNFLOWER OIL	3.3%
COCONUT OIL	0.9%
PALM OIL	0.5%
CANOLA OIL	0.5%
GROUNDNUT OIL	0.5%
HIMACHAL PRADESH	5.2%
MUSTARD OIL	5.2%
PUNJAB	3.8%
SESAME OIL	1.9%
MUSTARD OIL	1.9%
DELHI	2.8%
SESAME OIL	1.4%
MUSTARD OIL	1.4%
KARNATAKA	2.8%
GROUNDNUT OIL	0.9%
SUNFLOWER OIL	0.5%

ANNEXURE-VIII:BR READING:DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
SESAME OIL	0.5%
COCONUT OIL	0.5%
RICE BRAN OIL	0.5%
ANDHRA PRADESH	2.4%
SUNFLOWER OIL	1.9%
GROUNDNUT OIL	0.5%
MADHYA PRADESH	1.9%
GROUNDNUT OIL	1.4%
SESAME OIL	0.5%
RAJASTHAN	1.9%
MUSTARD OIL	1.4%
SOYBEAN OIL	0.5%
MAHARASHTRA	1.4%
SAFFLOWER OIL	0.9%
PALM OIL	0.5%
HARYANA	0.9%
SESAME OIL	0.5%
MUSTARD OIL	0.5%
KERALA	0.9%
COCONUT OIL	0.9%
BIHAR	0.5%
PALM OIL	0.5%
SIKKIM	0.5%
MUSTARD OIL	0.5%
MIZORAM	0.5%

ANNEXURE-VIII:BR READING:DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
MUSTARD OIL	0.5%
Grand Total	100.0%

ANNEXURE-IX: FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED

ANNEXURE-IX: FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
TAMIL NADU	18.8%
COCONUT OIL	5.9%
SESAME OIL	5.1%
GROUNDNUT OIL	3.5%
PALM OIL	2.1%
SUNFLOWER OIL	0.6%
RICE BRAN OIL	0.6%
MUSTARD OIL	0.4%
OLIVE OIL	0.1%
BLENDED OIL	0.1%
CANOLA OIL	0.1%
SAFFLOWER OIL	0.1%
UTTAR PRADESH	11.0%
MUSTARD OIL	4.6%
SESAME OIL	2.1%
SOYBEAN OIL	1.8%
SUNFLOWER OIL	0.6%
CANOLA OIL	0.6%
GROUNDNUT OIL	0.6%
PALM OIL	0.6%
BLENDED OIL	0.1%
OLIVE OIL	0.1%
TELANGANA	10.6%
PALM OIL	3.2%
GROUNDNUT OIL	3.2%

ANNEXURE-IX: FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
SUNFLOWER OIL	2.8%
MUSTARD OIL	0.4%
COCONUT OIL	0.3%
BLENDED OIL	0.1%
RICE BRAN OIL	0.1%
CANOLA OIL	0.1%
OLIVE OIL	0.1%
CHHATTISGARH	6.8%
MUSTARD OIL	2.5%
SOYBEAN OIL	1.3%
RICE BRAN OIL	1.0%
SUNFLOWER OIL	0.7%
BLENDED OIL	0.4%
SESAME OIL	0.3%
PALM OIL	0.3%
OLIVE OIL	0.1%
MANIPUR	6.3%
SOYBEAN OIL	3.5%
MUSTARD OIL	1.9%
PALM OIL	0.6%
RICE BRAN OIL	0.3%
KARNATAKA	5.6%
GROUNDNUT OIL	1.6%
SUNFLOWER OIL	1.0%
COCONUT OIL	0.9%

ANNEXURE-IX: FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
PALM OIL	0.7%
SESAME OIL	0.4%
MUSTARD OIL	0.4%
COTTONSEED OIL	0.1%
RICE BRAN OIL	0.1%
SOYBEAN OIL	0.1%
JAMMU AND KASHMIR	5.3%
MUSTARD OIL	3.4%
SESAME OIL	0.9%
SOYBEAN OIL	0.9%
RICE BRAN OIL	0.1%
MAHARASHTRA	5.1%
SOYBEAN OIL	1.3%
GROUNDNUT OIL	1.0%
MUSTARD OIL	0.7%
SUNFLOWER OIL	0.6%
SESAME OIL	0.4%
SAFFLOWER OIL	0.4%
PALM OIL	0.3%
CORN OIL	0.1%
COTTONSEED OIL	0.1%
MADHYA PRADESH	5.0%
GROUNDNUT OIL	1.5%
SOYBEAN OIL	1.2%
SESAME OIL	1.0%

ANNEXURE-IX: FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
MUSTARD OIL	0.7%
SUNFLOWER OIL	0.4%
BLENDED OIL	0.1%
NAGALAND	3.8%
SOYBEAN OIL	1.9%
MUSTARD OIL	1.5%
SUNFLOWER OIL	0.1%
BLENDED OIL	0.1%
RICE BRAN OIL	0.1%
ANDHRA PRADESH	3.8%
PALM OIL	1.6%
GROUNDNUT OIL	1.2%
SESAME OIL	0.7%
SUNFLOWER OIL	0.1%
RICE BRAN OIL	0.1%
GUJARAT	3.2%
MUSTARD OIL	1.5%
COTTONSEED OIL	0.7%
SOYBEAN OIL	0.3%
COTTONSEED OIL	0.3%
SESAME OIL	0.1%
PALM OIL	0.1%
GROUNDNUT OIL	0.1%
ODISHA	3.2%
SUNFLOWER OIL	1.3%

ANNEXURE-IX: FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
MUSTARD OIL	0.9%
PALM OIL	0.6%
COCONUT OIL	0.3%
RICE BRAN OIL	0.1%
RAJASTHAN	2.5%
MUSTARD OIL	1.5%
GROUNDNUT OIL	0.6%
SOYBEAN OIL	0.4%
HIMACHAL PRADESH	2.2%
MUSTARD OIL	1.8%
SESAME OIL	0.3%
RICE BRAN OIL	0.1%
HARYANA	1.5%
MUSTARD OIL	1.0%
CANOLA OIL	0.1%
SESAME OIL	0.1%
OLIVE OIL	0.1%
PUNJAB	1.3%
MUSTARD OIL	0.7%
SESAME OIL	0.6%
SIKKIM	1.3%
SOYBEAN OIL	0.4%
MUSTARD OIL	0.4%
SUNFLOWER OIL	0.3%
SAFFLOWER OIL	0.1%

ANNEXURE-IX: FATTY ACID PROFILE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs.	
STATE/ UT & OIL TYPE	% OF FAILED
KERALA	1.2%
SESAME OIL	0.7%
COCONUT OIL	0.3%
RICE BRAN OIL	0.1%
DELHI	1.0%
MUSTARD OIL	0.6%
SESAME OIL	0.3%
SUNFLOWER OIL	0.1%
BIHAR	0.1%
PALM OIL	0.1%
MIZORAM	0.1%
MUSTARD OIL	0.1%
Grand Total	100.0%

ANNEXURE-X: IODINE VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED

ANNEXURE-X:IODINE VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
TAMIL NADU	24.5%
COCONUT OIL	10.7%
SESAME OIL	6.9%
GROUNDNUT OIL	4.3%
PALM OIL	1.3%
SAFFLOWER OIL	0.4%
SUNFLOWER OIL	0.4%
CANOLA OIL	0.4%
UTTAR PRADESH	10.3%
MUSTARD OIL	3.9%
SESAME OIL	3.0%
SOYBEAN OIL	1.7%
PALM OIL	0.9%
RICE BRAN OIL	0.4%
GROUNDNUT OIL	0.4%
MADHYA PRADESH	9.0%
SOYBEAN OIL	3.9%
SESAME OIL	1.7%
GROUNDNUT OIL	1.7%
MUSTARD OIL	0.9%
PALM OIL	0.4%
BLENDED OIL	0.4%
GUJARAT	8.6%
MUSTARD OIL	3.4%
COTTONSEED OIL	2.1%

ANNEXURE-X:IODINE VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
PALM OIL	1.7%
GROUNDNUT OIL	0.9%
SOYBEAN OIL	0.4%
JAMMU AND KASHMIR	8.2%
MUSTARD OIL	5.6%
SESAME OIL	1.7%
SOYBEAN OIL	0.9%
CHHATTISGARH	6.9%
RICE BRAN OIL	2.1%
MUSTARD OIL	1.7%
BLENDED OIL	1.7%
SOYBEAN OIL	0.9%
SUNFLOWER OIL	0.4%
TELANGANA	6.4%
SUNFLOWER OIL	4.3%
RICE BRAN OIL	0.9%
PALM OIL	0.9%
GROUNDNUT OIL	0.4%
KARNATAKA	4.7%
GROUNDNUT OIL	1.7%
PALM OIL	1.3%
SUNFLOWER OIL	0.4%
SESAME OIL	0.4%
COCONUT OIL	0.4%
RICE BRAN OIL	0.4%

ANNEXURE-X:IODINE VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
MAHARASHTRA	4.7%
GROUNDNUT OIL	1.7%
SESAME OIL	0.9%
SAFFLOWER OIL	0.9%
MUSTARD OIL	0.4%
SOYBEAN OIL	0.4%
PALM OIL	0.4%
HIMACHAL PRADESH	4.3%
MUSTARD OIL	4.3%
JHARKHAND	2.6%
SOYBEAN OIL	0.9%
MUSTARD OIL	0.9%
SESAME OIL	0.4%
PALM OIL	0.4%
PUNJAB	2.6%
MUSTARD OIL	1.7%
SOYBEAN OIL	0.4%
PALM OIL	0.4%
KERALA	1.7%
SESAME OIL	1.3%
COCONUT OIL	0.4%
RAJASTHAN	1.7%
MUSTARD OIL	1.3%
SOYBEAN OIL	0.4%
DELHI	1.3%

ANNEXURE-X:IODINE VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
SESAME OIL	0.9%
MUSTARD OIL	0.4%
HARYANA	0.9%
MUSTARD OIL	0.9%
ODISHA	0.9%
SUNFLOWER OIL	0.4%
COCONUT OIL	0.4%
MANIPUR	0.4%
SOYBEAN OIL	0.4%
SIKKIM	0.4%
MUSTARD OIL	0.4%
Grand Total	100.0%

ANNEXURE-XI:SAPONIFICATION VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED

ANNEXURE-XI:SAPONIFICATION VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
TAMIL NADU	13.6%
CANOLA OIL	0.5%
COCONUT OIL	1.0%
COTTONSEED OIL	0.5%
GROUNDNUT OIL	1.5%
MUSTARD OIL	1.0%
OLIVE OIL	0.5%
SESAME OIL	7.5%
SUNFLOWER OIL	0.5%
PALM OIL	0.5%
JAMMU AND KASHMIR	13.1%
MUSTARD OIL	8.0%
RICE BRAN OIL	0.5%
SESAME OIL	2.0%
SOYBEAN OIL	2.5%
MADHYA PRADESH	12.6%
BLENDED OIL	0.5%
GROUNDNUT OIL	4.0%
MUSTARD OIL	0.5%
SESAME OIL	1.0%
SOYBEAN OIL	5.5%
SUNFLOWER OIL	1.0%
CHHATTISGARH	12.1%
BLENDED OIL	3.5%
COCONUT OIL	0.5%

ANNEXURE-XI:SAPONIFICATION VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
MUSTARD OIL	3.0%
RICE BRAN OIL	2.5%
SESAME OIL	1.5%
SOYBEAN OIL	1.0%
UTTAR PRADESH	11.6%
BLENDED OIL	0.5%
GROUNDNUT OIL	0.5%
MUSTARD OIL	6.5%
RICE BRAN OIL	0.5%
SESAME OIL	2.0%
SOYBEAN OIL	1.0%
SUNFLOWER OIL	0.5%
GUJARAT	9.0%
COTTONSEED OIL	2.0%
GROUNDNUT OIL	0.5%
MUSTARD OIL	5.0%
PALM OIL	1.5%
TELANGANA	7.0%
COCONUT OIL	0.5%
GROUNDNUT OIL	1.0%
MUSTARD OIL	0.5%
RICE BRAN OIL	0.5%
SUNFLOWER OIL	3.0%
PALM OIL	1.5%
KARNATAKA	5.0%

ANNEXURE-XI:SAPONIFICATION VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
GROUNDNUT OIL	3.0%
RICE BRAN OIL	0.5%
SESAME OIL	0.5%
SUNFLOWER OIL	1.0%
RAJASTHAN	4.5%
GROUNDNUT OIL	1.0%
MUSTARD OIL	3.5%
DELHI	2.0%
MUSTARD OIL	1.5%
SESAME OIL	0.5%
HIMACHAL PRADESH	2.0%
MUSTARD OIL	2.0%
HARYANA	1.5%
MUSTARD OIL	1.5%
PUNJAB	1.5%
MUSTARD OIL	1.5%
ODISHA	1.0%
COCONUT OIL	0.5%
MUSTARD OIL	0.5%
GOA	1.0%
MUSTARD OIL	1.0%
MAHARASHTRA	1.0%
MUSTARD OIL	0.5%
SOYBEAN OIL	0.5%
MANIPUR	0.5%

ANNEXURE-XI:SAPONIFICATION VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
SOYBEAN OIL	0.5%
SIKKIM	0.5%
MUSTARD OIL	0.5%
JHARKHAND	0.5%
SOYBEAN OIL	0.5%
Grand Total	100.0%

ANNEXURE-XII: BELLIER TEST (BT TEST) DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED

ANNEXURE-XII: BELLIER TEST (BT TEST) DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
MAHARASHTRA	16.0%
MUSTARD OIL	6.7%
GROUNDNUT OIL	5.3%
SAFFLOWER OIL	2.7%
SESAME OIL	1.3%
UTTAR PRADESH	16.0%
MUSTARD OIL	10.7%
SESAME OIL	2.7%
EXTRA VIRGIN OLIVE OIL	1.3%
GROUNDNUT OIL	1.3%
GUJARAT	14.7%
MUSTARD OIL	8.0%
GROUNDNUT OIL	2.7%
COTTONSEED OIL	2.7%
COTTONSEED OIL	1.3%
HIMACHAL PRADESH	10.7%
MUSTARD OIL	10.7%
TAMIL NADU	9.3%
GROUNDNUT OIL	5.3%
MUSTARD OIL	2.7%
CANOLA OIL	1.3%
JAMMU AND KASHMIR	8.0%
MUSTARD OIL	8.0%
KARNATAKA	6.7%
GROUNDNUT OIL	5.3%

ANNEXURE-XII: BELLIER TEST (BT TEST) DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
SESAME OIL	1.3%
MADHYA PRADESH	5.3%
GROUNDNUT OIL	2.7%
SESAME OIL	1.3%
MUSTARD OIL	1.3%
RAJASTHAN	5.3%
GROUNDNUT OIL	4.0%
MUSTARD OIL	1.3%
PUNJAB	4.0%
SESAME OIL	2.7%
MUSTARD OIL	1.3%
DELHI	1.3%
SESAME OIL	1.3%
ANDHRA PRADESH	1.3%
GROUNDNUT OIL	1.3%
HARYANA	1.3%
MUSTARD OIL	1.3%
Grand Total	100.0%

ANNEXURE - XIII: PRESENCE OF MINERAL OIL: STATE AND OILTYPE WISE SHARE IN FAILED SAMPLES			
STATES/ UT	% OF FAILED SAMPLES	OIL TYPE	% OF FAILED
HARYANA	52%	MUSTARD OIL	36%
MUSTARD OIL	24%	RICE BRAN OIL	20%
RICE BRAN OIL	12%	GROUNDNUT OIL	12%
GROUNDNUT OIL	8%	SOYBEAN OIL	8%
SUNFLOWER OIL	4%	SUNFLOWER OIL	8%
SOYBEAN OIL	4%	BLENDED OIL	8%
UTTAR PRADESH	24%	SESAME OIL	8%
BLENDED OIL	8%	Grand Total	100%
SUNFLOWER OIL	4%		
SOYBEAN OIL	4%		
SESAME OIL	4%		
GROUNDNUT OIL	4%		
JAMMU AND KASHMIR	16%		
MUSTARD OIL	12%		
SESAME OIL	4%		
ANDHRA PRADESH	8%		
RICE BRAN OIL	8%		
Grand Total	100%		

ANNEXURE-XIV:ACID VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED

ANNEXURE-XIV:ACID VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
TAMIL NADU	28.5%
SESAME OIL	8.9%
PALM OIL	8.1%
RICE BRAN OIL	4.1%
GROUNDNUT OIL	2.4%
BLENDED OIL	1.6%
COTTONSEED OIL	0.8%
SUNFLOWER OIL	0.8%
COCONUT OIL	0.8%
OLIVE OIL	0.8%
CHHATTISGARH	20.3%
RICE BRAN OIL	13.0%
BLENDED OIL	5.7%
SOYBEAN OIL	0.8%
PALM OIL	0.8%
UTTAR PRADESH	11.4%
BLENDED OIL	7.3%
RICE BRAN OIL	0.8%
MUSTARD OIL	0.8%
EDIBLE OIL	0.8%
VEGETABLE OIL	0.8%
GROUNDNUT OIL	0.8%
MAHARASHTRA	8.9%
RICE BRAN OIL	4.9%
SOYBEAN OIL	1.6%

ANNEXURE-XIV:ACID VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
GROUNDNUT OIL	1.6%
PALM OIL	0.8%
MADHYA PRADESH	8.1%
BLENDED OIL	5.7%
RICE BRAN OIL	2.4%
ANDHRA PRADESH	5.7%
RICE BRAN OIL	5.7%
TELANGANA	4.1%
RICE BRAN OIL	4.1%
GUJARAT	3.3%
COTTONSEED OIL	2.4%
PALM OIL	0.8%
JAMMU AND KASHMIR	3.3%
SOYBEAN OIL	2.4%
RICE BRAN OIL	0.8%
JHARKHAND	1.6%
SOYBEAN OIL	0.8%
SESAME OIL	0.8%
HIMACHAL PRADESH	1.6%
RICE BRAN OIL	0.8%
BLENDED OIL	0.8%
KARNATAKA	1.6%
SUNFLOWER OIL	0.8%
PALM OIL	0.8%
KERALA	0.8%

ANNEXURE-XIV:ACID VALUE: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
COCONUT OIL	0.8%
NAGALAND	0.8%
RICE BRAN OIL	0.8%
Grand Total	100.0%

ANNEXURE-XV:UNSAPONIFIABLE MATTER: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED

ANNEXURE-XV:UNSAPONIFIABLE MATTER: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
TAMIL NADU	33.3%
GINGELLY OIL	17.3%
RICE BRAN OIL	8.0%
GROUNDNUT OIL	4.0%
COCONUT OIL	1.3%
SESAME OIL	1.3%
BLENDED OIL	1.3%
JHARKHAND	28.0%
MUSTARD OIL	24.0%
PALM OIL	2.7%
SOYBEAN OIL	1.3%
MADHYA PRADESH	17.3%
SOYBEAN OIL	9.3%
GROUNDNUT OIL	5.3%
SUNFLOWER OIL	1.3%
BLENDED OIL	1.3%
CHHATTISGARH	8.0%
MUSTARD OIL	6.7%
COCONUT OIL	1.3%
UTTAR PRADESH	5.3%
MUSTARD OIL	4.0%
BLENDED OIL	1.3%
GUJARAT	2.7%
MUSTARD OIL	2.7%
ODISHA	2.7%

ANNEXURE-XV:UNSAPONIFIABLE MATTER: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE/ UT & OIL TYPE	% OF FAILED
SUNFLOWER OIL	2.7%
SIKKIM	1.3%
MUSTARD OIL	1.3%
JAMMU AND KASHMIR	1.3%
MUSTARD OIL	1.3%
Grand Total	100.0%

ANNEXURE-XVI:RANCIDITY: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs			
STATE/ UT AND OIL TYPE	% OF FAILED SAMPLES		% OF FAILED SAMPLES
		OIL TYPE	

ANNEXURE-XVI:RANCIDITY: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs			
STATE/ UT AND OIL TYPE	% OF FAILED SAMPLES	OIL TYPE	% OF FAILED SAMPLES
TELANGANA	79.1%	PALM OIL	55.8%
PALM OIL	48.8%	SUNFLOWER OIL	14.0%
SUNFLOWER OIL	14.0%	BLENDED OIL	11.6%
RICE BRAN OIL	7.0%	RICE BRAN OIL	7.0%
BLENDED OIL	4.7%	MUSTARD OIL	4.7%
SESAME OIL	2.3%	COTTONSEED OIL	2.3%
GROUNDNUT OIL	2.3%	SESAME OIL	2.3%
GUJARAT	9.3%	GROUNDNUT OIL	2.3%
PALM OIL	7.0%	Grand Total	100.0%
COTTONSEED OIL	2.3%		
UTTAR PRADESH	4.7%		
MUSTARD OIL	2.3%		
BLENDED OIL	2.3%		
CHHATTISGARH	4.7%		
BLENDED OIL	4.7%		
HARYANA	2.3%		
MUSTARD OIL	2.3%		

ANNEXURE-XVII: LEAD (Pb): DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs				
STATE/ UT AND OIL TYPE	% OF FAILED SAMPLES		OIL TYPE	% OF FAILED SAMPLES
JAMMU AND KASHMIR	36.7%		MUSTARD OIL	51.7%
MUSTARD OIL	20.0%		SOYBEAN OIL	16.7%
SOYBEAN OIL	10.0%		BLENDED OIL	10.0%
BLENDED OIL	5.0%		SESAME OIL	5.0%
EDIBLE OIL	1.7%		SUNFLOWER OIL	5.0%
MADHYA PRADESH	20.0%		GROUNDNUT OIL	5.0%
MUSTARD OIL	6.7%		SESAME OIL	3.3%
SESAME OIL	5.0%		COCONUT OIL	1.7%
SOYBEAN OIL	3.3%		EDIBLE OIL	1.7%
COCONUT OIL	1.7%		Grand Total	100.0%
BLENDED OIL	1.7%			
GROUNDNUT OIL	1.7%			
UTTAR PRADESH	16.7%			
MUSTARD OIL	10.0%			
SESAME OIL	3.3%			
BLENDED OIL	3.3%			
HIMACHAL PRADESH	11.7%			
MUSTARD OIL	11.7%			
RAJASTHAN	6.7%			
GROUNDNUT OIL	3.3%			
SUNFLOWER OIL	1.7%			
MUSTARD OIL	1.7%			
UTTARAKHAND	5.0%			
SUNFLOWER OIL	3.3%			

ANNEXURE-XVII: LEAD (Pb): DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs				
STATE/ UT AND OIL TYPE	% OF FAILED SAMPLES		OIL TYPE	% OF FAILED SAMPLES
SOYBEAN OIL	1.7%			
LADAKH	1.7%			
MUSTARD OIL	1.7%			
MAHARASHTRA	1.7%			
SOYBEAN OIL	1.7%			
Grand Total	100.0%			

ANNEXURE-XVIII: PHOSPHOROUS: DISTRIBUTION OF FAILED SAMPLES OF SOYBEAN OIL AMONG THE STATES/ UTs	
STATE	% OF SAMPLES FAILED
MANIPUR	54.5%
NAGALAND	27.3%
UTTAR PRADESH	9.1%
GUJARAT	9.1%
Grand Total	100.0%

ANNEXURE-XIX: VITAMIN A: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE & OIL TYPE	% OF SAMPLES FAILED

ANNEXURE-XIX: VITAMIN A: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE & OIL TYPE	% OF SAMPLES FAILED
UTTAR PRADESH	76.4%
MUSTARD OIL	32.9%
SOYBEAN OIL	14.8%
BLENDED OIL	13.4%
SUNFLOWER OIL	4.2%
GROUNDNUT OIL	3.2%
PALM OIL	2.8%
CANOLA OIL	1.9%
SESAME OIL	1.4%
RICE BRAN OIL	0.9%
VEGETABLE OIL	0.5%
EDIBLE OIL	0.5%
KARNATAKA	19.0%
SUNFLOWER OIL	6.0%
PALM OIL	5.1%
MUSTARD OIL	2.3%
BLENDED OIL	1.9%
SOYBEAN OIL	1.4%
RICE BRAN OIL	1.4%
SESAME OIL	0.5%
GROUNDNUT OIL	0.5%
MADHYA PRADESH	2.3%
SOYBEAN OIL	1.9%
GROUNDNUT OIL	0.5%
CHHATTISGARH	1.4%

ANNEXURE-XIX: VITAMIN A: DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE & OIL TYPE	% OF SAMPLES FAILED
BLENDED OIL	0.5%
RICE BRAN OIL	0.5%
MUSTARD OIL	0.5%
GUJARAT	0.9%
PALM OIL	0.5%
MUSTARD OIL	0.5%
Grand Total	100.0%

ANNEXURE-XX: VITAMIN D₂& D₃:DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE & OIL TYPE	% OF FAILED SAMPLES
UTTAR PRADESH	84.2%
MUSTARD OIL	35.0%
SOYBEAN OIL	16.7%
BLENDED OIL	15.3%
SUNFLOWER OIL	4.9%
GROUNDNUT OIL	3.4%
PALM OIL	3.4%
CANOLA OIL	2.0%
SESAME OIL	1.5%
RICE BRAN OIL	1.0%
VEGETABLE OIL	0.5%
EDIBLE OIL	0.5%
KARNATAKA	8.9%
SUNFLOWER OIL	4.9%
PALM OIL	3.0%
MUSTARD OIL	1.0%
MADHYA PRADESH	3.4%
SOYBEAN OIL	2.0%
MUSTARD OIL	1.0%
GROUNDNUT OIL	0.5%
CHHATTISGARH	2.0%
MUSTARD OIL	1.0%
RICE BRAN OIL	0.5%
BLENDED OIL	0.5%
GUJARAT	1.0%

ANNEXURE-XX: VITAMIN D₂& D₃:DISTRIBUTION OF FAILED SAMPLES OF OIL TYPES AMONG THE STATES/ UTs	
STATE & OIL TYPE	% OF FAILED SAMPLES
PALM OLEIN OIL	0.5%
MUSTARD OIL	0.5%
KERALA	0.5%
SUNFLOWER OIL	0.5%
Grand Total	100.0%

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
A	Quality			
(I)	Adulteration			
1	Test for Presence of Hydrocyanic acid (Ferric Chloride test)	22.46%	Jharkhand	Mustard Oil
2	Fatty Acid Profile (22 Tests)	17.35%	Tamil Nadu	Mustard Oil
3	Refractive Index at 40°C	4.88%	Tamil Nadu	Mustard Oil
	Butyro-Refractometer Reading at 40°C	4.96%	Tamil Nadu	Mustard Oil
4	Iodine value	5.42%	Tamil Nadu	Mustard Oil
5	Saponification value	4.63%	Tamil Nadu	Mustard Oil
6	Bellier Test (Turbidity temperature Acetic acid method)	3.42%	Maharashtra	Mustard Oil
7	Polenske Value	1.71%	Kerala	Coconut Oil
8	Test for presence of Olive Residue Oil (Pomace) in Olive Oil	0.81%	Haryana	Olive Oil
9	Test For Presence of Mineral Oil (Holdes Test)	0.59%	Haryana	Mustard Oil
10	Test for Presence of Argemone oil	0.34%	Haryana	Mustard Oil
11	TPC	0.33%	Madhya Pradesh	Soy Bean oil
12	Cloud point	0.27%	Gujarat	Palm oil

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
13	Flash Point	0.16%	Odisha	Sunflower oil
14	Test for presence of Castor Oil	0.07%	Haryana	Blended oil
15	Unsaponifiable matter	1.74%	Tamil Nadu	Mustard Oil
16	Test for Sesame seed Oil (Baudouin's Test)	0.00%	----	----
17	Melting Point	0.00%	----	----
18	Test for Presence of Cotton seed Oil (Halphens' Test)	0.00%	----	----
19	Test for Presence of Teaseed Oil	0.00%	----	----
20	Turbidity test at 30 °C for 24hrs(For Cotton seed oil)/ 35°C for 24hrs (Rice Bran oil)	0.00%	----	----
21	Test for presence of tricresyl phosphate	0.00%	----	----
22	Polybromide test	0.00%	----	----
23	Test for Semi siccative oil in Olive Oil	0.00%	----	----
24	Hexane Residues	0.00%		
(II)	Shelf-life indicators			
25	Acid value	2.77%	Tamil Nadu	Rice Bran Oil
26	Moisture	2.24%	Odisha	Rice Bran Oil
27	Moisture & Volatile matter	1.53%	Chhattisgarh&	Rice Bran Oil

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
			Telangana	
28	Rancidity	1.04%	Telangana	Palm Oil
29	Oleic Acid Content	0.80%	Gujarat	Cotton Seed oil
30	Peroxide value	0.22%	Goa	Mustard Oil
31	Free Fatty Acid	0.00%	-----	-----
(III)	Additive parameters			
32	DMPS	3.13%	Uttar Pradesh	Mustard Oil
33	TBHQ	0.26%	Uttar Pradesh &Karnataka	Blended oil
34	BHA	0.22%	Rajasthan, Madhya Pradesh	Groundnut oil Mustard oil
35	Phosphoric acid	0.00%	-----	-----
36	Beta carotene	0.00%	-----	-----
37	Potassium Bromate	0.00%	-----	-----
38	Carotenoids	0.00%	-----	-----
39	Monoglyceride citrate	0.00%	-----	-----
40	Diacetyl-tartaric acid and fatty acid esters of glycerol	0.00%	-----	-----
41	Polysorbates	0.00%	-----	-----
42	Propylene glycol esters of fatty acids	0.00%	-----	-----
43	BHT	0.00%	-----	-----
44	Propyl gallate	0.00%	-----	-----
45	Ascorbyl Esters	0.00%	-----	-----

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
46	Thiodiopropionates	0.00%	-----	-----
47	Guaiac resin	0.00%	-----	-----
48	Isopropyl citrate mixture	0.00%	-----	-----
(IV)	Other defects			
49	Allyl isothiocyanate	1.74%	Uttar Pradesh	Mustard Oil
50	Insoluble impurities	0.11%	Tamil Nadu	Coconut oil
51	Suspended and other foreign matter, separated water, added colouring or flavouring substances	0.07%	Gujarat	Soybean oil
52	Physical Examination	0.51%	Kerala	Sesame Oil
53	Phosphorus	1.47%	Manipur	Soy Bean oil
54	Iron	0.11%	Uttar Pradesh	Olive oil
55	Test for oryzanol	5.20%	Rajasthan	Rice Bran Oil
B	Safety			
(I)	Pesticide Residues			
56	Phenthoate	0.20%	Maharashtra	Ground nut oil & Sesame oil
57	Methyl parathion	0.34%	Gujarat	Cotton Seed oil & Mustard oil
58	Cypermethrin	0.31%	Gujarat	Cotton seed oil
59	Mepiquat chloride	0.19%	Chhattisgarh	Mustard Oil
60	Dichlorvos	0.17%	Maharashtra & Madhya Pradesh	Mustard Oil & Ground nut oil
61	Indoxacarb	0.14%	Madhya Pradesh	Soybean oil

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
62	Metribuzin	0.00%	-----	-----
63	Pyriithiolac sodium	0.00%	-----	-----
64	Bentazone	0.00%	-----	-----
65	Chlorpyrifos	0.00%	-----	-----
66	Thiamethoxam	0.00%	-----	-----
67	Chlothianidin	0.00%	-----	-----
68	Oxydemeton Methyl	0.00%	-----	-----
69	Clomazone	0.00%	-----	-----
70	Profenophos	0.00%	-----	-----
71	Cyantranilipole	0.00%	-----	-----
72	Spinetoram	0.00%	-----	-----
73	Alpha cypermethrine	0.00%	-----	-----
74	Trifloxystrobin	0.00%	-----	-----
75	Buprofezine	0.00%	-----	-----
76	Novaluron	0.00%	-----	-----
77	Difenthiuron	0.00%	-----	-----
78	Paraquat dichoride	0.00%	-----	-----
79	Dinotefuron	0.00%	-----	-----
80	Phosalone	0.00%	-----	-----
81	Emamectine Benzoate	0.00%	-----	-----
82	Pyridalyl	0.00%	-----	-----
83	Epoxyconazole	0.00%	-----	-----
84	Quizalofop-P-Tefural	0.00%	-----	-----
85	Fenpropathrin	0.00%	-----	-----
86	Tebuconazole	0.00%	-----	-----

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
87	Fenvalerate	0.00%	-----	-----
88	Triazophos	0.00%	-----	-----
89	Fipronil	0.00%	-----	-----
90	Metolachlor	0.00%	-----	-----
91	Flonicamid	0.00%	-----	-----
92	Monocrotophos	0.00%	-----	-----
93	Flubendiamide	0.00%	-----	-----
94	Oxadiargyl	0.00%	-----	-----
95	Fluizifop-P-Butyl	0.00%	-----	-----
96	Oxyfluorfen	0.00%	-----	-----
97	Fluvalinate	0.00%	-----	-----
98	Pendimethaline	0.00%	-----	-----
99	Fomesafen	0.00%	-----	-----
100	Phorate	0.00%	-----	-----
101	Glufosinate ammonium	0.00%	-----	-----
102	Picoxystrobin	0.00%	-----	-----
103	Haloxyfop-R-Methyl	0.00%	-----	-----
104	Pyraclostrobin	0.00%	-----	-----
105	Imazamox	0.00%	-----	-----
106	Pyriproxyphen	0.00%	-----	-----
107	Imazethapyr	0.00%	-----	-----
108	Quinalphos	0.00%	-----	-----
109	Imidacloprid	0.00%	-----	-----
110	Sodium-para-nitro-phenolate	0.00%	-----	-----

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
111	Spinosad	0.00%	-----	-----
112	Chlorantraniliprole	0.00%	-----	-----
113	Sulfentrazone	0.00%	-----	-----
114	Sulfoxaflor	0.00%	-----	-----
115	Kresoxim methyl	0.00%	-----	-----
116	Thiacloprid	0.00%	-----	-----
117	Lamdacyhalothrine	0.00%	-----	-----
118	Thiodicarb	0.00%	-----	-----
119	Acetamiprid	0.00%	-----	-----
120	Trichlorfon	0.00%	-----	-----
121	Alpha Naphthyl Acetic Acid	0.00%	-----	-----
122	Beta Cyfluthrin	0.00%	-----	-----
123	Metiram as CS ₂	0.00%	-----	-----
(II)	Toxic Metal contaminants			
124	Lead	1.58%	Jammu & Kashmir	Mustard Oil
125	Arsenic	0.24%	Maharashtra	Rice Bran Oil
126	Mercury	0.105%	Maharashtra	Rice Bran Oil
127	Tin	0.00%	-----	-----
128	Methyl Mercury as mercury	0.00%	-----	-----
129	Copper	0.00%	-----	-----
130	Cadmium	0.00%	-----	-----
(III)	Total Aflatoxin	1.00%		
131	Aflatoxin B ₁	0.96%	Tamil Nadu	Ground nut oil

ANNEXURE-XXI: SUMMARY OF % PASS/FAIL FOR ALL TESTS PERFORMED				
S No	Test Group/ Test Category/ Test name	% Tests Failed	Most Affected State	Most Affected Oil type*
				&Sesame oil
132	Aflatoxin B2	0.31%	Tamil Nadu	Ground nut oil
133	Aflatoxin G1	0.14%	Tamil Nadu	Ground nut oil &Sesame oil
134	Aflatoxin G2	0.07%	Tamil Nadu	Ground nut oil &Sesame oil
(IV)	Other Contaminants			
135	Melamine	0.00%	-----	-----
C	Misbranding			
(I)	Fortification Labels			
136	Vitamin A	18.05%	Uttar Pradesh	Mustard oil
137	Vitamin D2	17.96%	Uttar Pradesh	Mustard oil
138	Vitamin D3	2.67%	Uttar Pradesh	Mustard oil
(II)	Labelling requirements			
139	Mislabelling	8.58%	Telangana	Mustard oil

ANNEXURE-XXII: STATE/ UT WISE SAMPLE FAILURE IN ALL OIL TYPE																	
S N o	STATES & UTs	MST	SYB	BLN	GRN	SSM	PLM	SNF	RCB	CCN	CTN	XXX	CNL	SSF	FLX	CRN	Total
1	ANDAMA N & NICOBAR ISLAND	0	-	0	0	0	0	0	-	0	-	-	-	-	-	-	0
2	ANDHRA PRADESH	-	-	0	8	5	11	5	7	-	-	0	0	-	-	-	36
3	ARUNAC HAL PRADESH	0	0	0	0	-	-	0	0	-	-	-	-	-	-	-	0
4	ASSAM	2	0	0	-	-	0	0	0	0	-	-	-	-	-	-	2
5	BIHAR	0	0	0	0	-	1	0	0	-	-	-	-	-	-	-	1
6	CHHATTIS GARH	20	17	13	0	4	2	5	25	1	-	1	-	-	-	-	88
7	DELHI	8	1	4	0	3	0	1	1	-	-	-	1	-	-	-	19
8	GOA	2	0	0	0	0	0	0	0	-	-	0	-	-	-	-	2
9	GUJARAT	14	2	0	2	0	5	0	0	0	8	-	0	-	1	0	32
10	HARYAN A	28	3	2	2	2	0	1	3	1	-	1	1	-	-	-	44
11	HIMACHA L PRADESH	18	0	1	0	2	0	0	3	-	0	-	-	-	-	-	24
12	JAMMU & KASHMIR	34	12	3	-	6	-	-	1	-	-	1	-	-	-	-	57

ANNEXURE-XXII: STATE/ UT WISE SAMPLE FAILURE IN ALL OIL TYPE																	
S N o	STATES & UTs	MST	SYB	BLN	GRN	SSM	PLM	SNF	RCB	CCN	CTN	XXX	CNL	SSF	FLX	CRN	Total
1 3	JHARKHA ND	46	9	0	1	2	3	0	0	1	-	-	-	-	-	-	62
1 4	KARNATA KA	5	4	5	13	5	18	21	4	8	1	0	-	0	-	-	84
1 5	KERALA	0	-	0	-	9	0	1	1	5	-	-	-	-	-	0	16
1 6	LADAKH	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	1
1 7	MADHYA PRADESH	10	19	7	14	9	1	3	4	1	0	-	-	-	-	-	68
1 8	MAHARA SHTRA	10	10	0	9	4	2	4	6	0	1	0	-	3	-	1	50
1 9	MANIPUR	13	24	19	-	-	5	-	4	-	-	-	-	-	-	-	65
2 0	MEGHAL AYA	0	0	0	-	-	0	0	0	0	-	0	0	-	-	-	0
2 1	MIZORA M	1	0	0	-	-	0	-	0	-	-	0	0	-	-	-	1
2 2	NAGALA ND	10	13	5	-	-	-	1	4	-	-	-	-	-	-	-	33
2 3	ODISHA	13	1	2	0	0	7	10	6	2	-	0	0	-	-	-	41
2 4	PUNJAB	6	1	0	-	4	1	0	0	-	-	0	0	-	0	-	12

ANNEXURE-XXII: STATE/ UT WISE SAMPLE FAILURE IN ALL OIL TYPE																	
S N O	STATES & UTs	MST	SYB	BLN	GRN	SSM	PLM	SNF	RCB	CCN	CTN	XXX	CNL	SSF	FLX	CRN	Total
25	RAJASTH AN	12	3	1	9	0	-	1	9	1	-	0	0	-	-	-	36
26	SIKKIM	5	3	0	-	-	-	2	-	-	-	-	-	1	-	-	11
27	TAMIL NADU	3	0	3	41	52	16	7	7	41	1	1	1	1	-	0	174
28	TELANGA NA	4	-	3	24	1	32	32	13	4	0	1	1	-	-	-	115
29	TRIPURA	0	0	0	-	-	-	-	0	0	-	-	-	-	-	-	0
30	UTTAR PRADESH	111	44	65	9	16	14	12	6	1	0	6	5	-	-	-	289
31	UTTARAK HAND	0	1	0	0	0	-	2	-	0	-	-	-	-	-	-	3
32	WEST BENGAL	3	1	-	-	-	-	0	1	-	-	-	-	-	-	-	5
	GRAND TOTAL	379	168	133	132	124	118	108	105	66	11	11	9	5	1	1	1371

ANNEXURE-XXIII: SUMMARY OF ALL OIL TYPES FAILED				
S NO	OIL TYPE	NO. OF SAMPLES PICKED UP/ ANALYSED		% SAMPLES FAILED

ANNEXURE-XXIII: SUMMARY OF ALL OIL TYPES FAILED				
S NO	OIL TYPE	NO. OF SAMPLES PICKED UP/ ANALYSED	SAMPLES FAILED	% SAMPLES FAILED
1	SAFFLOWER OIL	10	5	50.0%
2	RICE BRAN OIL	218	105	48.2%
3	SESAME OIL	281	125	44.5%
4	GROUNDNUT OIL	304	132	43.4%
5	PALM OIL	306	118	38.6%
6	COCONUT OIL	195	66	33.8%
7	MUSTARD OIL	1302	379	29.1%
8	CANOLA OIL	32	9	28.1%
9	BLENDED OIL	483	133	27.7%
10	ANY OTHER OIL	43	11	23.8%
11	SUNFLOWER OIL	457	108	23.6%
12	SOYBEAN OIL	733	168	22.9%
13	COTTONSEED OIL	80	11	13.8%
14	CORN OIL	15	1	6.7%
15	FLAXSEED OIL	2	0	0.0%
	GRAND TOTAL	4461	1371	30.7%

ANNEXURE - XXIV: STATE-WISE AND OIL-WISE FAILURE IN ORYZANOL CONTENT

State/ UT	% of failed samples	Number of failed samples
MANIPUR	29.03%	27
BLENDED OIL	17.20%	16
SOYBEAN OIL	7.53%	7
MUSTARD OIL	4.30%	4
UTTAR PRADESH	15.05%	14
MUSTARD OIL	7.53%	7
RICE BRAN OIL	4.30%	4
SOYBEAN OIL	2.15%	2
SESAME OIL	1.08%	1
RAJASTHAN	11.83%	11
RICE BRAN OIL	9.68%	9
BLENDED OIL	1.08%	1
MUSTARD OIL	1.08%	1
JAMMU AND KASHMIR	11.83%	11
MUSTARD OIL	5.38%	5
SOYBEAN OIL	3.23%	3
SESAME OIL	2.15%	2
RICE BRAN OIL	1.08%	1
NAGALAND	7.53%	7
BLENDED OIL	5.38%	5
SOYBEAN OIL	1.08%	1
MUSTARD OIL	1.08%	1
MADHYA PRADESH	5.38%	5
RICE BRAN OIL	4.30%	4
MUSTARD OIL	1.08%	1
TELANGANA	5.38%	5
RICE BRAN OIL	5.38%	5
HIMACHAL PRADESH	3.23%	3

State/ UT	% of failed samples	Number of failed samples
RICE BRAN OIL	3.23%	3
TAMIL NADU	2.15%	2
RICE BRAN OIL	2.15%	2
KARNATAKA	2.15%	2
SESAME OIL	1.08%	1
GROUNDNUT OIL	1.08%	1
ANDHRA PRADESH	2.15%	2
RICE BRAN OIL	2.15%	2
ODISHA	2.15%	2
SUNFLOWER OIL	1.08%	1
MUSTARD OIL	1.08%	1
DELHI	1.08%	1
MUSTARD OIL	1.08%	1
SIKKIM	1.08%	1
MUSTARD OIL	1.08%	1
Grand Total	100.00%	93

ANNEXURE - XXV: TEST-WISE DATA FOR NUMBER OF SAMPLES TESTED, FAILED AND PERCENTAGES OF FAILURE

S. No.	Test	Number of samples tested for parameter (data submitted with results)	Number of Tests failed	% Failed
1	Physical Examination	4281	22	0.51
2	Allyl isothiocyanate	1093	19	1.74
3	Acid Value	4442	123	2.77
4	Bellier Test	2190	75	3.42
5	Oleic Acid Content	625	5	0.80
6	Butyro-Refractometer reading	4276	212	4.96
7	Cloud Point	1490	4	0.27
8	Flash Point	1240	2	0.16
9	Iodine Value	4297	233	5.42
10	Insoluble Impurities	872	1	0.11
11	Moisture	1427	32	2.24
12	Moisture and Volatile Matter	1111	17	1.53
13	Peroxide Value	926	2	0.22
14	Phosphorus	749	11	1.47
15	Polenske Value	292 162	5	1.71
16	Rancidity	4141	43	1.04

17	Refractive Index	4060	198	4.88
18	Saponification Value	4299	199	4.63
19	Suspended and Other Foreign Matter, Separated water, Added Flavouring and Coloring Substances	4278	3	0.07
20	Test for Oryzanol	1788	93	5.20
21	Test for presence of Argemone Oil	4433	15	0.34
22	Test for presence of Castor Oil	1538	1	0.07
23	Test for presence of Mineral Oil	4238	25	0.59
24	Test for presence of Olive Residue Oil in Olive Oil	124	1	0.81
25	Test for Sesame Seed Oil	1011	6	0.59
26	Unsaponifiable Matter	4299	75	1.74
27	BHA	1335	3	0.22
28	TBHQ	1831	5	0.27
29	DMPS	351	11	3.13
30	Vitamin A	1197	216	18.05
31	Vitamin D2	1130	203	17.96
32	Vitamin D3	449	12	2.67
33	Fatty Acid Profile	3920	680	17.3

FSSAI Edible Oil Survey-2020

i.	C6:0 (Caproic acid)	3942	3	0.08
ii.	C8:0 (Caprylic acid)	3969	29	0.73
iii.	C10:0 (Capric acid)	3965	46	1.16
iv.	C12:0 (Lauric acid)	4050	63	1.56
v.	Trans Fatty Acid	3045	15	0.49
vi.	C14:0 (Myristic acid)	4084	86	2.11
vii.	C16:0 (Palmitic acid)	4210	311	7.39
viii.	C16:1 (Palmitoleic acid)	4006	27	0.67
ix.	C17:0 (Margaric acid)	3811	34	0.89
x.	C17:1 (Cis -10 Heptadecanoic)	3820	14	0.36
xi.	C18:0 (Stearic acid)	4195	140	3.34
xii.	C18:1 (Oleic acid)	4223	168	3.98
xiii.	C18:2 (Linoleic acid)	4223	254	6.01
xiv.	C18:3 (Linolenic acid)	4185	173	4.13
xv.	C20:0 (Arachidic acid)	4088	133	3.25
xvi.	C20:1 (Eicosenoic acid)	4124	153	3.71
xvii.	C20:2 (Eicosadienoic acid)	4031	63	1.56
xviii.	C22:0 (Behenic acid)	4050	120	2.96
xix.	C22:1 (Erucic acid)	4012	139	3.46
xx.	C22:2 (Docosadienoic acid)	4018	38	0.95

xxi.	C24:0 (Lignoceric acid)	4030	61	1.51
xxii.	C24:1 (Nervonic acid)	4037	39	0.97
34	Mercury	3788	4	0.105
35	Lead	3799	60	1.58
36	Arsenic	3803	9	0.24
37	Iron	411	2	0.49
38	Total Aflatoxins	2896	29	1
39	Aflatoxin B1	2896	28	0.96
40	Aflatoxin B2	2896	9	0.31
41	Aflatoxin G1	2896	4	0.14
42	Aflatoxin G2	2896	2	0.07
43	TPC	3370	11	0.33
44	Cypermethrin	322	1	0.31
45	Dichlorvos	1545	2	0.13
46	Indoxacarb	717	1	0.14
47	Mepiquat Chloride	516	1	0.19
48	Methyl Parathion	1167	4	0.34
49	Phenthoate	3419	7	0.20
50	Labelling Requirements	4233	364	8.58
51	Hydrocyanic acid	138	31	22.46



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