Guidelines
For the Conduct of Test for
Distinctiveness, Uniformity and Stability
On

Noni
(*Morinda citrifolia* L.)

Protection of Plant varieties and Farmer's Rights Authority

(PPV & FRA)
Government of India

Noni (*Morinda citrifolia* L.)

I. Subject

These test guidelines shall apply to all varieties of Noni of the species *Morinda citrifolia* L.

II. Material required

1. The Protection of Plant Varieties & Farmers Rights Authority (PPV& FRA) shall decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered for registration under the Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001. Applicants submitting such plant material from a country other than India shall make sure that all customs and quarantine requirements stipulated under relevant national legislations and regulations are complied with. As a minimum the applicant may submit 10 grafted or budded plants of Noni on seedling rootstock for each centre (one year old).

2. The plant material supplied should be visibly healthy, not lacking in vigour, nor affected by any important pest or disease.

3. The plant material should not have undergone any treatment, which would affect the expression of the characteristics of the variety, unless the competent authorities allows or request such treatment. If it has been treated, full details of the treatment must be given.

III. Conduct of tests

1. The minimum duration of the DUS test shall normally be at least for two fruiting seasons in succeeded years.

2. The test should be carried out at two test locations with description of agronomic and climatic conditions ensuring satisfactory growth for the expression of the relevant characteristic of the variety and for conduct of the evaluation. Each test should include total of 6 trees for each variety. In particular, it is essential that the trees produce a satisfactory crop of fruit in each of the two growing seasons.

3. The field test shall be carried out following good agricultural practices (GAP) developed by CIARI/NRC on Noni.
4. Test Plot design, the design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle. The additional test protocol for special purpose may be established by PPV & FRA

Locations : Two

Spacing : 4 × 4 m
3 × 3 m (High density or dwarf varieties)

Number of replications : Three
Number plants per replication: Four
5. Accession number collection code with site details may be given.

6. In case of on site DUS testing, Single bearing tree would be taken up for testing of the traits as requested. The details pertaining to the conduct of onsite testing is enclosed as annexure I.
7. Additional tests, if any, for examining special characteristics may be facilitated by PPV FRA.

IV. Methods and Observations

The characteristics described in the Table of characteristics (see section VII) shall be used for the testing varieties and hybrids for their DUS.
For the assessment of distinctiveness and stability, observations shall be made on 4 plants or 16 parts taken from 4 plants with the exception of the observation on fruit which should be taken from each of the plant should be three. The age of the tree for the observation should be five years or above.

1. For the assessment of uniformity a population standard of 5% with an acceptance probability of at least 95% should be applied. In case of a sample size of 6 plants, no off types are allowed.
2. All observations of the tree and the branches should be made during dormancy.
3. Time of bloom should be recorded from opening of first flower to 75% bloom.
4. All observations on the leaf should be made on fully developed leaves of the middle third of current season's shoot.
5. Days to maturity should be recorded from 75% blooming to harvest.
6. Observations on the mature fruit should be recorded when fruit is ready for harvest.
7. Type of assessment of characteristics, indicated in column of table VII of characteristics is as follows:

a) MG: *Measurement by a single observation on a group of plants or parts of plant*
b) MS: *Measurement by a number of observations on a number of individual plants or parts of plant*
c) VG: *Visual assessment by a single observation on a group of plants or parts of plant*
d) VS*: Visual assessment by a single observation on individual plant or parts of plants*

V. Grouping of varieties

1. The candidate varieties for DUS testing shall be divided into groups to facilitate the assessment of Distinctiveness. Characteristic, which are known from experience not to vary, or to vary only slightly within a variety are which in their various states are fairly evenly distributed across all varieties in the collection are suitable for grouping purpose.
2. It is recommended that the concerned authorities use the following characteristics for grouping Noni varieties
   a. Tree growth habit (Characteristic No. 1)
   b. Leaf shape (Characteristic No. 6)
   c. Fruit shape (Characteristic No. 19)
   d. Fruit size (Characteristic No. 22)
   e. Length of Peduncle (Characteristic No. 28)
   f. Fruit flesh colour (Characteristic No. 30)

VI. Characteristics and Symbols

1. To assess Distinctive, Uniformity and Stability, the characteristic and their states as given in the table of characteristics (Section VII) shall be used.
2. Notes (1 to 9) shall be given for each state for expression for different characteristics for the purpose of electronic data processing.
3. Legend

(*) Characteristics that shall be observed during every growing season on all varieties and shall always be included in the description of the variety, except when the state of expression of any of these characters is rendered impossible by a preceding phonological characteristic or by the environmental conditions of the testing region. Under such exceptional situation, adequate explanation shall be provided.

(+) See Explanation on the table of characteristics in Section VIII. It is to noted that for certain characteristics, the plant parts on which observations to be taken are given in the explanation or figure (s) for clarity and not the colour variation.

4. A code number in the sixth column of Table of characteristics indicates the optimum stage for the observation of each characteristic during growth and development of plant. The relevant growth stages corresponding to these code numbers are described below:
    a. Observation on tree vigour and habit should be made during dormant season
    b. Observation on flowers should be made at the time of full bloom (75% flowering)
    c. The observations on the leaves should be made on mature leaves from current season's shoot.
    d. Observation on fruit should be made at mature fruit
    e. Observation on stone should be made after harvest of fruit.

Code for Growth Stages

The code number given in the table on characteristics indicates the optimum growth stage for the observation of each characteristic during the development of the plant.

Growth stage	**Code**
Initial vegetative phase	A
Fully expanded leaves stage	B
Flowering stage	C
Fruiting stage	D
Post harvest features of fruits	E

VII. TABLE OF CHARACTERISTICS

S.No	Characteristics	States	Code	Example varieties	Stage of observation	Types of assessment
1 (+)	Tree canopy	Cylindrical	1	-	A	
		Ellipsoidal	2	-		VG
		Conical	4	HD-6		
		Irregular	6	-		
		Spherical	8	-		
		Bushy	9	SPG-2, TRA-1, TRA-2		
2 (+)	Tree height (cm)	<200 Small	3		A	MS
		200-400 Medium	5	HD-6, SPG-2		
		>400 Tall	7	TRA-1, TRA-2		
3 (*)	Trunk Diameter (cm)	<20	1		A	MS
		20-30	3	HD-6		
		>30	5	SPG-2, TRA-1, TRA-2		
4 (*)	Bark surface	Rough	9	HD-6, TRA-1, TRA-2, SPG-2	A	VG
		Smooth	1	-		
5 (*)	Internode length (cm)	<8	1	HD-6, TRA-1, TRA-2,	A	MS
		8-10	3	-		
		>10	5	SPG-2		
6 (+)	Leaf shape	Elliptic	3	HD-6, TRA-1, TRA-2, SPG-2	B	VG
		Lanceolate	5	-		
		Ovate	7	-		
7 (+)	Leaf apex shape	Acute	1	SPG-2, HD-6, TRA-2	B	VG
		Acuminate	2	TRA-1		
		Obtuse	3	-		
		Cuspidate	4	-		
8 (*)	Leaf lamina colour	Light green(130)	1	TRA-2	B	VG
		Green(134)	3	SPG-2, HD-6		
		Dark Green(131)	5	TRA-1,		
9 (*)	Leaf length (cm)	Very short (15-20)	1		B	
		Short (20-25)	3	TRA-1, TRA-2		MS

		Medium (25-30)	5	SPG-2, HD-6		
		Long (30-35)	7	-		
10 (+)	Leaf width (cm)	Narrow (<10)	3	-	B	MS
		Medium (10-15)	5	SPG-2, HD-6		
		Broad (15-20)	7	TRA-1, TRA-2,		
11 (+)	Leaf petiole length (cm)	Short (<1.0)	3	-	B	MS
		Medium (1-2)	5	-		
		Long (>2)	7	SPG-2, HD-6, TRA-1, TRA-2		
12 (*)	Leaf petiole colour	Light green(130)	3	SPG-2, HD-6	B	VG
		Green (134)	5	TRA-2		
		Whitish green(157)	7	TRA-1		
		Reddish green	9	-		
13 (*)	Flower colour	White (N 155)	3	HD-6, SPG-2, TRA-1, TRA-2	C	VG
		Yellowish white(158)	5			
		Yellow (2-13)	7			
14 (+)	Position of stigma in relation to anther	Stigma is positioned above anthers	1	HD-6, SPG-2, TRA-1, TRA-2	C	VG
		Stigma is positioned at same level as anthers	2	-		
		Stigma is positioned below anthers	3	-		
15 (*)	Presence of pistillate florets	Absent	1	-	C	VG
		Present	9	HD-6, SPG-2, TRA-1, TRA-2		

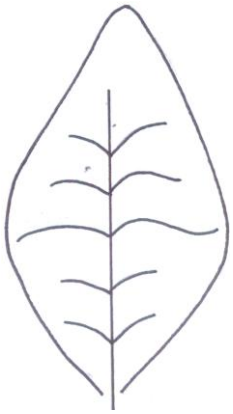
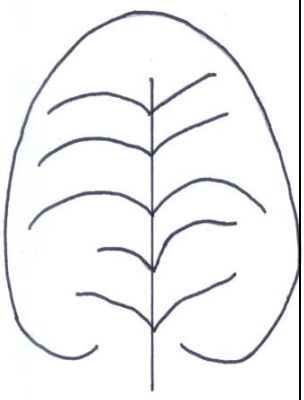
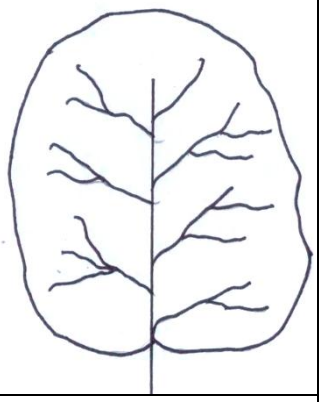
16 (*)	Flower length (cm)	>1	3	-	C	MS
		1-2	5	HD-6, SPG-2, TRA-1, TRA-2		
		>2	7	-		
17 (*)	Fruit colour	Whitish green (157)	3			
		Yellowish green (144-154)	5	SPG-2	D	VG
		Green (134)	7	HD-6, TRA-1, TRA-2		
18 (*)	Fruit surface texture	Smooth	1	TRA-1, TRA-2	D	VG
		Rough	2	SPG-2, HD-6		
19 (+)	Fruit shape	Obovate elongate	3	SPG-2	D	VG
		Obovate wide	5	HD-6, TRA-1, TRA-2		
		Round	7	-		
		Irregular	9	-		
20 (*)(+)	Fruit length (cm)	Very short (≤2.0)	1	-	D	MS
		Short (2.1-4.0)	3	-		
		Short to long (4.1-6.0)	5	TRA-1, TRA-2,		
		Long (6.1-8.0)	7	-		
		Extra long (>8.1)	9	SPG-2, HD-6		
21 (*)(+)	Fruit width (cm)	Narrow 2-4	1	HD-6, TRA-2, TRA-1	D	MS
		Medium >4-6	3	SPG-2, HD-6,		
		Broad >6-8	5	-		
		Very Broad >8	7	-		
22 (*)	Fruit size (length X width)	Very small	1		D	MS
		Small	3	TRA-1, TRA-2		
		Medium	5			
		Large	7	SPG-2		
		Very large	9	HD-6		
23	Fruit weight (g)	Very light	1	-	D	MS

(*)		<50				
		Light 50-100	3	-		
		Medium 100-150	5	SPG-2, TRA-1, TRA-2,		
		Heavy 150-200	7	HD-6		
24 (+)	Fruit bunching	Absent	1	SPG-2,TRA-1,TRA-2,	D	VG
		Present	9	HD-6		
25 (+)	Fruit base shape on mature fruit	Cordate	1	SPG-2, TRA-1, TRA-2	D	VG
		Tapering	2	-		
		Depressed	3	HD-6		
26 (*)	Colour of floral eye ring	Green (134)	1		D	VG
		Brown (N 200)	3	SPG-2, HD-6, TRA-1, TRA-2		
27 (+)	Peduncle (fruit stalk) length positioning at maturity	Sessile	1	SPG-2, HD-6	D	VG
		Pedicellate	3	TRA-1, TRA-2		
28 (*)	length of peduncle	Short	3	TRA-1		VG
		Long	5	HD - 6		
29 (*)	Days to harvest from flowering to fruit ripening	Early (90-100)	1	-	D	MS
		Medium (100-120)	3	TRA-1, TRA-2,		
		Late (>120-130)	5	SPG-2, HD-6,		
		Very late (>130)	7	-		
30 (*)	Fruit flesh colour	White (N 155)	1		D	VG
		Cream (155)	3	TRA-1, TRA-2, SPG-2, HD-6		
		Pink (56)	5			
31 (*)	Average no. of seeds per fruit	Less (<50 seeds/fruit)	1	-	E	MS
		Medium (50-100 seeds/fruit)	3	TRA-1		
		High (100-150) seeds/fruits)	5	HD-6, SPG-2, TRA-2		

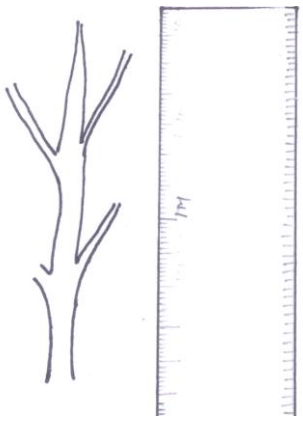
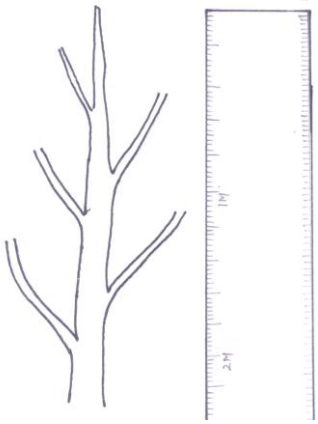
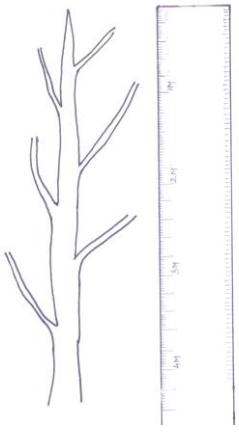
		Very high (> 150 seeds/fruit)	7	-		
32 (+) (*)	Seed length (cm)	Short (<0.5)	1	-	E	MS
		Medium (0.5-0.8)	3	HD-6, SPG-2, TRA-1, TRA-2		
		Long (>0.8)	5			
33 (*)	Seed width (cm)	Narrow (<0.5)	1	HD-6	E	MS
		Medium (0.5-0.7)	3	TRA-1, TRA-2, SPG-2		
		Broad (>0.7)	5	-		
34 (*)	100 seed weight (g)	Light (Less than 2 g)	3	HD-6	E	VG
		Medium (2-3 g)	5	TRA-1, TRA-2, SPG-2		
		Heavy (More than 3 g)	7			
35 (*)	Seed colour	Silver Brown (164)	1	SPG-2	E	VG
		Reddish Brown (184)	2			
		Brown (N 200)	3	-		
		Dark Brown (200)	4	HD-6, TRA-1, TRA-2		
		Black (202)	5	-		
36 (*)	Seed wing	Absent	1	HD-6, SPG-2, TRA-1, TRA-2	E	VG
		Present	9	-		

VIII. EXPLANATION AND ILLUSTRATION ON THE TABLE OF CHARACTERISTICS

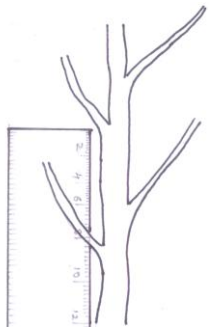
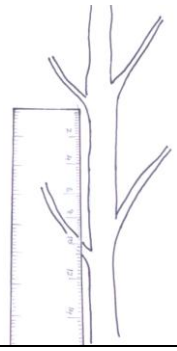
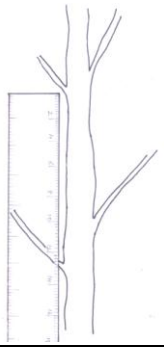
Characteristic 1. Tree canopy

		
Ellipsodial	**Conical**	**Irregular**
		
Spherical	**Cylindrical**	**Bushy**

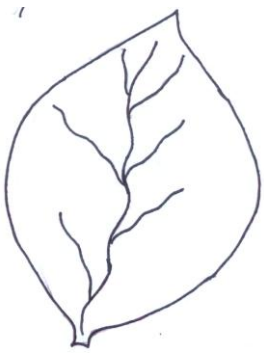
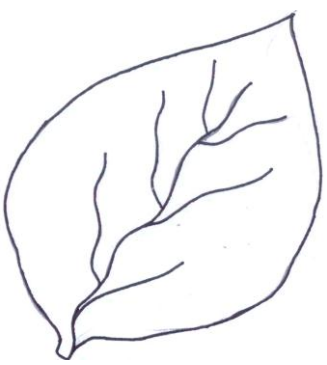
Characteristic 2. Tree height

		
Small	**Medium**	**Large**

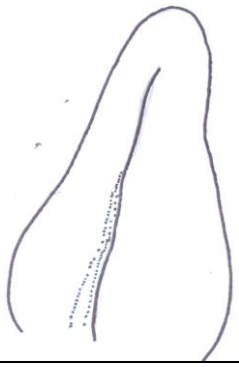
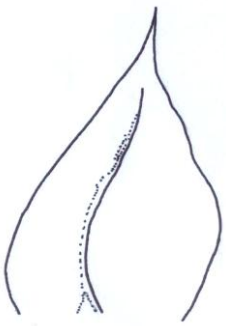
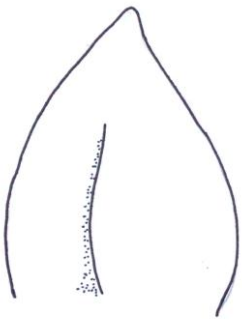
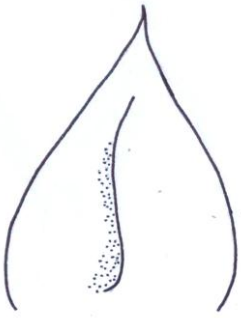
Characteristic 5. Inter node length

		
< 8cm	**8-10 cm**	**>10 cm**

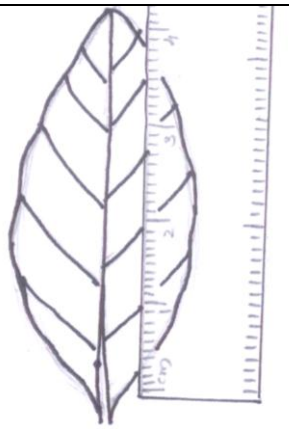
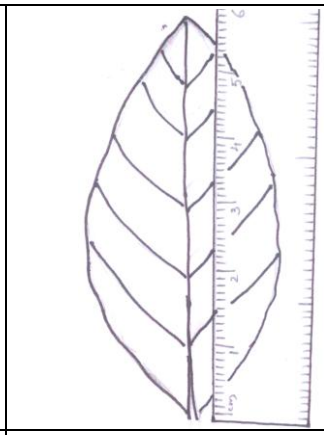
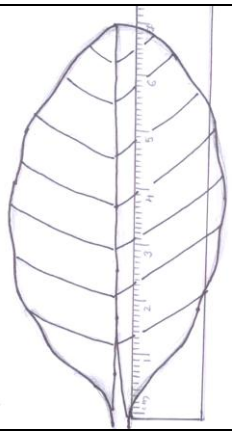
Characteristic 6. Leaf Shape

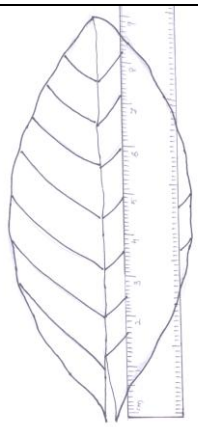
			
Elliptic	**Lanceolate**	**Ovate**	**Oval**

Characteristic 7. Leaf Apex Shape

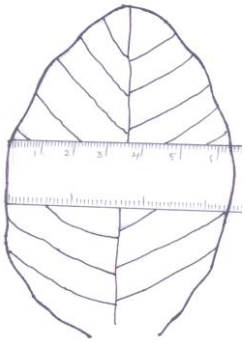
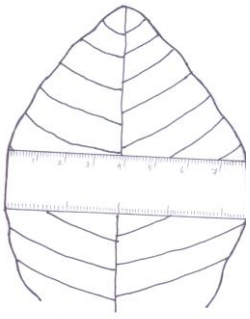
			
Obtuse	**Acuminate**	**Acute**	**Cuspidate**

Characteristic 9. Leaf length (cm)

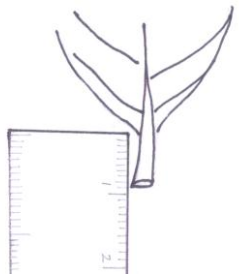
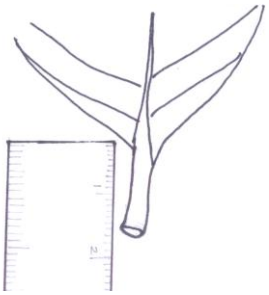
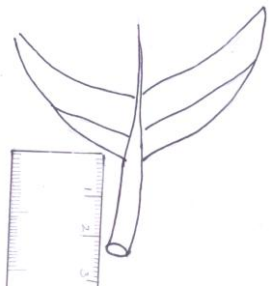
		
Very short	**Short**	**Medium**


Large

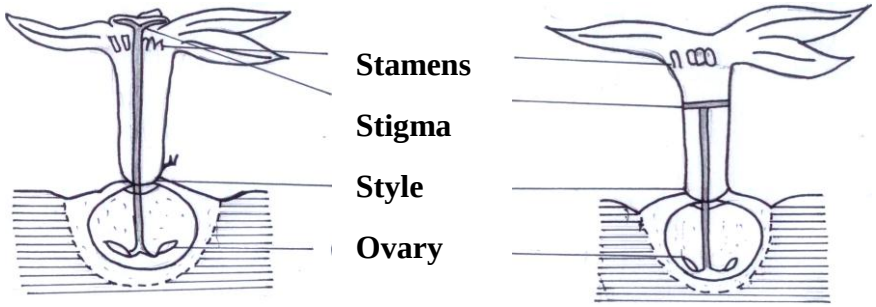
Characteristic 10. Leaf width

		
Narrow	**Medium**	**Broad**

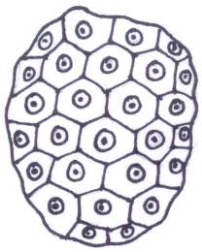
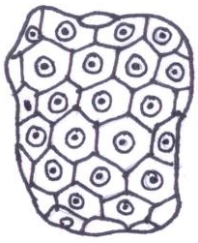
Characteristic 11. Leaf petiole length (cm)

		
Short	**Medium**	**Large**

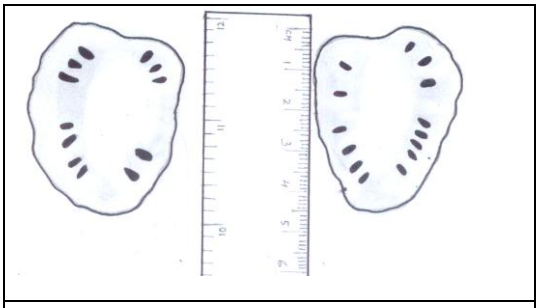
Characteristic 14. Position of stigma in relation to anther



Characteristic 18. Fruit surface texture

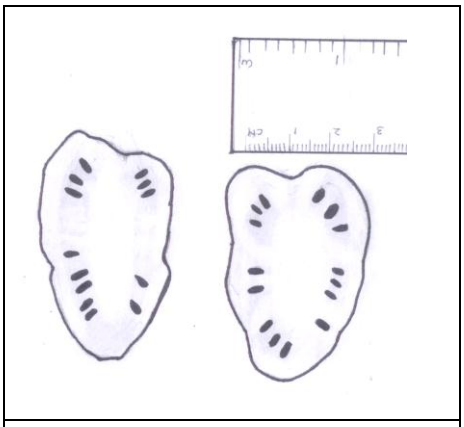
			
Obovate Elongate	**Obovate Wide**	**Round**	**Irregular**

Characteristic 20. Fruit length (cm)



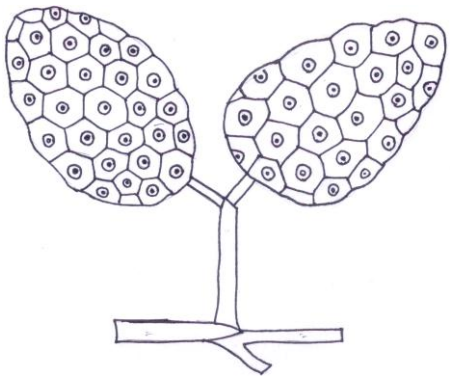
Fruit Length

Characteristic 21. Fruit width

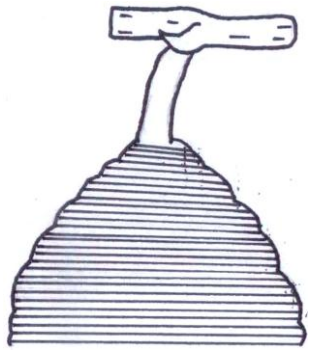
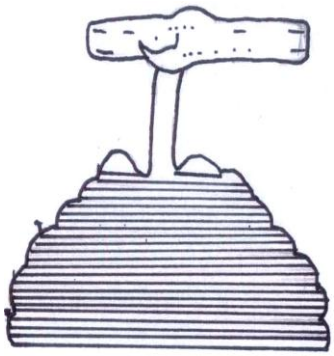
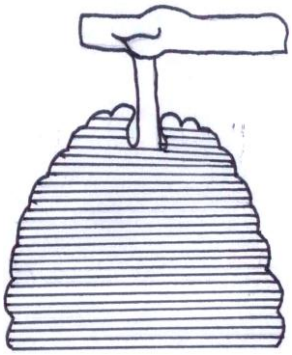


Fruit Width

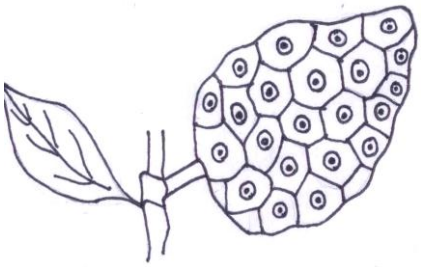
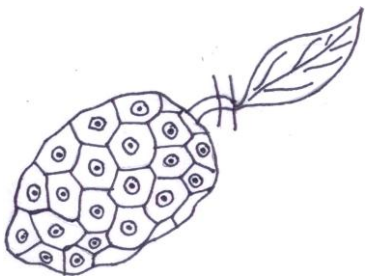
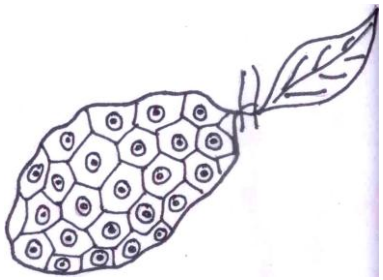
Characteristic 24. Fruit bunching



Characteristic 25. Fruit base shape on mature fruit

		
Cordate	**Tapering**	**Strongly Depressed**

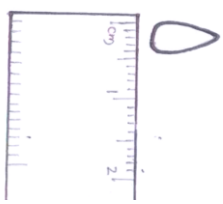
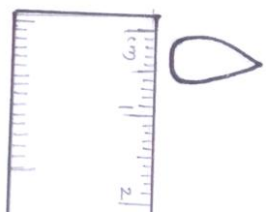
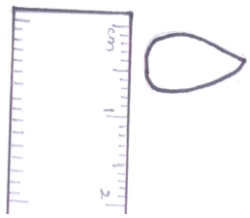
Characteristic 27. Peduncle (fruit stalk) length positioning at maturity

		
Conspicuous erect	**Small Drooping**	**Sessile**

Characteristic 32. Seed length

		
Short	**Medium**	**Large**

Characteristic 33. Seed width

		
Narrow	**Medium**	**Broad**

IX. DUS TESTING CENTRE

1. Central Island Agricultural Research Institute, Port Blair, Andaman & Nicobar Islands.
2. National Research Center on Noni, World Noni Research Foundation, Chennai

X. LIST OF REFERENCE AND EXAMPLE VARIETIES

1. CARI-TRA-1 (CARI Noni Samridhi)
2. CARI-HD-6 (CARI Sampada)
3. TRA-2 (CARI Noni Sanjivini)
4. CARI- Noni Saline-1 (CARI- Rakshak)

XII. ANNEXURES

Working Group

The Test Guidelines developed by the Task Force (4/14) constituted by the PPV&FR Authority

The Members of the Task Force (4/14)

1.	Dr. Kirti Singh, Chairman World Noni research Foundation, Chennai	Chairman
2.	Dr. P. Rethinam Former Executive Director, APCC. Coimbatore (TN)	Member
3.	Dr. Anurudh K .Singh Former Head of the Conservation Division NBPGR, New Delhi	Member
4.	Dr. T. Marimuthu Additional director & Member Secretary, World Noni research Foundation, Chennai	Member

5.	Dr. D.R. Singh, Director, National Research Centre for Orchids, ICAR, Pakyong- 737106 (Sikkim)	Member & Nodal Officer
6.	Dr. Ravi Prakash, Secretary, Registrar, PPV&FR Authority, New Delhi	Member Secretary
7.	Dr. V.A. Parthasarthy Ex-Director, IISR, Calicut	Special Invitee
8.	Dr. P.N. Mathur Regional Director India Bioversity International Sub-regional office for South Asia, G-1 Block, NASC Complex, DPS Marg, New Delhi - 110012	Special Invitee

Nodal Officer

Dr. I. Jaisankar
Scientist (Forestry), Horticulture & Forestry Division
CIARI, Port Blair

1. **Signature of the Principal Investigator……**

2. **Signature of the Co- Investigator- 1……**