

**MODEL GUIDELINES**  
for  
**Assaying Laboratory at Mandis under e-NAM**



**September-2017**

**Directorate of Marketing & Inspection (DMI)  
Ministry of Agriculture and Farmers Welfare  
Department of Agriculture, Cooperation and Farmers Welfare  
Government of India**

## CONTENTS

<b>Section</b>	<b>Title</b>	<b>Page</b>
1	Introduction	3
2	Objectives	4
3.	Role of various agencies	4
4.	Assaying Equipment benefit over traditional Methods	5
5.	Validation	5
6.	Management Requirements	6
7.	Physical infrastructure	7
8	Safety & Hygiene	7
9.	Laboratory organization	8
10.	Training	8
11.	Reporting & Progress Review	8
12.	Sampling	8
13.	Tradable commodities	9
14.	Equipment	10
15.	Annexure I	11
16.	Annexure II	12
17.	Annexure III	13
18.	Annexure IV	14
19.	Annexure V	15
20.	Annexure VI	16
21.	Annexure VII	17
22.	Annexure VIII	18

## 1. INTRODUCTION

National Agriculture Market is a virtual market with a physical market (mandi) at the back end. Electronic National Agricultural market (e-NAM) networks the existing APMC/mandis to create a unified national market for agricultural commodities for pan-India electronic trading. It has one of the objective as to establish quality assaying systems for quality assurance to promote informed bidding/online trading for farmers and buyer. The assaying of agricultural produce at the market level is of utmost importance to enhance the marketability of the produce and to enable the farmers to realize price commensurate to the quality of their agricultural produce. Tradable parameters have been formulated and continuing to facilitate quality assaying of notified commodities for trading on e-NAM platform.

(1) Model Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017 (APLM Act 2017) vide Section 2(5) defines “Assaying lab” as a laboratory set up, as prescribed in the Rules/Bye-laws/guidelines/ instructions, for testing of quality parameters as per the tradable parameters or grade-standards or any other parameters notified by the competent authority.

Model APLM Act 2017 vide Section 41 (6) states that Market Committee may establish or allow to be established 3rd party assaying /testing labs, and, therefor, constitute a committee, as may be prescribed, to promote assaying, grading and activities and services incidental thereto.

Model APLM Act 2017 vide Section 132 (2) (XXV) envisages to develop procedure for setting up of assaying labs including in private sector and promotion of quality certification system. Constitution of committee with technical member of Directorate of Marketing & Inspection to promote quality certification system.

(2) The Establishment of assaying laboratories for testing of agricultural produces on tradable parameters at APMCs is essential for all stakeholders. These guidelines are prepared to frame required standards and specifications for assaying laboratories, manpower requirements equip human resource and lay down the procedures for approval of assaying Laboratories and other activities incidental thereto. The states need to put in place a system of quality assaying wherein no farmer is charged for the assaying services.

(3) Laboratory quality can be defined as accuracy, reliability and timeliness of reported test results. The laboratory results must be as accurate as possible, all aspects of the laboratory operations must be reliable, and reporting must be timely to be useful. In this manual, minimum requirement for establishing an assaying laboratory have been mentioned. Assaying laboratory is to be equipped with modern equipment which are fast, accurate, easier to use, reliable and acceptable to all stakeholders. However, the laboratory may have additional facilities and may be continuously upgraded / modernized. Mandis may set up additional labs depending upon volumes of arrivals in the market. This guideline covers assaying laboratory

equipped for 90 Agricultural Commodities like Cereals, Pulses, Oil seeds, Fruits &Vegetables etc for online trading by farmers/traders under e-NAM.

## **2. Objectives (vide para (2) of eNAM guidelines 2016):**

The main objectives of the Scheme are -

(i) to integrate markets first at the level of the States and eventually across the country through a common online market platform, to facilitate pan - India trade in agricultural commodities;

(ii) to streamline marketing / transaction procedures and make them uniform across all markets to promote efficient functioning of the markets;

(iii) to promote better marketing opportunities for farmers / sellers through online access to more buyers / markets, removal of information asymmetry between farmer and trader, better and real-time price discovery based on actual demand and supply of agri-commodities, transparency in auction process, prices commensurate with quality of produce, online payment etc. that contribute to marketing efficiency;

**(iv) to establish quality assaying systems for quality assurance to promote informed bidding by buyers; and**

(v) to promote stable prices and availability of quality produce to consumers.

## **3. Role of various Agencies:**

### **(1) Role of DMI ( vide para 8.2 (iii), (iv) (v) of eNAM guidelines)**

(iii) provide technical advice/support to the State Agricultural Marketing Department /Directorate /Board/ APMC/RMC for establishing quality assaying laboratory and related apparatus and issues incidental thereto;

(iv) frame and release required standards and specifications for assaying laboratories, manpower requirements and other activities incidental thereto;

(v) equip human resource and lay down the procedures for approval of assaying Laboratories;

### **(2) Role of APMC ( vide para 8.7 (vi) (vii) (viii) of eNAM Guidelines)**

(vi) set up Quality Assaying Laboratory with skilled manpower to ensure quality assaying of produce offered for sale on e-NAM compulsorily. Such labs shall be approved by an Agency notified by the Department/ State;

(vii) promote third party assaying labs duly approved by an agency notified by the Department / State;

(viii) put in place a system of quality assaying wherein no farmer is charged for the assaying services;

## 4. Assaying Equipment benefit over traditional methods

Since Assaying equipment are calibrated to mimic a reference method they inherit the variability of that reference method (mostly BIS methods). Here it is important to recognize that all analytical methods do have a certain variability. Some methods have a very low variability, whereas others have a higher one. More manual methods generally have a higher variability than highly automated ones.

(1) **Accuracy and precision:** It is also very important to recognize the difference between two commonly used terms i.e. accuracy and precision. Precision is the ability to repeat the same result several times, whereas accuracy is the ability to reach the correct results. **The best way to study accuracy is to participate in proficiency tests and compare results with those of other labs. It is also possible to analyze a set of samples at a second independent lab and calculate the standard deviation between the two labs at regular intervals.**

Over the years assaying instruments are very widely adopted in worldwide laboratories, as it offers significant benefits over the chemical analysis methods it replaces.

(2) **The assaying lab should have;**

- (i) Testing capabilities for all the tradable parameters of notified agricultural commodities.
- (ii) Sophisticated and reliable assaying equipment / instruments
- (iii) Approved Assayers
- (iv) Quick turnaround time
- (v) Validated techniques

## 5. Validation - Adjustment of Instruments calibrations

Validation is a confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled

(1) **Method validation** is an important requirement in the practice of chemical analysis. Requirements in standards such as ISO/IEC 17025 [1], ISO 15189 [2] and ISO 15195 [3] have helped in clarifying this. For example, the need to demonstrate that methods are fit for purpose is stressed in Clause 5.4.2 of ISO/IEC 17025: “The laboratory shall use test and/or calibration methods, including methods for sampling, which meet the needs of the customer and which are appropriate for the tests and/or calibrations it undertakes...” and further: “When the customer does not specify the method to be used, the laboratory shall select appropriate methods...”.

According to the International Standard ISO/FDIS 12099 at least 10 samples are needed for determination of bias and at least 20 samples are needed for determination of the calibration performance, expressed as the Standard Error of Prediction (SEP).

## **(2) Analyzing samples for validation**

It is recommended to analyze the exact same sample on the instrument and by the reference methods. Very few sample types are completely homogenous and there are differences between different sub-portions of a sample. Hence sample should be homogenized.

Minimize the time between assaying instrument and reference analysis to reduce the risk in samples quality change. The moisture content changes very rapidly and samples should be vacuum packed or stored in airtight containers in an environment where they will not degrade. Regular plastic bags are not sufficient for storage.

To minimize errors samples should be measured in duplicate, both by assaying instrument and by the reference methods.

The farmer/producer gets paid based on the grain quality/range and the amount of grain/agricultural produce delivered, hence it is critical that results are accurate and comparable regardless of location of the Assaying lab /APMC.

## **6. MANAGEMENT REQUIREMENTS**

- (1) Deficiencies encountered such as poor performance in ILC/PT, non- repeatability of test results while performing quality checks shall be registered as non-conforming testing work and suitable corrective actions taken after conducting root cause analysis.
- (2) Records of personnel including training records shall be kept permanent - i.e. so long as the person is working in the laboratory. Similarly, history of individual equipment shall be kept permanent – so long as the equipment is used in the laboratory.
- (3) Internal audit of the laboratory shall be conducted at least once in 12 months and shall cover all the sections including the testing section(s) and covering all the applicable requirements of ISO/IEC 17025:2005 and NABL 103.
- (4) “Analytical measurements should be made to satisfy an agreed requirement.” (i.e. to a defined objective).
- (5) “Analytical measurements should be made using methods and equipment which have been tested to ensure they are fit for purpose.”
- (6) “Staff making analytical measurements should be both qualified and competent to undertake the task.” (and demonstrate that they can perform the analysis properly).
- (7) “There should be a regular independent assessment of the technical performance of a laboratory.”
- (8) “Analytical measurements made in one location should be consistent with those made elsewhere.”
- (9) “Organisations making analytical measurements should have well defined quality control and quality assurance procedures.”

7. **Physical infrastructure:**The Laboratory building layout should be devised with efficiency in mind. The infrastructural design of the laboratory may be made by engineers of State, along with following points for better working condition and environment.
- (i) The assaying laboratory should have a cemented room of about the size of 20 feet x 15 feet. The room should have proper ventilation and a proper door with which it can be securely closed.
  - (ii) The laboratory room should have a side working table 2 to 2.5 feet in breadth with 3 feet in height covering the entire length and breadth of each side of the room with at least one wash basin at each end of the table with proper drainage facilities.
  - (iii) The laboratory room should be provided with running water supply and electricity.
  - (iv) **Optional:** A separate air-conditioned room of the size 10 feet x 10 feet attached to the main laboratory room for purpose of receiving and keeping of samples and records safely.
  - (v) A wooden/steel almirah, a working table and a chair should be provided.
  - (vi) Internet connectivity is a pre-requisite for integration with the e-NAM software since the reports will be auto generated and posted on the bidding page.

**8. Safety and Hygiene:**

- (i) The laboratory building should have a cemented construction and should be clean and maintained in a hygienic condition.
- (ii) The laboratory should have good ventilation and should be protected from rain water.
- (iii) Laboratories should be well-lit for smooth operations.
- (iv) Flooring needs to be of a non – slip material.
- (v) The laboratory should always be kept clean and be practically free from insect, rodents etc.
- (vi) The waste materials generated during grading and or other operations should be disposed of immediately so as to avoid any type of contamination.
- (vii) The assayer shall strictly abide by the instructions given in the manual and follow the methods and procedures as per the trading parameters of respective commodities.
- (viii) Due care and precautions should be taken while storing /handling hazardous chemicals
- (ix) Electrical apparatus should have proper earthing to avoid fire due to short-circuiting. Electricity must either be a stable supply, or the voltage must be stabilized by either one large stabilizer for the whole laboratory. The lab should have sufficient number of electrical sockets.
- (x) Inflammable and poisonous chemicals should be kept away from the sources of heat and naked flame.
- (xi) Eating, drinking, and smoking are always discouraged, and should be prohibited, in the laboratory.
- (xii) Fire extinguisher for laboratory purposes should be provided.
- (xiii) At least two entrances/exits should be provided for each laboratory whenever possible.
- (xiv) First Aid box should be available in the lab, along with emergency Telephone no. of hospital/doctors/contact person.

## 9. **Laboratory organization:**

### **Manpower:**

- (i) The assaying laboratory shall have sufficient numbers ( min 2) of Approved Assayers based on agricultural produce arrivals ( nos of lots) in mandi
- (ii) Assayers should have studied Chemistry as one of the subject at graduation level, reporting to Mandi secretary/ or as decided by SAMB/Market Committee.
- (iii) The laboratory shall have an attendant who should have minimum Xth Class pass educational qualification.

## 10. **Training:**

- (i) The Assayer should have undergone training in the grading of the agricultural commodities from Regional Agmark laboratory of DMI.
- (ii) The assayers should be provided commodity specific training at various institutes like Ginning Training Center Nagpur on cotton assaying etc.
- (iii) Regular and refresher training should be organized at competent labs/training center to keep the personnel update for new tradable commodities.

## 11. **Reporting &Progress review:**

- (i) The assayer will carry out the assaying of agricultural commodities and shall keep all records pertaining to grading of commodities and will issue report etc
- (ii) All the analysis records must be documented.
- (iii) Backup copies of records may be held in electronic form.
- (iv) Random checking of the results should be done inter-laboratory and intra-laboratory to check the proficiency of the personnel.
- (v) The laboratory shall use only official methods of testing.
- (vi) A referral lab may be identified by the State in case of any dispute.
- (vii) Laboratory report format is at Annexure VII
- (viii) List of instruments available in assaying laboratories and working condition of instruments is at **Annexure VIII**

## 12. **Sampling:**

- (i) **Loose Heap:** From a lot, sample might be drawn by inserting hand into the heap up to elbow or more, with the palm upward. The palm should then be cupped with fingers holding tightly together so that the dirt does not strain from the commodity. The arm should be withdrawn slowly. Commodity should be transferred into a sample bag. Such samples should be taken out from different sides and depths. A required quantity as mentioned for particular commodity in Tradable Parameters should be collected. This should be mixed thoroughly to ensure a homogeneous mixture. Each lot should be separately sampled.
- (ii) **Bins:** Samples should be drawn of different depths with the help of a probe sampler. The small quantity samples so drawn should be mixed together to obtain a composite sample of a lot.
- (iii) **Bagged / Packed commodities:** Samples may be taken with a sampler (Parkhi) or by inserting hand or by means of a long scoop after cutting open the seams. An equal number of scoops should be taken out from the top and center of the packages. The quantity of sample drawn from each bag should not exceed 200 g. The sample so drawn should be thoroughly mixed to from composite mixture.

### 13. Commodities for which tradable parameters published up to August 2017

#### A. FOOD GRAINS

1. Arhar
2. Moong whole
3. Masoor (whole)
4. Urad (whole)
5. Wheat
6. Maize
7. Chana (whole)
8. Bajra
9. Barley
10. Jowar
11. Paddy
12. Rajma
13. Ragi
14. Lobia
15. Basmati rice
16. White Peas
17. Castor seed
18. Mustard seed
19. Soyabean
20. Groundnut
21. Cotton seed
22. Sunflower seed
23. Kusum seed
24. Sesame seed
25. Niger Seed
26. Sal Seed
27. Coconut
28. Pongam seeds
29. Peanuts

#### C. FRUITS

30. Apple
31. Pear
32. Mandarin
33. Sapota
34. Musk melon
35. Table grapes
36. Litchi
37. Pomegranate
38. Banana
39. Plum
40. Peach
41. Mango
42. Sweet orange
43. Custard apple
44. Watermelon
45. Lemon
46. Guava
47. Jackfruit
48. Kinuu
49. Cashew nut
50. Raw Mango
51. Onion
52. Tomato
53. Pea
54. Bottle gourd
55. Bitter gourd
56. Cucumber
57. Brinjal
58. Cabbage
59. Cauliflower
60. Green chillies

61. Carrots
62. Sweet potato
63. Spinach (palaksaag)
64. Mustard leaf (sarsosaag)
65. Potato
66. Coriander leaves
67. Garlic
68. Lady finger
69. Ginger
70. Beetroot
71. Ribbed celery
72. Cluster beans
73. Ridge Gourd (Turai)
74. Reddish
75. Sweet Corn
76. Capsicum
77. Jimikand (Suran)

#### E. SPICES

- 78 Cumin
79. Red chilli
80. Turmeric
81. Ajwain
82. Coriander whole
83. Dried Raw Mango Slices

#### F. MISC.

84. Cotton
85. Guar gum seed
86. Mahua flower
87. Tamarind seed
88. Jaggery
89. Reetha
90. Bamboo

## 14. Equipment:

- (i) All the equipment should be under permanent control of the laboratory and should be capable of in context of the tests performed.
- (ii) The equipment must be calibrated depending upon the requirements by an outside accredited lab and/or internally as the case may be.
- (iii) Instruction manual, operation manual and other details of the equipment like calibration, due date of calibration, safety precaution, etc must be available at the side of the equipment.
- (iv) Each equipment should be uniquely identifiable.
- (v) The equipment should be placed and test must be performed under a proper environmental condition as prescribed.
- (vi) Equipment not working should be placed under a tag "out of order".
- (vii) Maintenance plan of the equipment should be available and should be done under annual maintenance contract.
- (viii) The equipment should be handled by technically competent and Approved personnel only.
- (ix) Proper procedure as prescribed by the manufacturer should be followed for cleaning of the equipment and its accessories before and after use.
- (x) Do and don'ts regarding important instruction should be available along with side of the equipment and should be visible all the time.
- (xi) Software of equipment should be upgraded and validated from time to time.
- (xii) The equipment should be placed on a vibration free platform.
- (xiii) A computer with printer may be provided
- (xiv) The details of equipment, glassware and chemicals required for assaying of tradable commodities are at Annexures;
  - 1. Food Grains at **Annexure-I**
  - 2. Oil seeds at **Annexure-II**
  - 3. Fruits & Vegetables at **Annexure-III**
  - 4. Spices at **Annexure-IV**
  - 5. Cotton at **Annexure-V**
  - 6. Miscellaneous at **Annexure-VI**

## EQUIPMENT REQUIRED FOR GRADING OF CEREALS AND PULSES (16 COMMODITIES)

1.Arhar,2. Moong Whole,3. Masoor(Whole),4. Urd (Whole), 5. Wheat, 6. Maize, 7. Chana(whole),8. Bajra,9. Barley,10. Jowar, 11. Paddy, 12. Rajma, 13. Ragi, 14. Lobia, 15. Basmati rice, 16. White peas

Sr. No	Tradable Parameter	Name of Equipment	Technical Specification, if any	Aprox. Cost
1	2	3	4	5
1	Moisture (i) or (ii)	(i) Near Infra-Red (NIR)spectroscopy Analyser	Near Infrared Analyser from reputed original equipment manufacturer, Capability to test <b>moisture, oil content, protein, fiber, sugars, starch, gum content</b> and other organic compounds which absorbs Infra-red light	Rs 14 lakhs
		(ii) Digital Moisture meters	1. Digital Moisture meter (3.5 -40%), capacitance technology or 2. Heating element metal tabular with electronic balance(0.01 % readability) or 3. Halogen based heating module/ Infra based heating module	1. Rs 16,500 2. Rs 1.5 lakhs 3. Rs 1.00 lakhs
		Multipurpose Lab Accessories	1. Inkjet/Laser jet printer 2. Grinder 3. Thermometer: Digital or Mercury (0.1deg least count) 4. Hotplate: Round or rectangular,electrical, Thermostatic control, Max surface temp: 350C 5. Desiccators: Sealable enclosures containing desiccants, Made of heavy glass 6. Oven (digital): ambient to 250 C (0.1deg)	1. Rs 4000 2. Rs 1000/- 3. Rs 1000/- 4. Rs 5000/- 5. Rs 5000/- 6. Rs 60,000/-
2.	Foreign Matter	(i) Manual assaying	<b>(i) Electronic Balance:</b> Digital(electromagnetic type), up to four decimal places <b>Accessories:</b> i. Bullion weights (5g, 10g, 50 g, 100 g, 500g) ii. Sample storage container suitable to sampling size iii. Four Sieves: 4.0mm (mesh No. 5) a) 3.35mm, (mesh No.6) b) 1.70mm, (mesh No. 12) c) 1.00mm (mesh No. 18) iv. Enameled Plates: Flat type with raised rims v. Forceps: Laboratory grade vi. Magnifying Glass: (magnification of 10x) Laboratory grade vii. Small scoop (with handle 105mm x 100mm x 25mm) <b>(ii) Computer vision based assaying</b>	(i) Rs 1.5 Lakh
		or (ii) Electronic Assaying		(ii) Competitive price
3.	Other Edible grains	As above	Approved Assayer	Not Applicable
4.	Slightly Damaged Grains			
5.	Weevilled Grains			
6.	Luster	Visual	-do-	Not Applicable
7.	Uniformity	-do-	-do-	Not Applicable

Note: Prices are indicative which may vary model to model.

**EQUIPMENTS REQUIRED FOR GRADING OF OIL SEEDS (13 COMMODITIES)**

1. Caster seed, 2. Mustard seed, 3. Soyabean, 4. Groundnut, 5. Cotton Seed, 6. Sun flower seed, 7. Kusum seed, 8. Sesame seed, 9. Niger Seed, 10. Sal Seed, 11. Coconut, 12. Pongam Seeds, 13. Peanuts

<b>Sr.No</b>	<b>Name of Tradable Parameter</b>	<b>Name of Equipment</b>	<b>Technical Specification, if any</b>	<b>Aprox. Cost</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	Oil Content	NIR	Vide Sr. No. 1 of Annexure I	As at Annexure I
2.	Moisture	NIR or Digital Moisture Meter	Vide Sr. No. 1 of Annexure I	As at Annexure I
3.	Foreign Matter	Manual/electronic assaying	Vide Sr. No. 2 of Annexure I	As at Annexure I
4.	Other Edible grains	-do-	-do-	-do-
5.	Slightly Damaged Grains			
6.	Weevilled Grains			
7.	Luster	Visual	Approved Assayer	Not Applicable
8.	Uniformity	-do-	-do-	-do-

Note: Prices are indicative which may change model to model.

**EQUIPMENT REQUIRED FOR GRADING OF FRUITS & VEGETABLES (48 COMMODITIES)**

1. Apple, 2.Pear, 3.Mandarin, 4.Sapota,5.Musk Melon, 6.Table Grapes, 7.Litchi,8.Pomegranate,9.Banana, 10.Plum, 11.Peach, 12.Mango,13.Orange, 14.Custard Apple,15. Watermelon, 16.Lemon,17.Onion,18.Tomato, 19.peas,20.Bottle Gourd, 21.Bitter Gourd, 22.Cucumber, 23.Brinjal, 24.Cabbage, 25.Cauliflower, 26.Green Chilli,27. Carrots,28.Sweet potato, 29.Spinach,30. Mustard leaf,31.Potato,32.Coriander leaves,33.Garlic, 34.Lady finger,35.Ginger, 36.Beetroot,37.Ribbed celery, 38.Guava,39.Jackfruit, 40.Kinuu,41.Cashew Nut, 42.Raw Mango, 43. Cluster beans,44. Ridge Gourd(Turai), 45. Reddish,46.Sweet Corn,47. Capsicum, 48. Jimikand (Suran)

<b>Sr.No</b>	<b>Name of Tradable Parameter</b>	<b>Name of Equipment</b>	<b>Technical Specification, if any</b>	<b>Approximate cost (in Rs.)</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1.	Appearance	Visual	Approved Assayer	Not Applicable
2.	Uniformity	Manual	Approved Assayer	Not Applicable
3	Color	1.Colourimeter /chromameter or 2.Visual	1. Table top or portable instrument from reputed firm 2.Assayer should be free from colour blindness	1. 1.0 lakh 2.Not Applicable
4	Size	Digital Vernier calipers	Least count: 0.01mm (Measuring Range: 0-300mm)	Rs. 3000/-
5	Shape	-do-	-do-	-do-
6	Defects	Manual	Approved Assayer	Not Applicable

Note: Prices are indicative which may change model to model.

**Annexure IV****EQUIPMENT REQUIRED FOR GRADING OF SPICES (6 COMMODITIES)**

(1. Cumin 2. Red Chilli, 3. Turmeric, 4. Ajowain, 5. Coriander whole, 6. Dried Raw Mango Slices)

<b>Sr.No</b>	<b>Name of Tradable Parameter</b>	<b>Name of Equipment</b>	<b>Technical Specification, if any</b>	<b>Approximate cost (in Rs.)</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	Color	1.Colourimeter/chromameter or 2. Manual	Vide Sr. No3 of Annexure III	As at Annexure III
2	Size	Digital Vernier calipers	Least count 0.01 mm, Measuring Range: 0-300mm	Rs. 3000/-
3	Shape	Digital Vernier calipers	-do-	-do-
4	Defects	Manual	Approved Assayer	Not Applicable
5	Moisture	Digital Moisture meters	Vide Sr. No. 1 of Annexure -I	As at Annexure -I
6	Foreign Matter	Manual/electronic assaying	Vide Sr. No. 2 of Annexure -I	Rs1 lakh
7	Shriveled, Immature, Weevilled, Damaged and Discolored seed	-do-	-do-	-do-
8	Insect Damage matter	-do-	-do-	-do-
9	Unripe and marked fruits, broken fruits and Fragment	-do-	-do-	NA
10	Capsaicinoid content (Red Chili)	UV visible Spectrophotometer	Double beam Wavelength range: 200-800 nm	Rs 3.50 lakhs
11	Curcumin content (Turmeric)	-do-	-do-	-do-
12	Luster	Visual	Approved Assayer	NA
13	Uniformity	-do-	--	NA
14	Defective Rizomes (In Turmeric)	-do-	--	NA

Note: Prices are indicative which may vary model to model.

**EQUIPMENT REQUIRED FOR GRADING OF COTTON**

<b>Sr.No</b>	<b>Tradable Parameter</b>	<b>Name of Equipment</b>	<b>Technical Specification, if any</b>	<b>Aprox. Cost</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1	Staple length	1. High Volume Instrument (HVI) 2. High Volume tester (HVT)	Rapid fiber testing instrument for measuring the fiber quality, combined and independent module testing	1. 1 Cr 2. 25 lakhs
2	Trash	-do-	-do-	-do-
3	Fiber/Bundle Strength	-do-	-do-	-do-
4	Micronaire	-do-	-do-	-do-
5	Mature fiber	-do-	-do-	-do-
6	Moisture	-do-	-do-	-do-
7	Linters	Delinting Machine	Delinting Machine	Competitive price

Note: Prices are indicative which may change model to model.

**EQUIPMENT REQUIRED FOR GRADING OF MISC COMMODITIES (6 Commodities)**

1. Guargum Seed, 2. Mahua Flower, 3. Tamarindseed 4. Jaggery or Gur, 5. Reetha

Sr.No	Tradable Parameter	Name of Equipment	Technical Specification, if any	Aprox. Cost
1	2	3	4	5
1	Moisture	Digital Moisture meter	Vide Sr. No. 1 of Annexure I	As at Annexure I
2.	Foreign Matter	Manual/electronic assaying	Vide Sr. No. 2 of Annexure I	As at Annexure I
3.	Protein content (in Guar gum)	NIR Analyser	Vide Sr. No. 1 of Annexure I	As at Annexure I
4.	Gum content (in Guar gum)	NIR Analyser	Vide Sr. No. 1 of Annexure I	As at Annexure I
5.	Total Reducing Sugar plus sucrose	Refractometer	Digital Refractometer	Rs. 4.5 lakh
7.	Damaged pods and seed content	Electronic balance	Approved Assayer	Not Applicable
8.	Immature, Damaged and discolored seed	Electronic balance and accessories	Approved Assayer	Not Applicable
9.	Defects	Electronic balance and accessories	Approved Assayer	Not Applicable
10.	Crude fiber, Ash content	NIR Analyser	Vide Sr. No. 1 of Annexure I	As at Annexure I
11.	Luster	Visual	Approved Assayer	Not Applicable
12.	Uniformity	-do-	-do-	Not Applicable
<b>6. Bamboo</b>				
1	Girth at thin end	Measuring tape	Tape with least count of 1 mm	Rs 1000/-
2	Standard Lengths (In meter)	-do-	-do-	-do-
3	Girth Class (In cm)	-do-	-do-	-do-

Note: Prices are indicative which may vary model to model.

**ASSAYING REPORT (Lot wise)**

1. Name of the commodity:
2. Lot ID/Gate ID:
3. Name of farmers/seller:

Sr.No.	Tradable Parameters	Range of Characteristics			Value Obtained	Recommended Range of Lot	Test Method
		Range I	Range II	Range III			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Signature of Assayer  
Date

Authorized Signatory  
Designation  
Name of APMC

**Status of Instruments/Equipment (Monthly)**

**Name of Mandi:**

**Date of Inspection:**

<b>Sr.No</b>	<b>Name of the Instrument/Equipment</b>	<b>Whether functional , if No, reasons for the same</b>	<b>Whether under Annual Maintenance Contact (AMC), if no reasons for the same</b>	<b>Remarks</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>

**Date**

**Authorized Signatory  
Designation  
Name of APMC**