

A descriptor list for morphological characterisation of Noni (*Morinda citrifolia* L)

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SUMMARY

The descriptor list presented here is intended for assessing genetic diversity based on morphological variation and for cultivar identification in noni, *Morinda citrifolia* (L.): Rubiaceae (syns. *M. bracteata* Roxb., *M. citrifolia* var. *bracteata* (Roxb.) Hook f.; *M. indica* L.). This work examined the three botanical varieties viz. *M. citrifolia* var. *citrifolia*; *M. citrifolia* var. *bracteata*; and *M. citrifolia* var. *potteri* as sub-populations of one polymorphic species, *M. citrifolia*, which have fixed unique traits over time and space. The descriptor list comprises of 49 polymorphic descriptor states consisting of 19 vegetative, 9 floral, 15 fruit, and 6 seed traits. It was derived from assessments based on a limited sample (ca. 39 landraces), particularly for vars *bracteata* and *potteri*, and is intended to set a baseline for future improvements.

1 MORPHOLOGICAL

DESCRIPTOR LIST FOR NONI, *M. CITRIFOLIA*.

1.0 VEGETATIVE CHARACTERS

1.1 PLANT HEIGHT [M]

Measured from ground level to first pair of primary branch.

1.2 CROWN DIAMETER ?[M].

1.3 PLANT SHAPE (FIGURE 1).

- 1 Ellipsoid
- 2 Conical
- 3 Irregular
- 4 Spherical
- 5 Cylindrical
- 99 Others (specify)

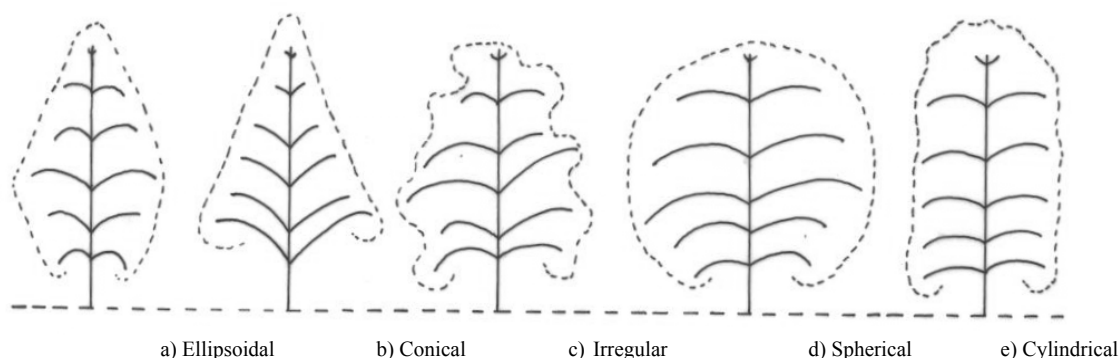


Figure 1. Plant shape (Descriptor list code: 1.1)

1.4 PRESENCE OF ORTHOTROPIC SHOOT.

- 0 Absent
- 1 Present

1.5 TRUNK DIAMETER [CM].

Measure at 20 cm from ground level.

1.6 YOUNG SHOOT PIGMENTATION.

Observe second or third internode from the terminal bud.

- 1 Green
- 2 Red
- 3 Pink

A

99 Others (specify)

1.7 GROWTH HABIT OF PRIMARY

Observe from fourth node on the third or fourth pair of primary branches.

- 1 Erect [$\leq 45^\circ$]
- 2 Semi-erect [$> 45^\circ \leq 90^\circ$]
- 3 Drooping [$> 90^\circ$]
- 99 Others (specify)

1.8 INTERPETIOLAR STIPULE APEX SHAPE ON LATERAL SHOOT (FIGURE 2)

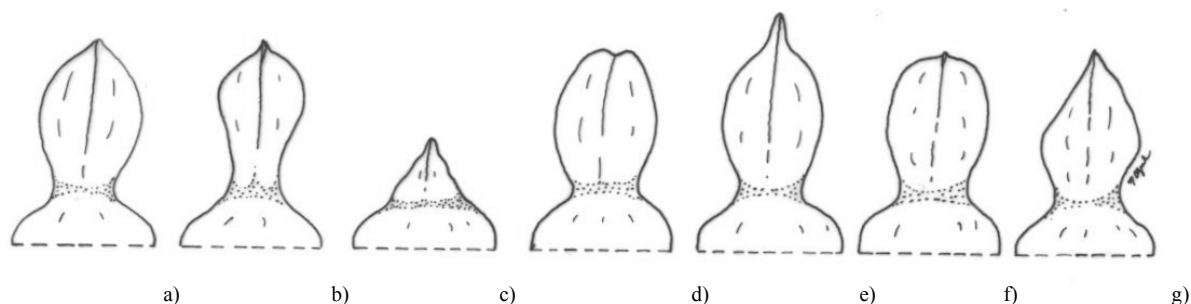


Figure 2. Interpetiolar stipule apex: a) mucronate (broad), b) mucronate (narrow), c) acute (short), d) retuse, e) cuspidate, f) obtuse, and g) acute (long) (Descriptor list code: 1.8).

Observe second or third node.

- 1 Mucronate (broad)
- 2 Mucronate (narrow)
- 3 Acute (short)
- 4 Acute (long)
- 5 Retuse
- 6 Cuspidate
- 7 Obtuse
- 99 Others (specify)

1.9 STIPULE COLOUR ON LATERAL SHOOT.

Observe second or third node.

- 1 Green
- 2 Light green
- 3 Dark green
- 4 Pale green
- 5 Reddish green
- 99 Others (specify)

1.10 INTERNODE LENGTH [CM].

Measure four internodes from five randomly selected mature branches, and record the average.

1.11 LEAF LENGTH [CM].

Measure from petiole insertion to leaf apex. Record the average of five randomly selected matured leaves from third node from the lateral shoot.

1.12 LEAF WIDTH [CM].

Mean of five leaves measured at the widest point

1.13 LEAF PETIOLE LENGTH [CM].

Mean of five leaves measured from petiole base to lamina insertion.

1.14 LEAF PETIOLE COLOUR.

- 1 Light green

- 2 Whitish green
- 3 Reddish green
- 99 Others (specify)

1.15 YOUNG SHOOT (FOLIAGE) COLOUR.

- 1 Green
- 2 Light green
- 99 Others (specify)

1.16 LEAF LAMINA COLOUR.

- 1 Green
- 2 Light green
- 3 Dark green
- 4 White-green variegation
- 99 Others (specify)

1.17 LEAF GLOSSINESS.

- 0 Not glossy
- 1 Semi-glossy
- 2 Glossy

1.18 LEAF APEX SHAPE.

- 1 Acute
- 2 Acuminate
- 99 Others (specify)

1.19 NUMBER OF LATERAL VEINS OF LEAF.

Count from the right side of the leaf upper side?

- 1 6 – 8
- 2 9

2 FLORAL CHARACTERS

Make all observations (visual, count, measurement) from minimum of five florets and record the average (Figure 3).

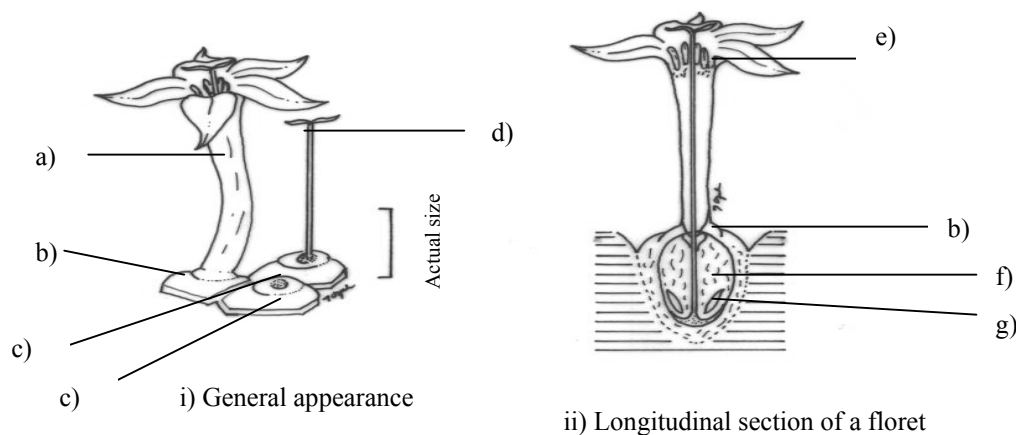


Figure 3. Floral characters: a) normal floret, b) rudimentary floral bract, c) floral eye, scar left by the corolla tube and style, d) pistillate floret with exposed pistil, e) stamen, f) placenta, and g) ovule.

2.1 NUMBER OF COROLLA LOBES PER FLORET.

- 1 Five
- 2 Six
- 3 Both

2.2 LENGTH OF FILAMENT.

- 1 Inconspicuous or sessile
- 2 Conspicuous

2.3 HETEROSTYLY.

- 1 Stigma is positioned above anthers
- 2 Stigma is positioned at same level as anthers
- 3 Stigma is positioned below anthers

2.4 ANTHOR NUMBER PER FLORET.

- 1 Five
- 2 Six
- 3 Both

2.5 Corolla tube length [cm].
Measure from base to sinus.

2.6 STYLE LENGTH [CM].

2.7 NUMBER OF FULLY OPENED FLORETS ON FLOWERING HEADS AT ONE TIME.

- 1 One
- 2 Two
- 3 Three or more than three

2.8 PRESENCE OF PISTILLATE FLORETS (FIGURE 3).

- 0 Absent
- 1 Present

2.9 OCCURRENCE OF FLORAL BRACTS (FIGURE 4).

- 1 Rudimentary
- 2 Single floret
- 3 Two to three florets
- 4 More than three florets
- 99 Others (specify)

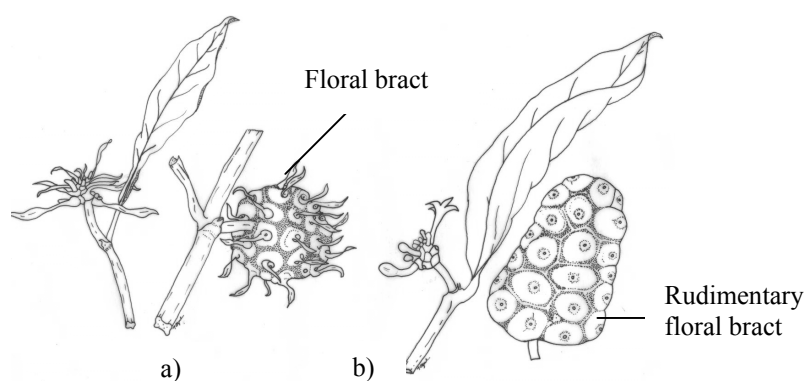


Figure 4. Inflorescences and fruits: a) variety *bracteata*, , showing floral bracts, and b) variety *citrifolia*, with rudimentary bracts.

3 FRUIT CHARACTERS

Make all observations (visual, measure) from minimum of five matured fruits. For all quantitative traits record the average.

3.1 FRUIT COLOUR.

- 1 Yellowish green
- 2 Whitish green
- 3 Green
- 99 Others (specify)

3.2 COLOUR OF FLORAL EYE OUTLINE

- 1 Pink

- 2 Green
- 3 Yellowish green
- 4 Whitish green
- 99 Others (specify)

3.3 FLORAL EYE POSITION RELATIVE TO BRACT OR RUDIMENTARY BRACT (FIGURE 5).

- 1 Above bract or rudimentary bract
- 2 Level with bract or rudimentary bract
- 3 Humped bract or rudimentary bract
- 4 Variable
- 99 Others (specify)

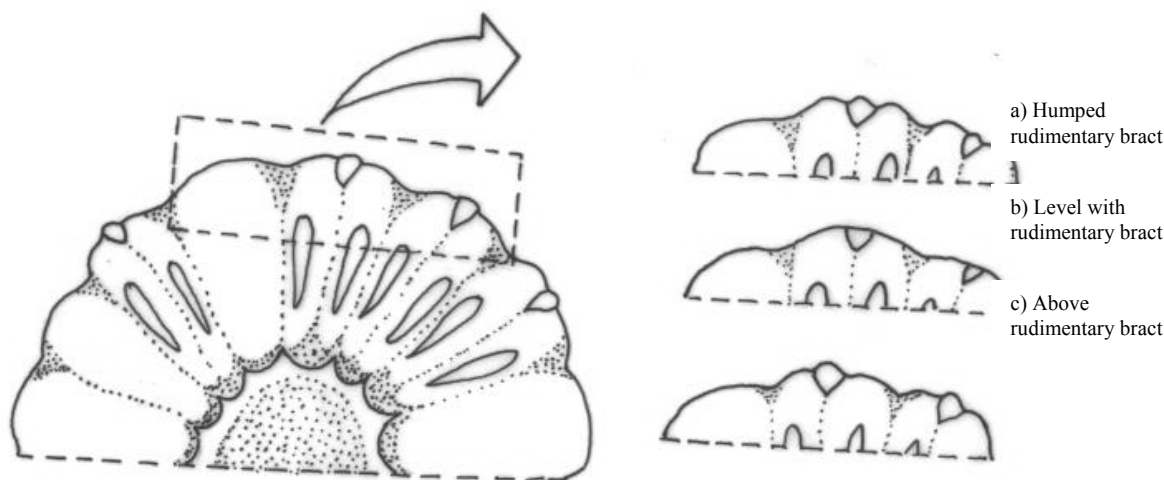


Figure 5. Floral eye position relative to bract or rudimentary bract (Descriptor list code: 3.3).

3.4 FRUIT SKIN TEXTURE.

- 1 Smooth (no cracks to few shallow cracks on fruit eyes)
- 2 Rough (cracks on almost all fruit eyes)
- 3 Very rough (deep cracks on fruit flesh and eyes)

3.5 FRUIT SHAPE.

- 1 Round
- 2 Narrowly obovate
- 3 Clavate
- 4 Obovate wide
- 99 Others (specify)

3.6 PRESENCE OF PARTHENOCARPCIC FLORETS

- 0 Absent
- 1 1 to 5 florets
- 2 More than 5

3.7 FRUIT LENGTH [CM].

3.8 FRUIT WIDTH [CM].

3.9 FRUIT WEIGHT [G].

3.10 PEDUNCLE POSITIONING AT FLOWERING (FIGURE 6).

- 1 Sessile or inconspicuous
- 2 Conspicuous erect
- 3 Conspicuous drooping
- 99 Others (specify)

3.11 PEDUNCLE POSITIONING AT MATURITY (FIGURE 6).

- 1 Sessile or inconspicuous
- 2 Conspicuous erect
- 3 Conspicuous drooping
- 99 Others (specify)

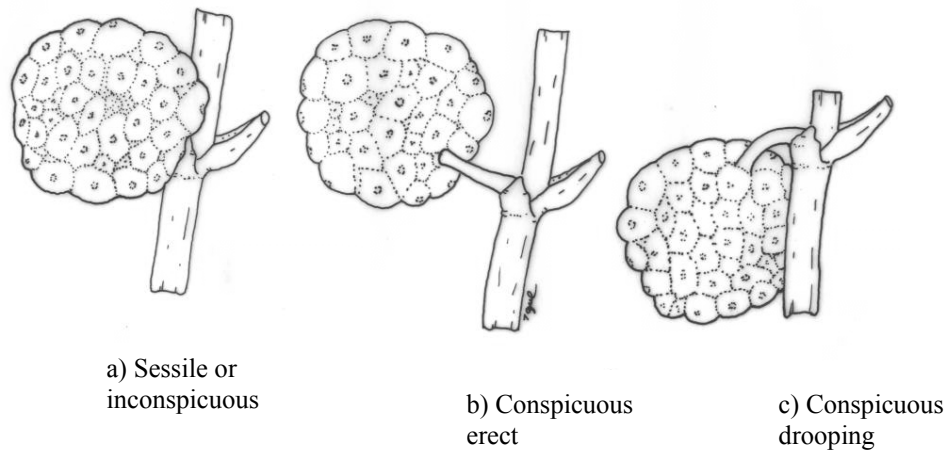


Figure 6. Position of the peduncle (Descriptor list code: 3.10 and 3.11).

3.12 FRUIT BUNCHING (FIGURE 7).

- 0 Absent
1 Present

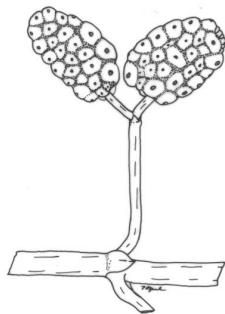


Figure 7. Fruit bunching (Descriptor list code: 3.12).

3.13 FRUIT BRANCHING (FIGURE 8)

- 0 Absent
1 Present

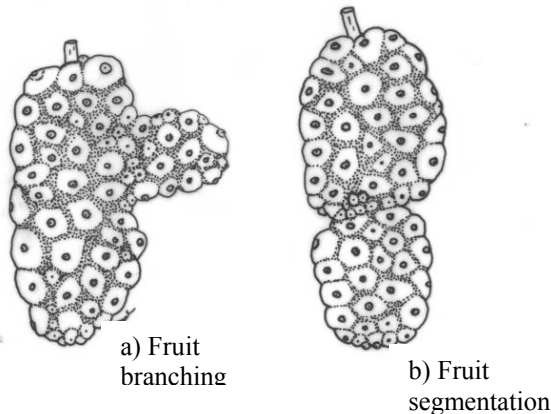


Figure 8. Fruit branching and segmentation (Descriptor list code: 3.13 and 3.14).

3.14 FRUIT SEGMENTATION (FIGURE 8).

- 0 Absent
1 Present

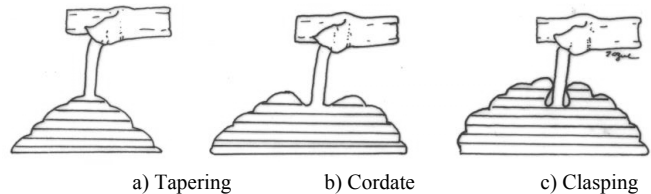


Figure 9. Fruit base shape (Descriptor list code: 3.15).

3.15 FRUIT BASE SHAPE ON MATURE FRUIT (FIGURE 9).

- 1 Broadly acute
2 Depressed
3 Strongly depressed (or clasping)
99 Others (specify)

4 SEED CHARACTERS

Make all observations (qualitative/quantitative) from a minimum of twenty fresh seeds (Figure 10) extracted from fully ripen fruits. Use light microscope to enhance qualitative observations. For all quantitative traits record the average

4.1 AVERAGE NUMBER OF SEEDS PER FRUIT

4.2 SEED LENGTH [CM].

4.3 SEED WIDTH [CM].

Measure at widest part on same specimen in 4.1.

4.4 SEED THICKNESS [MM].

Measure at thickest part on same specimen of 4.1.

4.5 SEED COLOUR.

- 1 Black
2 Brown
3 Reddish brown
4 Dark brown
5 Silver brown
99 Others (specify)

4.6 PRESENCE OF PULP PLATES ON SEED COAT.

- 0 Absent

1 Only on air sac

2 Only on embryo sac

3 Between spine and air sac
- 4 On both air sac and embryo sac

5 On air sac, embryo sac and between spine and air sac

99 Others (specify)

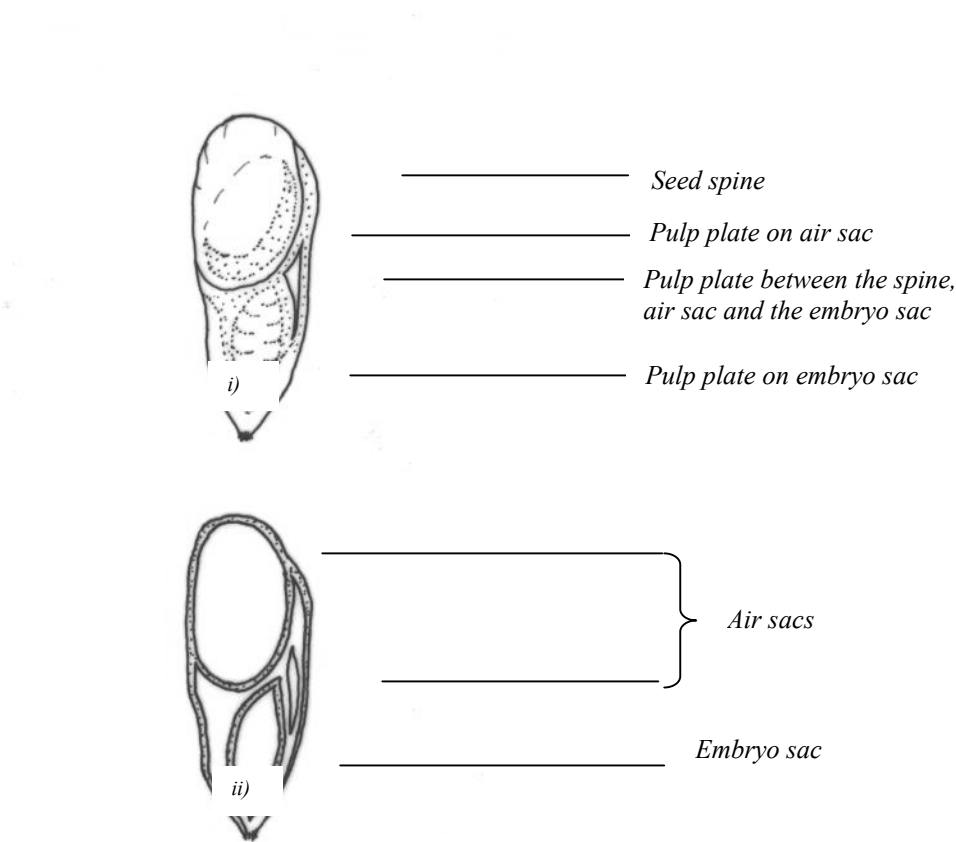


Figure 10. Seed characters: i) External features, and ii) a longitudinal section of a generalized noni seed.

5 ACKNOWLEDGEMENT

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REFERENCES

Waki, J. 2005. Morphological variation among noni (*Morinda citrifolia*) landraces in Morobe Province, Papua New Guinea. Unpublished Postgraduate Diploma thesis. Agriculture Department, PNG University of Technology, Lae, Papua New Guinea.